MARYLAND
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SURVEY

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VOLUME SIX

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Also with the coöperation of several members of the scientific bureaus of the National Government.

LETTER OF TRANSMITTAL

To His Excellency EDWIN WARFIELD,

Governor of Maryland and President of the Geological Survey Commission.

Sir:—I have the honor to present herewith the sixth volume of the general reports of the Maryland Geological Survey. The several articles contain information of value regarding a variety of subjects which I feel confident will prove of assistance in the development of the State's resources. The elaborate report on the physical features of the State is a careful summary of the physiography, geology, mineral resources, soils, climate, hydrography, terrestrial magnetism, and forestry of Maryland, and should prove of great interest and value to the citizens of the State. I am,

Very respectfully,

WM. BULLOCK CLARK,

State Geologist.

JOHNS HOPKINS UNIVERSITY,

BALTIMORE, *December 30, 1906.*

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ILLUSTRATIONS

PREFACE

The present volume, which forms the sixth in the series of general reports, is largely devoted to economic subjects. Each of the parts constituting the volume has been issued separately at different times, the exact date of which will be indicated in subsequent paragraphs.

The *Physical Features of Maryland,* by Wm. Bullock Clark and Edward B. Mathews, with the collaboration of other specialists, forms Part I of the volume and embraces a detailed account of the Physiography, Geology, Mineral Resources, Agricultural Soils, Climate, Hydrography, Terrestrial Magnetism, and Forestry, with illustrations of the type fossils which characterize the several geological horizons in Maryland. Prepared originally at the request of the Maryland Commissioners to the Louisiana Purchase Exposition to meet the demands for authoritative information regarding the State and to answer in detail the many inquiries resulting from the exhibit in the Mines Building at St. Louis, it puts in written and permanent form the latest information regarding the various Physical Features of the State and supplies a need which has long existed for just such a comprehensive and reliable treatment. This paper was first published separately in May, 1906. A new geological and agricultural soil map of the State which has been prepared to accompany this report will be found in the pocket at the end of the volume.

The *Exhibits of Maryland Mineral Resources made by the Maryland Geological Survey at Buffalo, Charleston, St. Louis, and Annapolis,* by Wm. Bullock Clark, comprises a brief account of the collections representing the Mineral Resources of the State which were exhibited at these three expositions and subsequently deposited at Annapolis, and forms Part II of the volume. The quality of the work of the State Survey is well shown by the large number of gold medals and other awards which these exhibits have received. The installation of these various collections in a permanent form in the old Hall of Delegates at Annapolis is described in detail. This report was published separately in May, 1906.

The *Fourth Report on The Highways of Maryland,* with especial reference to the operations of the Highway Division from January first, 1904, to May first, 1905, by A. N. Johnson, forms Part III of the volume. The various activities of the Highway Division during this period are described. Work was carried on in various parts of the State, various detailed surveys were made, and a large amount of testing was also done in the laboratory. The State Aid Road Law which was approved in 1904 is described, together with the methods of application for aid, the allotment by counties, and other provisions of this law. This report was published separately in May, 1906.

The *First Report on State Highway Construction,* by Walter Wilson Crosby, forms Part IV of the volume and discusses, in detail, the operations from May first, 1905, to the close of that year. Petitions for improvement were received from eighteen of the twenty-three counties of the State. Thirty-five contracts in fourteen counties provided for the improvement of over 40 miles of roads, of which about one-half was finished by the close of the year. A valuable feature of this report is the general discussion of what constitutes a good road, the various types of good roads, and what they ought to cost. The methods of construction in Maryland are described, and it is shown that State Aid roads not only serve for the training of the local authorities in modern road building, but also as models, so that the standard of road construction is raised in every part of the State. This report was published separately in May, 1906.

The *Counties of Maryland, Their Origin, Boundaries, and Election Districts,* by Edward B. Mathews, forms Part V of the volume and constitutes a valuable historical discussion of the methods and circumstances of the origin of the different counties of Maryland, an account of their boundaries, and their division into election districts. A series of maps graphically supplements the text. A feature of importance to students is a summary at the end of the discussion of each county of the enactments which affected its territory. These are arranged chronologically and consist of quotations from the original records, often inaccessible and always difficult to find.

The illustrations employed in this volume have been secured through various channels. Most of them have been made by members of the State Geological Survey, while others have been secured from private sources.

The Survey is especially indebted to the Director of the U. S. Geological Survey, who through his Chiefs of Division has co-operated at nearly all points with the State Survey. The Survey is also under obligation to a number of paleontologists, including Dr. Charles D. Walcott, Professor Charles Schuchert, Dr. J. M. Clarke, Dr. George H. Girty, Mr. David White, Dr. E. O. Ulrich, and Dr. Stuart Weller, for aid in completing the series of illustrations of the characteristic fossils of Maryland formations.

PART I

REPORT ON THE PHYSICAL FEATURES OF MARYLAND

EMBRACING AN ACCOUNT OF THE

PHYSIOGRAPHY, GEOLOGY, MINERAL RESOURCES, AGRICULTURAL SOILS, CLIMATE, HYDROGRAPHY, TERRESTRIAL MAGNETISM, AND FORESTRY

AND ACCOMPANIED BY

A NEW GEOLOGICAL AND AGRICULTURAL SOIL MAP OF THE STATE

BY

WM. BULLOCK CLARK AND EDWARD B. MATHEWS

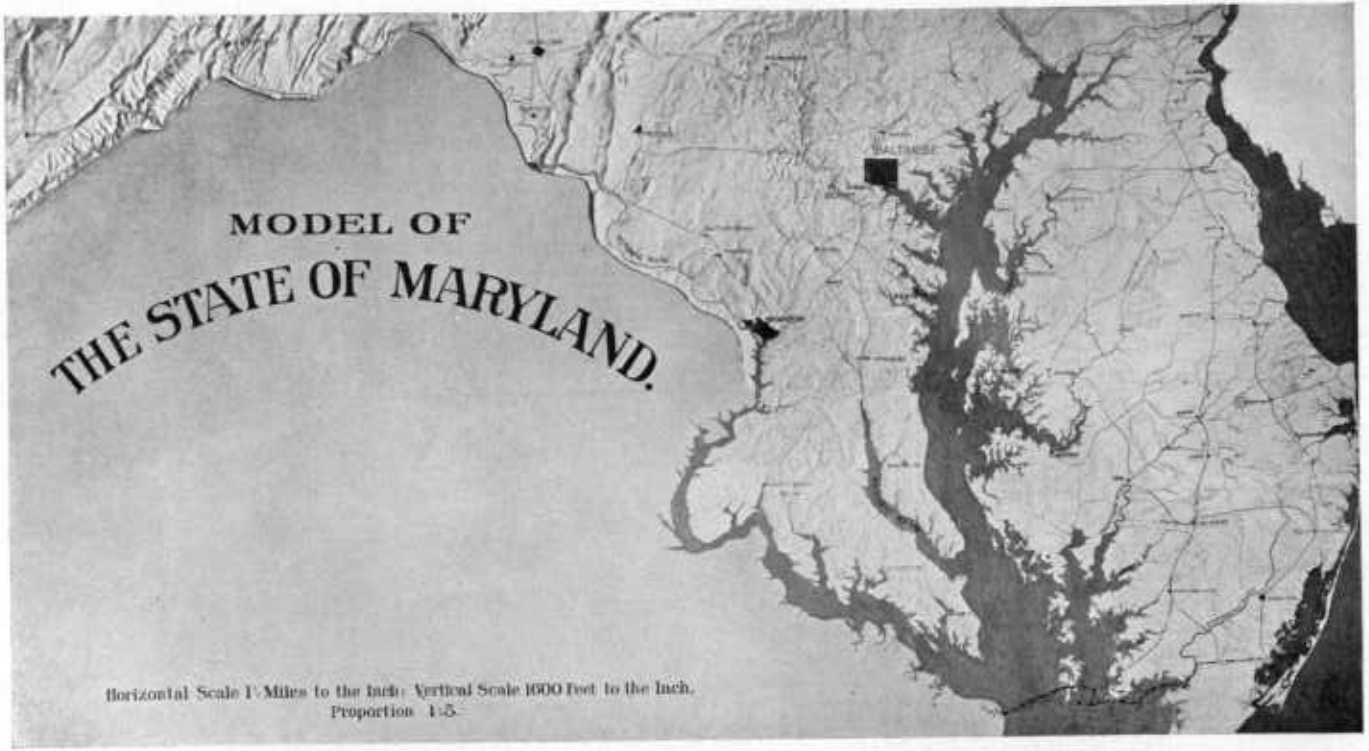
WITH THE COLLABORATION OF

GEO. B. SHATTUCK, CHAS. K. SWARTZ, J. A. BONSTEEL, CLEVELAND ABBE, JR., O. L. FASSIG, L. A. BAUER, F. H. NEWELL, AND W. D. STERRETT

NOTE

This contribution to The Physical Features of Maryland was prepared by the Maryland Geological Survey at the request of the Maryland Commissioners to the Louisiana Purchase Exposition to meet the demands for authoritative information regarding the State and to answer in detail the many inquiries resulting from the exhibit in the Mines Building at St. Louis. It puts in written and permanent form the records of that exhibit and will supply a need that has long existed.

The chapters entitled Introduction, History of Investigation regarding the Physical Features of the State, Physiography, Geology and Mineral Resources were written by Wm. Bullock Clark and Edward B. Mathews with the assistance of George B. Shattuck, Charles K. Swartz, Cleveland Abbe, Jr., and others of the Maryland Geological Survey. The chapter on Agricultural Soils was prepared by J. A. Bonsteel of the U. S. Bureau of Soils; that on Climate by Oliver L. Fassig of the U. S. Weather Bureau; that on Hydrography by F. H. Newell of the Hydrographic Division of the U. S. Geological Survey; that on Terrestrial Magnetism by L. A. Bauer of the U. S. Coast and Geodetic Survey; and that on Forestry by W. D. Sterrett of the U. S. Forest Service.



VIEW OF MODEL OF THE STATE OF MARYLAND.

THE PHYSICAL FEATURES OF MARYLAND

EMBRACING AN ACCOUNT OF THE PHYSIOGRAPHY GEOLOGY, MINERAL RESOURCES, AGRICULTURAL SOILS, CLIMATE, HYDROGRAPHY, TERRESTRIAL MAGNETISM AND FORESTRY

BY

WM. BULLOCK CLARK AND EDWARD B. MATHEWS

WITH THE COLLABORATION OF OTHERS

INTRODUCTION.

LOCATION.—The State of Maryland, lying midway between the North and South, and stretching from the Atlantic Ocean to the crest of the Alleghanies, with the great estuary of the Chesapeake Bay and its tributaries extending far into the land in all directions, possesses many natural advantages in location over neighboring commonwealths. There is probably no state of equal size in the Union that has such a variety in its agricultural and mineral resources and in its sea and bay products, while its generally salubrious climate renders every section healthful as a place of residence. From its eastern to its western borders may be found a succession of districts suitable from their surroundings for the most diverse employments.

The State of Maryland is the most northern of the Southern States, and is situated between the parallels 37°53′ and 39°44′ north latitude and the meridians 75°4′ and 79°30′ west longitude, the exact position of the western boundary being still undetermined.

BOUNDARIES.—The boundaries of Maryland are based upon both arbitrary locations and geographic features. Different interpretations of the descriptions of the limits of the early grants, such as "the land hitherto unsettled," and "the first fountain of the Potomac," led to

disputes, some of which are still open. The northern, as well as parts of the eastern, southern, and western boundaries are conventional lines of which the best known is the "Mason and Dixon Line."

The *eastern* and *northern* boundaries of Maryland consist of the Atlantic Ocean and a line separating the former possessions of the Penns, now the states of Pennsylvania and Delaware, from those of the Lords Baltimore. From the original settlements of the country until 1760 when the courts interpreted the manner of carrying out the Agreement of 1732, these boundaries were in dispute. According to this agreement the boundary line was to run due west from "Cape Henlopen" (Fenwicks Island, fifteen miles south of the point now known as Cape Henlopen) to a point midway between the Chesapeake and the Atlantic. From this "middle point" the line was to run northerly tangent to a circle of twelve miles radius whose center was at Newcastle, Delaware. From the "tangent point," where the tangent line touched the circle, the boundary was to follow the circle to a point due north of the tangent point. From this point the line was to run due north to the northeast corner of the State, which was to be on the parallel of latitude, fifteen miles south of the southernmost part of Philadelphia as it was at the time of the legal decision in 1760. From this northeast corner the boundary was to extend due west to the western limits of the State.

The causes leading to such a complicated line are intimately related to the history of the early settlements in the three states affected. The original grants to Lord Baltimore in 1632 seem to include territory which was subsequently granted to William Penn and a smaller area settled by the Swedes and Dutch and subsequently granted to the Duke of York. The latter gave rise to the circular boundary about Newcastle, the former to the compromise lines suggested by the English Government in 1683 and subsequently settled by the Agreement of 1732. Attempts had been made by local surveyors to run the lines during the decade preceding the assignment of the work in 1763 to Charles Mason and Jeremiah Dixon, noted English astronomers and mathematicians, but the difficulties of running such peculiar lines through unbroken forests had been too great for the colonial surveyors with their crude

instruments. When Messrs. Mason and Dixon arrived in Philadelphia, in 1763, they found that the local surveyors had already determined the "middle point" and the "tangent point" and had run a provisional line as far as the northeast corner of the State. From the time of their arrival in November 1763 until December 1767, Mason and Dixon were engaged in determining the various local points and in running and marking the northern boundary of the State, which they continued to Dunkard's Creek, some miles beyond the limits of Maryland, where they were stopped by the Indians. They also re-ran and marked the tangent line beginning at the "middle point." Along the greater portion of the lines surveyed by them each mile was marked by a stone monument (mounds of stone surrounding wooden posts were used west of Sideling Hill) which had on four out of five mile-stones the letter "P" engraved on the northen side, and the letter "M" on the southern side, while at each fifth mile was a stone of the same size, known as a "crown-stone," with the coat-of-arms of the Penns cut on the northern face and with that of Lord Baltimore on the southern. These stones came from the quarries on the Isle of Portland in England. Some of the original monuments remained in good condition but many had become dilapidated or had been removed when the legislatures of Maryland and Pennsylvania made provision in 1900 for the relocating and remarking of the line. The work was completed in 1904 by a Commission composed of representatives of the States of Maryland and Pennsylvania and of the United States Government. This line, known as the Mason and Dixon Line, became famous in the great controversy preceding the Civil War as the boundary between the free and slave-holding states and has been regarded as the division line between the North and South.

The *southern* boundary, long in dispute, was permanently settled in 1874, as far as the Maryland-Virginia portion is concerned, by a board of commissioners appointed by the states of Maryland and Virginia. According to this agreement the boundary follows the low-water line on the right bank of the Potomac River to Smith's Point at its mouth, thence northeasterly across Chesapeake Bay to the southern end of Smith's Island, and thence to the middle of Tangier Sound. Here

the boundary runs south 10°30′ west, until it intersects a straight line connecting Smith's Point and Watkins' Point, and thence eastward through the center of Pocomoke Sound and Pocomoke River until it reaches the westward prolongation of the old Scarborough and Calvert line surveyed in 1668, which it follows to the Atlantic Ocean. There is still some controversy as to the exact location of some of the boundary marks, especially in Pocomoke Sound where the oyster interests of Maryland and Virginia conflict. The states of Maryland and West Virginia have not yet agreed on the western terminus of this line.

The *western* boundary of the State has not been finally settled. According to the original charter, this line was to run due north from the "first fountain" of the Potomac River. The North Branch was early regarded as the main stream but later surveys showed the South Branch to be longer than the North Branch. The "Fairfax Stone" supposed to be placed at the westernmost source of the North Branch, has been recently shown to be on a tributary of that stream. The real source is about one mile farther west, and this point has been recently marked by the State of Maryland with a monument known as the "Potomac Stone." A very crooked line run by Francis Deakins in 1787 from the Fairfax Stone is now claimed by West Virginia as the boundary line. Subsequently in 1860 a straight line was run by Lieut. N. Michler, U. S. A., from the same point. In 1897 W. McCulloh Brown and Dr. L. A. Bauer ran a straight line from the Potomac Stone. The questions at issue must be passed on by the Supreme Court of the United States.

SIZE.—The extreme width of the State from east to west is 240 miles, and the extreme length from north to south 125 miles, the latter, however, narrowing toward the west where it becomes less than two miles at Hancock. Beyond this point it again broadens, although narrowing again at Cumberland to five miles. The total area within the limits of the State is estimated at 12,210 square miles, of which 9,891 square miles are land. The remaining 2,319 square miles are water, distributed as follows: Chesapeake Bay, 1,203; Chincoteague Bay, 93; smaller estuaries and streams, 1,023 square miles.

VIEW OF THE STATE HOUSE AT ANNAPOLIS.

COUNTIES.—Maryland is divided into 23 counties and Baltimore City of which Garrett, Allegany, Washington, and the western part of Frederick comprise the mountainous region known as Western Maryland; the eastern part of Frederick, Carroll, Montgomery, Howard, Baltimore, Harford, and the western part of Cecil the Piedmont area, which is also referred to under the name of Northern-Central Maryland; Anne Arundel, Prince George's, Calvert, Charles, and St. Mary's, commonly called Southern Maryland; and the eastern part of Cecil, Kent, Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, Somerset, and Worcester, known as Eastern Maryland. Of these twenty-three counties all but seven lie upon navigable waters.

There seems to have been no consistent method adopted in erecting the several counties of the State. Some, like St. Mary's and Kent, grew

THE POPULATION OF THE STATE BY COUNTIES.

Counties	Date of Erection	State Census 1901	United States Census			Area in sq. miles	County towns
			1900	1890	1880		
Allegany	1789	58,304	53,694	41,571	38,012	440.5	Cumberland
Anne Arundel	1650	34,791	39,620	34,094	28,226	430.4	Annapolis
Baltimore	1659	88,028	90,755	72,909	83,336	646.8	Towson
Baltimore City	1729 / 1851	517,035	508,957	434,439	332,313	30.0	.....
Calvert	1654	9,963	10,223	9,860	10,538	216.8	Prince Frederick
Caroline	1726	16,792	16,248	13,903	13,766	317.4	Denton
Carroll	1838	33,651	33,860	32,376	30,992	445.3	Westminster
Cecil	1674	24,450	24,662	25,851	27,808	374.6	Elkton
Charles	1660	16,602	17,662	15,191	18,548	462.0	La Plata
Dorchester	1666	28,293	27,962	28,843	23,110	573.2	Cambridge
Frederick	1748	51,639	51,920	49,512	50,482	660.0	Frederick
Garrett	1872	17,386	17,701	14,213	12,175	681.0	Oakland
Harford	1773	28,307	28,269	28,993	28.042	439.8	Belair
Howard	1850	16,276	16,715	16,269	16,140	249.1	Ellicott City
Kent	1637	17,788	18,786	17,471	17,605	281.0	Chestertown
Montgomery	1776	29,155	30,451	27,185	24,759	517.6	Rockville
Prince George's	1695	28,325	29,898	26,080	26,451	479.6	Upper Marlboro
Queen Anne's	1706	18,568	18,364	18,461	19,257	363.4	Centerville
St. Mary's	1637	25,628	17,182	15,819	16,934	369.1	Leonardtown
Somerset	1668	16,890	25,923	24,155	21,668	328.6	Princess Anne
Talbot	1661	20,314	20,342	19,736	19,065	267.1	Easton
Washington	1776	44,491	45,138	39,782	38,561	457.3	Hagerstown
Wicomico	1867	22,908	22,852	19,930	18,016	368.9	Salisbury
Worcester	1742	20,805	20,865	19,747	19,539	491.5	Snow Hill
The State	....	1,181,691	1,188,044	1,042,390	934,943	9,891.0	Annapolis

with the development of the province and were subsequently bounded by the erection of new counties; others, like Charles and Dorchester, were erected by the ruling Lord Baltimore. Cecil County was erected by proclamation of the Governor while Washington, Montgomery, Howard, and Wicomico were established in constitutional conventions. The great majority of counties were, however, erected by Acts of Assembly. The records now extant do not show the original extent or the exact date of erection of several of the counties but it is of interest to note that eighteen out of the twenty-three counties were established before the close of the Revolutionary War and eleven of these before 1700. Baltimore City, since 1851 has not been in any county but unlike any other American city except Greater New York is a distinct division of the State.

TOTAL POPULATION AT VARIOUS PERIODS.

Year	1634	1660	1671	1701	1715	1748	1756	1760	1770
Population	200	12,000	20,000	25,000	30,000	130,000	154,188	166,523	199,827

Year	1775	1782	1790	1800	1810	1820	1830	1840
Population	225,000	254,050	319,728	341,548	380,546	407,350	447,040	470,019

Year	1850	1860	1870	1880	1890	1900
Population	583,034	687,049	780,894	934,943	1,042,390	1,188,044

The counties of Maryland, unlike those of many other states, are the ultimate units of territory and not the combination of townships. This fact together with the paucity of large towns and the agricultural character of the communities have made the counties as such of unusual importance in all political and social relations. Election districts are established in all the counties.

HISTORY.—Maryland was settled by a party of Englishmen under Leonard Calvert, who left the mother country in the "Ark and Dove"

in 1633, and finally landed near the mouth of the Potomac, on the shores of St. Mary's River, in 1634. The proprietor, Cecilius Calvert, second Baron of Baltimore, received the territory from Charles I, under a charter which allowed many liberties, including freedom from taxation by the King. In 1649 the colonists established these privileges by the "Toleration Act" which forbade discrimination on account of religious opinions. The Puritans from Virginia sought refuge in Maryland, and in 1652 even captured the State government for a period.

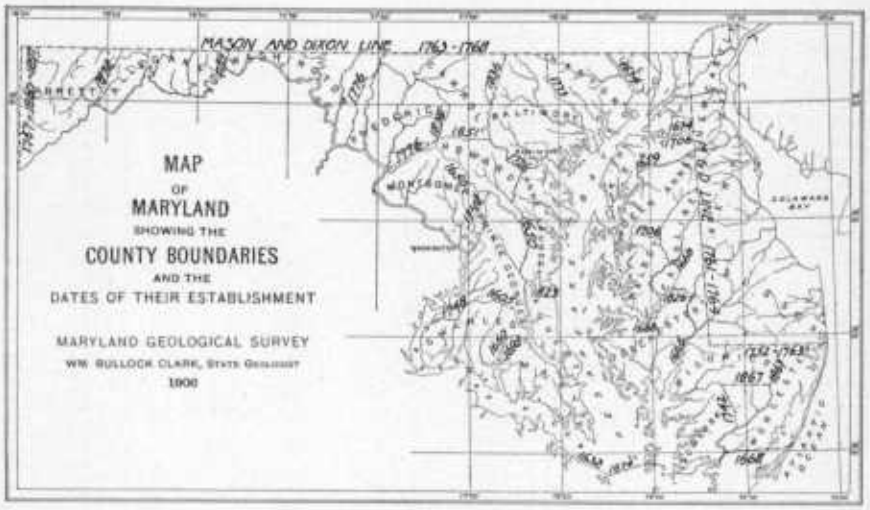


FIG. 1.—Map of Maryland showing Boundaries.

About this time the Duke of York (afterwards James II), through ignorance of the country, deeded to William Penn some of the land which had already been given to Lord Baltimore. This mistake led to a long border dispute which only ended with the location of the Mason and Dixon Line (1763-1767). In 1694 the capital of the State was moved from St. Mary's City to Annapolis.

During the Revolutionary War no important military operations took place in Maryland, although the "Maryland Line" fought with valor in many engagements, especially those of Long Island, Camden, Cowpens, Guilford, and Eutaw Springs. On December 22, 1783, Washing-

ton resigned his commission as commander-in-chief of the army in the Senate chamber at Annapolis where the Continental Congress was then in session.

During the War of 1812 several Maryland towns were pillaged by the British, but Baltimore was saved from plunder by the repulse of the enemy at North Point and Fort McHenry. It was during the bombardment of the latter place that Francis Scott Key wrote "The Star-spangled Banner."

Among the battles of the Civil War three were fought on Maryland soil, South Mountain (September 14, 1862), Sharpsburg, or Antietam (September 16-17, 1862), and Monocacy (July 9, 1864). There were also small conflicts at many points, especially along the Potomac.

In the history of the State are many incidents which have since become of national or international importance. The first wheat was shipped to Europe from Baltimore in 1771; the first regular steam-packet that crossed the Atlantic direct from the United States sailed from Baltimore in May, 1838; while the Morse telegraph line transmitted its first message ("What hath God wrought") from Baltimore to Washington, April 9, 1844. Baltimore was the first city in America to have a water company (1792), street gaslights, a railroad (1828), and an electric street railroad (1881). The city contains the first American monument to Columbus, the first official state monument to George Washington, the oldest American lodge of the Independent Order of Odd Fellows, and the oldest College of Dental Surgery.

The earliest settlers in Maryland were Englishmen, whose descendents are now scattered all over the State, and comprise the leading element in the population. Many of the early settlers in the country adjacent to Pennsylvania were of German extraction, and their descendents are to-day numerous and influential. Next in importance are the negroes who comprise one-fifth of the population and who are relatively more prominent in Charles, Calvert, and St. Mary's counties, where they compose fully one-half of the population; and least important in the western counties along the Mason and Dixon Line, where there is only one negro, on the average, to fourteen whites. In Baltimore, Cecil,

and Harford counties, the negroes comprise one-sixth of the population, while in the counties of the eastern and western shore, not previously enumerated, they form about two-fifths of the entire population. During the last twenty-five years there has been a great increase in the Polish, Hungarian, and Bohemian inhabitants, who have settled chiefly in Baltimore City.

Maryland has always been a religious center. As early as 1629 services were regularly conducted on Kent Island by an ordained minister

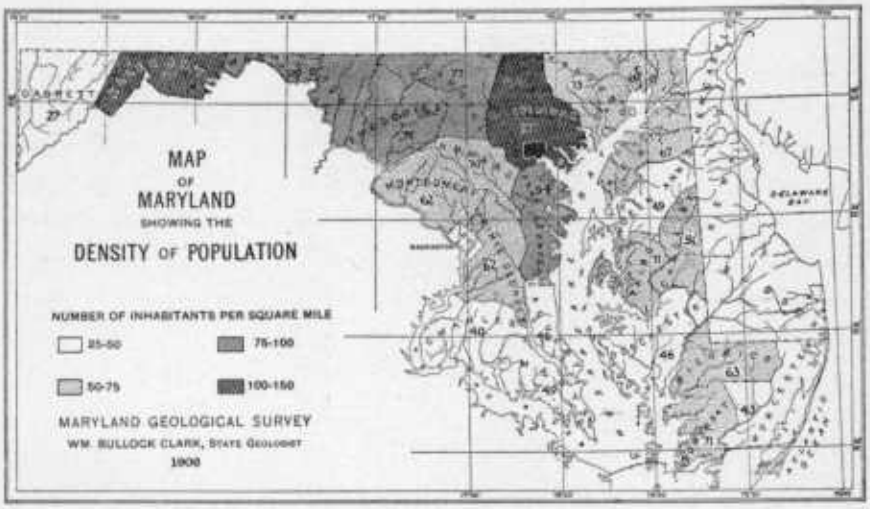


FIG. 2.—Map of Maryland showing the Density of Population by Counties.

of the Church of England. The first Presbyterian Church in America was established at Snow Hill about 1700, and in 1766 Robert Strawbridge established the first Methodist congregation in America in Carroll, then Frederick County. Many of the most prominent of the early settlers were Roman Catholics, and the See of Baltimore has held the first position in America since the decree of 1858. There are 59 denominations or sects represented in Maryland, and although many of them are scattered throughout the State they show local variations in strength, which are often closely related to the history, beliefs, and nationalities of the early settlers.

STATE GOVERNMENT.—The present government of the State of Maryland is based on a Constitution formulated and ratified in 1867. Earlier constitutions were adopted in 1776, 1851, 1864, and the constitution of 1776 was very much changed in 1837. According to the present Constitution the State is divided into 23 counties and Baltimore City, which in turn are subdivided into districts for school and election purposes. There are no units such as townships, but the local affairs of the cities, towns, and villages are carried on by officers in accordance with charters and special acts.

Among the State officials under the Constitution of 1867 are the Governor, elected for four years, and the Secretary of State, who is appointed by the Governor. The Senate and House of Delegates, which together form the General Assembly or Legislature, consist of 27 Senators elected for four years, one from each of the 23 counties and the four districts of Baltimore City, and 101 Delegates, elected for two years. Each of the legislative districts of Baltimore is entitled to six Delegates, the number allowed the largest county. The Assembly meets every other year, on the first Wednesday in January, and may remain in session only 90 days. At the call of the Governor a special session may be held, which is limited by law to 30 days.

The judicial powers of the State are vested in a Court of Appeals composed of eight judges; Circuit Court with eight chief judges, seven of whom are the judges of the Court of Appeals, and twenty-two associate judges, eight of the latter with one chief judge, who is not a member of the Court of Appeals, constituting the Supreme Bench of Baltimore City; and Orphans' Court with seventy-two judges. The Appeal and Circuit Court judges are elected for fifteen years, the judges of the Orphans' Court for four, the registrars of wills for six, and the sheriffs for two. The Attorney-General of the State and the State's Attorneys are elected for four years. Justices of the peace, constables, coroners, and notaries are appointed by the Governor.

Among other prominent State officials are the Comptroller, who is the financier for the State, and who is elected by the people for two

years; and the Treasurer, who is the banker and who is elected by the General Assembly for a two-year term.

The more important State organizations are the Board of Public Works, Militia, Fishery Force, Land Office, State Agricultural Experiment Station, State Geological Survey with its Highway Division, State Weather Service, State Horticultural Bureau, Bureau of Industrial Statistics, Immigration Bureau, Board of Education, Board of Health, Boards of Medical Examiners, Examiners of Dental Surgery, State Lunacy Commission, Live Stock Sanitary Board, and the Fish Commission.

EDUCATION.—The educational history of the State dates back to 1696, when Governor Francis Nicholson established the first public school at Annapolis, now St. John's College. The State schools were brought under the general supervision of the State Board of Education in 1864, and are now supported by State and local taxation. A State Superintendent of Schools was provided for by the General Assembly of 1900. The State schools also include a Normal School for teachers, schools for the deaf and dumb, and for the blind. Baltimore is the educational center of the State. In this city are located the Johns Hopkins University and Medical School, Maryland University, Peabody Institute, The Woman's College of Baltimore, Maryland Institute, St. Mary's Seminary, College of Physicians and Surgeons, Baltimore Medical College, Maryland College of Pharmacy, Baltimore College of Dental Surgery, and many others.

Within the limits of the State are also the Maryland Agricultural College at College Park, St. John's College at Annapolis, Washington College at Chestertown, Mt. St. Mary's College at Emmitsburg, Western Maryland College at Westminster, and many smaller institutions.

HISTORY OF INVESTIGATIONS REGARDING THE PHYSICAL FEATURES OF THE STATE.

The study of the physical features of Maryland began at a very early period and has continued almost uninterruptedly to the present day. The resources of the State early attracted attention and there was no colony more conspicuous than Maryland for its varied natural wealth and the unparalleled transportation facilities afforded by the Chesapeake Bay and its numerous estuaries.

EARLY INVESTIGATIONS.—The first account of the physical characteristics of the Maryland area is given by Captain John Smith in "The General Historie of Virginia" as the result of explorations which he made of the Chesapeake Bay and its tributaries in the year 1608. The shores of the Bay were surveyed by him as far as the Susquehanna River and the Potomac River was ascended to the falls above Georgetown. The map which Captain Smith prepared shows with remarkable correctness the outlines of the regions which he visited and was the basis of most cartographic work for the next two centuries.

An important publication entitled "A Relation of Maryland" was published in 1635 in which a description is given of the agricultural soils and the minerals observed by the first settlers. From this it is evident that bricks were made from the very settlement of the province out of the clays of the region and that the iron ore which later afforded the basis for one of the most important industries of colonial times was already observed. The marl also was used to enrich the soil and certain of the better clays were employed in the making of simple pottery.

In 1670 Augustin Herman, a Bohemian engineer, published his map of Maryland which had been prepared at the request of Lord Baltimore, and in return for which he obtained Bohemia Manor on the Eastern Shore. The map represents many portions of the country unvisited by Smith, although in many particulars it marks no advance over that of the latter.

With the increase in the number of colonists and the gradual settlement of the country, wider knowledge was gained regarding the physical features of Maryland; new industries were opened up and the older ones still further extended so that before the close of the seventeenth century Maryland became one of the most progressive of the colonies in the development of her natural resources.

During the eighteenth century the natural resources of Maryland were still further explored and many important industries established, Maryland ranking among the foremost of the colonies in the production both of iron and copper. The Assembly in 1719 passed an Act for the encouragement of the iron industry in which it is stated "that there are very great conveniences for carrying on of iron works within this province, which have not hitherto been embraced for want of proper encouragement to some first class undertakers."

One of the most important factors in the development of the iron industry was the organization in 1722 of the Principio Company, which in that year commenced the erection of a furnace in Cecil County near the mouth of Principio Creek. This company was composed of English gentlemen of wealth who were familiar with iron manufacture in the old country. At an early date in the history of this enterprise, probably 1725, Augustine and Lawrence Washington, the father and half-brother of the future President of the United States, became interested in the company, which soon outranked all others in America in the manufacture of pig and bar iron, being the proprietor of three furnaces and two forges in Maryland and one furnace in Virginia.

Many other companies were organized for the working of the iron deposits prior to the Revolution. A Baltimore company, which was incorporated in 1723, built a furnace at the mouth of Gwynn's Falls. A blast furnace in Harford County was built about 1760. In 1761 the Governor and Council of Maryland reported to the Commissioners of the Board of Trade and Plantations in England that there were eighteen furnaces and ten forges in the State, which made 2,500 tons of pig iron per year.

Just prior to the beginning of the Revolution several furnaces were

built in central Maryland, among them being the Catoctin furnace in Frederick County. Bishop says that during the Revolutionary War there were seventeen or eighteen forges in operation in Maryland in addition to the furnaces and other iron works. These furnaces and forges were built mostly on the tributaries of Chesapeake Bay. They were all of the same type, using charcoal for fuel with cold blast and applying the power of the blow-cylinder by water-wheels. Some of these furnaces, especially the Catoctin furnace, furnished guns and projectiles for the Continental army.

During these years attempts were also made to discover and develop other mineral products. In a letter from Philemon Lloyd to Lord Baltimore and co-partners in 1722 the writer speaks of the discovery of copper ore and other minerals. A report made by the Governor and Council to the Board of Trade of London in 1748 states among other things that "there are in the Province great shews of copper in many places, but of the several attempts that have been made to discover veins of that metal none has yet been made that quitted cost." It was probably shortly after this that a party of English miners opened the Liberty and Mineral Hill mines. They built a small smelting furnace on the Deer Park tract of land near the latter mine where they smelted the ores, and must have produced considerable quantities of copper, as shown by the large amount of rich slags and residue left at the furnace, which nearly a century later were hauled to Baltimore and profitably reworked. Operations at these mines ceased for a time with the opening of the Revolution.

In various letters to Lord Baltimore during the period above described, references are made to the natural resources of the State and accounts are given of the different types of rock, of the condition of the soils, and of the general character of the country, based particularly on more extended explorations of the central and western portions of the colony. Before the opening of the Revolution there was already a wide acquaintance with the broader features of the physiography and mineral products of Maryland.

The controversy regarding the northern boundary of the State which

was finally determined by the survey of Mason and Dixon, already described, also added much to the existing knowledge regarding the physical features of the State.

The years following the Revolutionary War witnessed the gradual development of the modern science of geology. At first the methods were crude, but already some years before the organization of the first survey of the State, geology had come to take a leading position among the sciences. It was only during the last decade of this period that anything like modern methods of classification and of cartographic representation of geological formations came to be generally adopted, yet during these years much was done in the elucidation of the geology of Maryland. The first observations on the geology of Maryland during this early period were made by Thomas Jefferson and published in his "Notes on Virginia" in 1782.

A contribution of much importance was made by Wm. Maclure of Philadelphia in 1809 to the American Philosophical Society entitled, "Observations on the Geology of the United States explanatory of a geological map," in which we have the first attempt at a correlation of American formations with those of Europe, the Wernerian classification being adopted.

In 1810 Dr. H. H. Hayden presented a "Mineralogical and Geological Description of the Country Surrounding Baltimore," in which an area extending about nine miles from the city and including the region of the Bare Hills, is considered; and in 1814 Robert Gilmor, Jr., published "A Descriptive Catalogue of Minerals occurring in the vicinity of Baltimore, arranged according to the distribution méthodique of Hauy," in which he enumerates forty-three minerals found within a distance of 12 miles of the city.

Dr. Hayden published in Baltimore in 1820 a most interesting volume, entitled "Geological Essays; or an Inquiry into some of the Geological Phenomena to be found in various parts of America and elsewhere," in which numerous Maryland localities are cited, especially in the vicinity of Baltimore, in support of the theories which he advanced. Among other interesting facts he mentions the finding of mastodon teeth in Maryland.

An important contribution to the stratigraphy of the Coastal Plain formations of Maryland was made by Professor John Finch in a "Geological Essay on the Tertiary Formations in America," in the American Journal of Science and Arts for 1824. This was the first attempt at a correlation of the deposits of the Coastal Plain on scientific grounds, and although thus early in the history of the subject minute comparisons, which were not justified by the facts, were made, yet the knowledge of the Maryland Tertiary formations was materially advanced. In this article Professor Finch objects to Maclure's use of the term "alluvium" and shows that the formations so called are "contemporaneous with the newer Secondary and Tertiary formations" of other parts of the world.

During the same year Thomas Say of Philadelphia presented "An Account of some of the Fossil Shells of Maryland," in which he describes and figures many new species, although he draws few geological inferences from the organic remains examined.

Another contribution of some moment is "An Account of the Examination and Surveys, with Remarks and Documents Relative to the Projected Chesapeake and Ohio, and Lake Erie Canals," which was published by James Shriver in Baltimore in 1824. This pamphlet includes remarks on the minerals and rocks of the area traversed.

In Robinson's "Catalogue of American Minerals, with their localities," published in Boston in 1825, several pages are devoted to Maryland minerals.

The publication of an article by Dr. T. A. Conrad of Philadelphia "On the Geology and Organic Remains of a part of the Peninsula of Maryland" in 1830 marks the beginning of a new epoch in the study of Maryland geology. Unlike his predecessors, Conrad from the first applied the paleontological evidence he possessed to an interpretation of the stratigraphy; and although many of his conclusions were erroneous, still the knowledge of the geology of the Coastal Plain was very materially advanced by the methods which he introduced. During this and subsequent years Conrad added largely to the knowledge of the Tertiary faunas of Maryland and Virginia.

During the same year Philip T. Tyson published his "Notice of some

Localities of Minerals in the counties of Baltimore and Harford, Md.," in the American Journal of Science and Arts. Maryland is indebted to many important contributions from his pen from this time forward.

The close of the period prior to the organizations of the First Geological Survey of Maryland found much interest developed in the study of the geology of the State and at this early day considerable knowledge had been gained regarding the geological deposits.

FIRST STATE GEOLOGICAL SURVEY, 1833-42.—The General Assembly of Maryland in 1833 passed resolutions authorizing the Governor and Council to appoint an Engineer and a Geologist, the former to report on "a plan and drawing for a complete map of Maryland," etc., and the latter on the "probable cost of a Geological Survey of the State." In connection therewith they were authorized to collect all available information and make such researches as were necessary to that end. J. H. Alexander was appointed Engineer and J. T. Ducatel, Geologist.

In 1834 "An Act to provide for making a new and complete Map and Geological Survey of this State" was passed by the General Assembly and the same men were continued as Engineer and Geologist respectively. Although the work on the State map was greatly interfered with by legislation requiring special surveys, Alexander completed about 1840 a topographical map of the State on the scale of 1:200,000 with 50-foot contour lines to the east of the Monocacy River and 100-foot contour lines to the west of that stream. Several special topographical maps had been completed prior to this time, among them one of Dorchester, Somerset, and Worcester counties on the scale of 1:211,200 with 4-foot contour lines in 1835 and published in the report of the Geologist for that year; and another of St. Mary's, Charles, and part of Prince George's counties on the scale of 1:200,000 with 10-foot contour lines, which was likewise employed by the Geologist in the same publication as a base for his geological data. The topographic work has peculiar interest to-day since it represents the first attempt of any State to carry on a topographic survey.

The geological investigations were extended over the greater portion of the State and small annual reports were issued by Ducatel until 1841,

the offices of Engineer and Geologist being abolished in February, 1842. The last report of the Geologist dealt with the important resources of the western section of the State, then just coming to be recognized for the first time. In addition to the work of the State Geologist, before described, a pamphlet was prepared in 1836 by James C. Booth upon the coal lands of a portion of the Georges Creek basin, and in the succeeding year further contributions were made by Philip T. Tyson and D. V. Douglas. Tyson also prepared at this time "A Descriptive Catalogue of the principal minerals of the State of Maryland," which was published in the Transactions of the Maryland Academy of Science and Literature.

During the latter years of the existence of the State Survey, Dr. Conrad made further contributions to the Tertiary geology and paleontology of Maryland, describing numerous fossils from the Calvert Cliffs. Correlations were also made of the Eocene deposits of Upper Marlboro, Fort Washington, and other localities.

After the organization of the Maryland Geological Survey the neighboring states of Virginia, Pennsylvania, and Delaware followed the same course, the survey of Virginia being organized in 1835 under W. B. Rogers, that of Pennsylvania in 1836 under H. D. Rogers, and that of Delaware in 1839 under J. C. Booth. The investigations carried on by these surveys along the borders of Maryland were of much importance in deciphering the geological structure of the formations of Maryland as well. The work of the Rogers brothers particularly to the north and south of Maryland had an important bearing upon the development of knowledge regarding the geology of the State of Maryland and the results of their work are still frequently employed by those seeking information regarding the geological structure of the State.

INVESTIGATIONS TO OUTBREAK OF CIVIL WAR.—After the termination of the Geological Survey little was done in the study of the geology of the State for several years. Dr. Conrad continued his study of the Maryland and Virginia Tertiary faunas. This period was also marked by a visit of Sir Charles Lyell, the eminent English geologist, to the Carboniferous area of Western Maryland, an account of which is given in his volume of travels in America published in 1845. About this time

Professor James Hall of Albany, New York, secured large collections of Silurian and Devonian fossils from the Cumberland region, many of which were figured and described in the first volume of the Paleontology of New York, published in 1847.

Important work was going on during this period in the neighboring State of Pennsylvania under H. D. Rogers the State Geologist, which was of much value in determining the classification and distribution of the geological formations of central and western Maryland. The final report of this Survey appeared in 1858 and it is still an important source of information. The Survey of Virginia under W. B. Rogers had a much shorter existence and had already terminated before the abolition of the Maryland organization.

The U. S. Coast and Geodetic Survey began its surveys in Maryland in 1844 in the vicinity of Baltimore and from that time down to the present day has with some intermissions been almost continuously engaged in work in Maryland territory.

In 1848 the State made provisions for a State Agricultural Chemist, the first incumbent of the office being Dr. James Higgins. His work possessed little of geological interest, but he was succeeded in 1858 by Mr. Philip T. Tyson, who devoted a large part of his time to geological investigations, believing as he stated in his First Report published in 1860, that " from what is now known of the origin and character of soils, we must conclude that the very foundation of any intelligent and practical application of science to agriculture in any region, must consist of a thorough investigation of its geological and mineral constitution." In this same report Tyson published the first colored geological map of the State on the scale of 12 miles to an inch, that was by far the most complete representation of Maryland's geology that had been attempted up to that time. A second report was published in 1862 in which further attention is given to the mineral resources of the State. In this latter year the office of State Agricultural Chemist was abolished.

INVESTIGATION SUBSEQUENT TO CIVIL WAR UNTIL 1880.—The Maryland Academy of Sciences was established in 1863 with Mr. Philip T. Tyson as its first president. Much interest continued to be shown by him

in the geology of the State which has been maintained by his co-worker and successor, Dr. Philip R. Uhler, who in later years frequently contributed articles regarding the mineral characteristics of the area.

The Maryland Agricultural College and Experiment Station, the former established in 1856, and greatly strengthened by Federal action in 1862 and subsequently, have in the years since the Civil War taken an active and important part in the study of the agricultural possibilities of the State.

Among the more important private contributions to the knowledge of the geology of the State during this period were those made by Dr. Conrad and his colleagues of the Philadelphia Academy of Sciences who continued their studies of the younger formations of the State, and Dr. James Hall of Albany who continued his elaborate studies of the Paleozoic fossils of the Appalachian region and who published in the Reports of the New York Geological Survey numerous figures and descriptions of Western Maryland forms.

In 1876 the U. S. Coast and Geodetic Survey made a survey of Baltimore harbor and its approaches, the General Assembly having appropriated $5000 for the purpose. In 1886-87 the earlier work was supplemented by a verification of the triangulation and its adjustment to more recent computations. Work in other sections of the State was also in progress during this period which resulted in published charts that have added much to our knowledge of the topography and hydrography of the lands and waters of the Chesapeake Bay region and its larger tributaries.

INVESTIGATIONS FROM 1880 TO ORGANIZATION OF PRESENT STATE GEOLOGICAL SURVEY.—The organization of the Johns Hopkins University in 1876 inaugurated a new period of scientific activity in Maryland that has meant much for the material advancement of the State. The authorities from the start recognized the importance of a thorough study of the physical characteristics of the region adjacent to Baltimore as well as of the State. The organization of the Chesapeake Zoological Laboratory in the summer of 1878 under the immediate charge of Dr. W. K. Brooks marked the beginning of systematic work in this

FIG. 1.—VIEW OF TALBOT TERRACE SHOWING WICOMICO ESCARPMENT, KENT CO.

FIG. 2.—VIEW OF CALVERT CLIFFS ON CHESAPEAKE BAY, CALVERT COUNTY.

VIEWS OF COASTAL PLAIN SCENERY.

direction. A close association with the Maryland Fish Commission was effected and in 1879 the laboratory was stationed at Crisfield where an excellent opportunity was afforded for the special study of the oyster beds of the Chesapeake. The results of this work were subsequently published as a report of the Maryland Fish Commission in a volume entitled "The Development of the American Oyster."

In 1880 the Baltimore Naturalist's Field Club was organized under the direction of Professor H. N. Martin of the University for the study of the fauna, flora, geology, and physical geography of the neighborhood of Baltimore. The club was founded "in order to meet the recognized want in the city of some organization for the active promotion of field work in natural history." All members of the University and residents of Baltimore of known attainments as naturalists were eligible for election to the club. An outcome of the work of the field club was the preparation in 1884 of an excursion map of Baltimore and its neighborhood by Mr. A. L. Webster, a student of the University who had formerly been a topographer of the United State Geological Survey.

The Geological Department was organized in 1883 when Dr. George H. Williams began his connection with the institution as an instructor in mineralogy. His appointment marks the beginning of a period of investigation of the geology and mineral resources of the State that has been carried on by his associates and successors continuously to the present day. It is certainly not claiming too much to say that this period is by far the most important in the study of the physical features of Maryland.

Almost from the first the members of the geological department have carried on their investigations in close co-operation with the United States Geological Survey and frequently as members of its staff. The results obtained have received wide publicity, and have greatly benefited the State.

The investigations of Dr. Williams were largely devoted to the crystalline rocks of the Piedmont Plateau lying to the north and west of Baltimore, which through his labors has become classic ground in microscopical petrography. Many articles were published by Dr.

Williams on the geology of the State from 1883 until his death in 1894.

In 1887 Dr. W. B. Clark became associated with the University as instructor of stratigraphic geology and paleontology and at once took up a study of the geological formations of the Coastal Plain district in the eastern and southern counties of the State.

The preparation of a book upon Maryland which should properly set forth its resources, industries, and institutions was intrusted in 1892 by the Board of World's Fair Commissioners to members of the faculty of the Johns Hopkins University; those portions relating to the physical features and mineral resources being prepared by Professor Williams and Professor Clark. This summary of the physiography, geology, and mineral wealth of the State was the most complete statement which had been prepared up to that time. The full volume appeared in 1893, although special portions had been published from time to time by the authors in scientific journals.

Dr. Edward B. Mathews who had been appointed instructor in mineralogy and petrography in 1894 took up the work of Professor Williams in the Piedmont Plateau, devoting his attention especially to the northern counties of the belt.

Since the year 1896 the investigations of the instructors and students of the Johns Hopkins University have been so closely identified with the work of the Maryland Geological Survey that it is not necessary to describe the researches in detail since most of the results have been published in the volumes of the Survey.

The United States Geological Survey which was organized in 1879 initiated work in Maryland in 1883. Attention was chiefly directed at the start to the preparation of a topographic map of the region as part of a plan for a map of the United States. A good deal of preliminary work was done from time to time during the next thirteen years until the organization of the Maryland Geological Survey when a systematic joint survey of the State was inaugurated, nearly all of the old maps having been since that time resurveyed.

Geological work was also carried on by the United States Geological

Survey in various portions of the State chiefly in co-operation with the instructors of the Johns Hopkins University. A number of the members of the National Survey were also engaged in the study of various problems within the State including Messrs. W J McGee and N. H. Darton in the Coastal Plain and Mr. Arthur Keith in the Catoctin and Blue Ridge district.

Hydrographic work was commenced by the United States Geological Survey in Maryland in 1891 by a study of the Potomac River. This work was still further extended in 1896 by the establishment of stations on other streams in co-operation with the Maryland State Weather Service. Since the publication of the first annual tabulation of the mineral resources of the United States in 1883, the United States Geological Survey has each year given an account of the Maryland output, its information in later years being largely based on the work of the Maryland Geological Survey which has yearly collected the statistics.

The U. S. Weather Bureau has also done much for many years in the study of the climate of the State, its Baltimore office being the headquarters of a Section Director who, in co-operation with the Maryland State Weather Service which was organized in 1892, has systematically by the means of local observers throughout the State secured daily observations regarding the temperature and rainfall as well as frequent reports regarding the condition of the crops. This information has been published at frequent intervals by the joint services, the State Bureau also issuing an elaborate monograph on the climate of the State in 1899.

INVESTIGATIONS OF PRESENT STATE GEOLOGICAL SURVEY, 1896 TO DATE.—The Maryland Geological Survey was inaugurated in 1896 by the passage of an act by the General Assembly entitled "An Act to establish a State Geological and Economic Survey, and to make provision for the preparation and publication of reports and maps to illustrate the natural resources of the State, together with the necessary investigations preparatory thereto." In 1898 and again in 1904 further acts were passed adding to the scope of the work as originally contemplated. The investigations now cover a wide variety of subjects

including topography, geology, agricultural soils, climate, hydrography, terrestrial magnetism and forestry, as well as highway engineering. Reports covering all these subjects are issued from time to time as desirable material is collected. Ten volumes and many maps have already been published.

The topographic surveying which is carried on in co-operation with the United States Geological Survey, each organization contributing an equal amount to the support of the work, has now been completed for Garrett, Allegany, Baltimore, Harford, Prince George's, Calvert, St. Mary's, Cecil, Kent, Queen Anne's, Caroline, Talbot, Dorchester, Wicomico, Somerset, and Worcester counties, while portions of the remaining counties have also been surveyed. Nearly all of this work has been done since the organization of the State Survey as the earlier maps of the United States Geological Survey have in nearly every case either been fully revised or resurveyed. Many of the old maps were on too small a scale to meet the many demands made on them and the work at best was only considered of a preliminary character.

The geological work is now completed for somewhat over one-half of the State and follows as fast as possible the preparation of the topographic base maps on which the results are platted. A number of economic reports have been published including those on the building and decorative stones, the clays, and the coals, the three leading mineral products of the State. Systematic reports are complete for the Devonian, Eocene, Miocene, Pliocene, and Pleistocene, those for the Eocene and Miocene having already been published.

The highway work which was authorized by the General Assembly in 1898 was at first in the nature of an investigation of the highway needs of the State. The existing conditions were fully investigated, the amount of traffic studied, and plans prepared to meet the present requirements for a modern system of roads. The available materials throughout the State were carefully studied with a view to their use in road construction. At the request of the county authorities, surveys for intended improvements were made and plans and specifications furnished to many of the counties. The authorities came gradually to

depend largely on the advice and help of the Survey's engineers. This work continued for six years, three biennial reports being issued during the period, until 1904 when a State Aid Highway Act was passed adding still further to the powers of the Geological Survey. Under this act $200,000 annually were appropriated by the State to meet one-half the expense of the roads built under the plans and specifications of the Highway Division of the Survey. Eighteen out of the 23 counties of the State applied the first year, the law becoming operative January 1, 1905, for aid under the act, and of these 14 went forward with the actual construction of the highways. By the terms of the act roads of a permanent nature must be built and the materials selected have been either crushed stone, gravel, or oyster shells, as the local conditions required.

The preparation of agricultural-soil maps has gone forward year by year in co-operation with the Bureau of Soils of the United States Department of Agriculture and maps have been completed for nearly one-half of the State. Measurements of the various streams have also been made by co-operation with the Hydrographic Division of the United States Geological Survey, permanent gages being maintained on all the leading water courses. Forestry studies have also been taken up in co-operation with the United States Forest Service and forestry maps have been completed for nearly one-half the State and will ultimately form the basis for progressive and intelligent forestry development. The magnetic declination has been studied for all sections of the State and north and south lines have been established at all of the county seats for the aid of the surveyors of each district. Tables of magnetic variation have been furnished the county authorities so that the metes and bounds of all land surveys can be readily verified where monuments are still extant.

An important service has been rendered by the State Geological Survey in the preparation of mineral exhibits for the Buffalo, Charleston, and St. Louis Expositions at all of which the State has received the highest praise and frequently greater recognition in this department than any other State in the country. At Buffalo the only Gold Medal

awarded to any State for its exhibits of mineral resources was obtained by Maryland; at Charleston, where a larger number of medals were awarded, Maryland obtained twice the number of Gold Medals received by any other State in this department; and at St. Louis a Grand Prize and many Gold Medals were received for the elaborate display made by this department of the State government.

In 1900 the Governor of the State appointed the State Geologist a Commissioner on behalf of the State of Maryland to take charge of the resurvey of the Mason and Dixon line. An engineer of the United States Coast and Geodetic Survey was placed in charge of the field party and this work has now been completed and will add materially to the knowledge of the topography and other physical characteristics of the area adjacent to the northern boundary of the State.

PHYSIOGRAPHY.

The State of Maryland forms a portion of the Atlantic slope which stretches from the crest of the Alleghanies to the sea, and which is divided into three more or less sharply defined regions known as the Coastal Plain, the Piedmont Plateau, and the Appalachian Region. These three districts follow the Atlantic border of the United States in three belts of varying width from New England southward to the Gulf. Maryland is, therefore, closely related in its physiographic features to the states which lie to the north and south of it, while its central location on the Atlantic border renders the Maryland section perhaps the most characteristic in this broad tract. In crossing the three districts from the ocean border the country rises at first gradually and then more rapidly until it culminates in the highlands of the western portion of the State. The particular characteristics of each district will be fully discussed in the following pages.

The physical features of a country to no inconsiderable degree determine the pursuits of its inhabitants, and these indirectly affect their social, political, and financial welfare. The residents of mountainous districts have their peculiar occupations, while those of the low lands find their employment in other ways. In regions bordering the sea or inland bodies of water still other means of livelihood are sought by the people. The character of the soil and its adaptability to particular crops become also important factors, while the underlying rocks, not only by their influence upon the conditions of life already described, but also by their inherent wealth in mineral resources, still further influence the well-being of the community. It becomes necessary, therefore, to know something of the physical features of a country, or a State, if one would understand its past history or indicate the lines of its future prosperity.

COASTAL PLAIN.

The Coastal Plain is the name applied to the low and partially submerged surface of varying width extending from Cape Cod southward through Florida and confined between the Piedmont Plateau on the west and the margin of the continental shelf on the east. The line of demarkation between the Coastal Plain and the Piedmont Plateau is sinuous and ill-defined for the one passes over into the other oftentimes with insensible topographic gradations, although the origin of the two

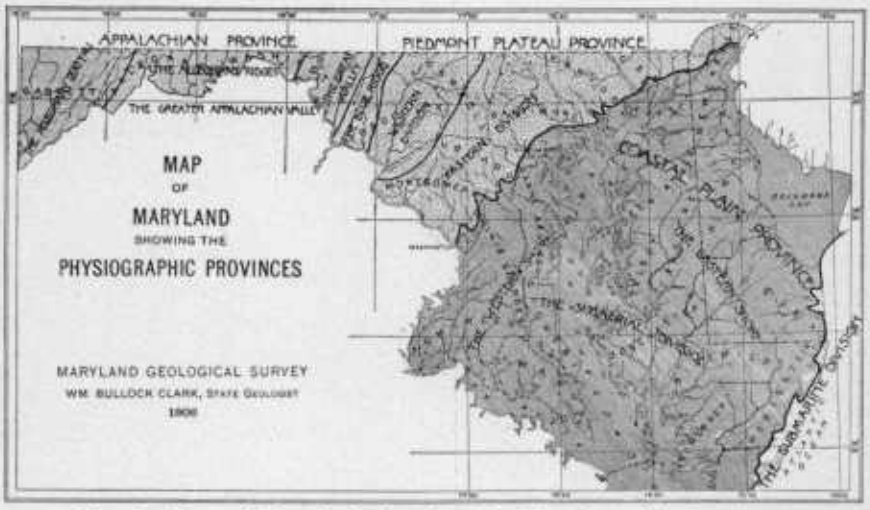


FIG. 3.—Map of Maryland showing the Physiographic Provinces.

districts is quite different. A convenient, although somewhat arbitrary, boundary between the two regions is furnished in Maryland by the Baltimore and Ohio Railroad in its extension from Wilmington southwestward through Baltimore to Washington. The eastern limit of the Coastal Plain is at the edge of the continental shelf. In the vicinity of Maryland this is located about 100 miles off shore at a depth of 100 fathoms beneath the surface of the Atlantic Ocean. It is in reality the submerged border of the North American continent which extends seaward with a gently-sloping surface to the 100 fathom line. At this point there is a rapid descent to a depth of 3000 fathoms where the continental rise gives place to the oceanic abyss.

THE DIVISIONS OF THE COASTAL PLAIN.

The Coastal Plain, therefore, falls naturally into two divisions, a submerged or *submarine division* and an emerged or *subaerial division.* The seashore is the boundary line which separates them. This line of demarkation, although apparently fixed, is in reality very changeable, for during the geologic ages which are past it has migrated back and forth across the Coastal Plain, at one time occupying a position well over on the Piedmont Plateau, and at another far out to sea. At the present time there is reason to believe that the sea is encroaching on the land by the slow subsidence of the latter, but a few generations of men is too short a period in which to measure this change.

The subaerial division is itself separable in Maryland into the Eastern Shore and the Western Shore. These terms, although first introduced to designate the land masses on either side of Chesapeake Bay, are in reality expressive of a fundamental contrast in the topography of the Coastal Plain. This difference gives rise to an Eastern Shore and a Western Shore type of topography. Chesapeake Bay and Elk River separate the two. But fragments of the Eastern Shore type are found along the margin of the Western Shore at intervals as far south as Herring Bay, and again from Point Lookout northwestward along the margin of the Potomac River. On the other hand an outlier of the Western Shore type of topography is found at Grays Hill in Cecil County at the northern margin of the Eastern Shore. The Eastern Shore type of topography consists of flat, low, and almost featureless plains, while the Western Shore is a rolling upland, attaining four times the elevation of the former and resembling the topography of the Piedmont Plateau much more than that of the typical Eastern Shore. It will be seen later that these two topographic types, which at once strike the eye of the physiographer as being distinctive features, are in reality not as simple as they first appear, but are built up of a complex system of terraces dissected by drainage lines.

The Coastal Plain of Maryland, with which most of the State of Delaware is naturally included, is separated from that of New Jersey by

the Delaware River and Delaware Bay and from that of Virginia by the Potomac River, but these drainage ways afford no barriers to the Coastal Plain topography, for the same types with their systems of terraces exist as well in New Jersey and Virginia as in Maryland.

The Chesapeake Bay which runs the length of the Coastal Plain drains both shores. From the Western Shore it receives a number of large tributaries among which may be mentioned the Northeast, Susquehanna, Bush, Gunpowder, Patapsco, Magothy, Severn, South, Patuxent, and Potomac rivers. On the Eastern Shore its principal tributaries consist of Bohemia Creek, Sassafras, Chester, Choptank, Nanticoke, Wicomico, and Pocomoke rivers. These streams, which are in the process of developing a dendritic type of drainage, have cut far deeper channels on the Western than on the Eastern Shore. If attention is now turned to the character of the shore-line, it will be seen that along Chesapeake Bay it is extremely broken and sinuous. A straight shore line is the exception and in only one place, from Herring Bay southward to Drum Point, does it become a prominent feature. These two classes of shore correspond to two types of coast. Where the shore is sinuous and broken, it is found that the coast is low or marshy, but where the shore-line is straight, as from Herring Bay southward to Drum Point, the coast is high and rugged as in the famous Calvert Cliffs which rise to a height of 100 feet or more above the Bay. The shore of the Atlantic Ocean is composed of a long line of barrier beaches which have been thrown up by the waves and enclose behind them lagoons flushed by streams which drain the seaward slope of the Eastern Shore. Of these Chincoteague Bay is the most important.

THE COASTAL PLAIN TERRACES.

It was stated in the early part of this chapter that the topography of the Coastal Plain was in reality more complex than at first appeared and that this complexity was due to a system of terraces out of which the region is constructed. The subaerial division of the Coastal Plain contains four distinct sets of terraces and part of another, while the sub-

marine division is composed of one set only. This makes for the Coastal Plain as a whole a group of five sets of terraces. In describing these terraces, the author will anticipate somewhat material which will be discussed later in another place and will, for the sake of simplicity, designate these terraces, beginning with the highest, by the names of Lafayette, Sunderland, Wicomico, Talbot, and Recent. The first four and part of the fifth fall within the subaerial division and the last one principally within the submarine division of the Coastal Plain. All five of the subaerial terraces are found on the Western Shore while only three of them occur on the Eastern Shore. These terraces wrap about each other in concentric arrangement and are developed one above the other in order of their age, the oldest standing topographically highest.

LAFAYETTE TERRACE.—The highest of the five terraces is known as the Lafayette. It is best developed in Maryland in the region between the Anacostia, Potomac, and Patuxent rivers as far south as Charlotte Hall. In other words, it caps the divides at the northern extension of the southern Maryland Peninsula. The surface of this terrace varies considerably in appearance according to position. In the interior where it is removed from the influence of streams, it is as flat and featureless as any portion of the Eastern Shore, but along the margins where it has been dissected by waterways, they have transformed it into a gently-rolling country and its true character is obscured. Besides this extensive development of the Lafayette terrace, there are remnants of the same surface distributed along the border of the Piedmont Plateau from the Potomac River northeastward through Delaware and Pennsylvania to within a few miles of the Delaware River. There are also a few outliers scattered about the Coastal Plain. Most of these are grouped about the southern margin of the principal area in the vicinity of Charlotte Hall, a few more are found in Anne Arundel County, and a very important cluster occurs on the high hills of Elk Neck in Cecil County. Southward beyond the Potomac River this Lafayette terrace continues on through Virginia southward to Florida and Texas and over into Mexico. It is believed that at one time these scattered remnants of the

Lafayette terrace were united in a continuous whole and that their present isolated condition has been brought about by erosion. If we assume that they were once continuous, it will be a simple matter to establish the present attitude of this terrace, notwithstanding the fact that its surface has been somewhat modified by erosion. In the Piedmont region of Cecil County the surface of the Lafayette terrace lies at an altitude of 470 feet. It rises to about 500 feet in the vicinity of Lochraven and Catonsville near Baltimore, to 486 feet at Burtonsville, Montgomery County, and again to 400 feet in the District of Columbia. Thus we see over a distance of about 80 miles that the surface of the Lafayette is relatively horizontal. This direction is, however, from northeast to southwest and approximately parallel to the trend of the modern coast line. If, now, the altitude of the Lafayette terrace is examined at right angles to this direction, namely toward the southeast, it is found that on the high hills of Elk Neck, in Cecil County, the surface of the Lafayette terrace lies at about 300 feet, making a slope in Cecil County of 170 feet in a distance of about 10 miles. At Charlotte Hall, St. Mary's County, the surface lies at a height of about 200 feet, making a slope between the District of Columbia and Charlotte Hall of 200 feet in a distance of about 36 miles. It will thus be seen that the surface of the Lafayette terrace has a slight incline toward the southeast or, in other words, slopes gently toward the ocean.[1]

[1] It will be explained later that this slope represents the gradual descent of a sub-aqueous terrace away from the shore-line out into deeper water. The elevation at the foot of the scarp represents the altitude of the old shore-line which, on account of oscillations in level, has been somewhat thrown out of a horizontal position since its formation, so that it lies at slightly different altitudes in various portions of the Coastal Plain. The altitudes recorded away from the scarp-line, show the elevations of the sub-aqueous terrace at varying distances from the ancient shore. These also have been slightly thrown out of their original position so that their former level attitude is now somewhat obscured. In any one locality, however, the various terraces from the oldest to the youngest occupy distinct levels and are usually separated by pronounced scarps, but when definite localities are compared the shore-line of one bench may be found to correspond in altitude at the present time with the deeper water phases of the next higher bench. This discrepancy, as has just been said, is due to tilting, and will be fully explained below.

SUNDERLAND TERRACE.—Beneath the Lafayette terrace, wrapping around it like a border, extending up into its body in re-entrants, and separated from it by a scarp-line is the next younger terrace designated above as the Sunderland terrace. This surface has its greatest development in southern Maryland on the Calvert and St. Mary's peninsulas. It covers the high divides of Calvert County and occupies a similar position in Charles and St. Mary's counties south of the Lafayette terrace. Beyond this region it is represented by outliers, many of which are several square miles in extent. They are principally found in the District of Columbia and in the region between the Patuxent and Patapsco rivers. There are also a number of smaller outlying areas which are distributed along the western border of the Coastal Plain between Baltimore and Elkton. South of the Potomac the Sunderland terrace continues on into Virginia, but as it has not been mapped in regions beyond Fredericksburg, it is not known how far in this direction it extends. Northward, beyond Maryland, this terrace has been found in Delaware and Pennsylvania and it is extensively developed in southern New Jersey.

The same statement may be made regarding this terrace as was made regarding that of the Lafayette, viz. that, in the interior where it has not been modified by erosion, it still retains its original level, featureless character, but along the borders where it has been attacked by the head waters of streams, it has been transformed into a rolling country. The relation between the surfaces of the Sunderland and Lafayette terraces becomes manifest whenever the two occur in juxtaposition. Then it is seen that they occupy different levels, that of the Lafayette always being higher than that of the Sunderland. This difference in altitude is sometimes slight, at other times it forms a prominent feature in the topography. Usually the descent from one to the other is gentle, but occasionally it is accomplished by means of an abrupt drop resembling in appearance a sea-cliff which has been modified by subaerial erosion.

Throughout the region as a whole there are distinguishable two types of descent between the Lafayette and Sunderland terraces. The one type is confined to the Piedmont Plateau, the other to the Coastal Plain, or, in other words, when the Lafayette terrace lies on the Pied-

mont Plateau and the Sunderland terrace rests beneath it either on the Piedmont or close to its eastern border, the descent from one surface to the other is usually considerable and is accomplished by a topography of low, subdued, rolling hills which pass down from the Lafayette terrace, occupying successively lower and lower areas until they finally blend with the surface of the Sunderland terrace beneath. This type of descent may be seen along the eastern border of the Piedmont Plateau between Cecil County and the District of Columbia. The other type of descent is found wherever the Lafayette and Sunderland terraces approach each other in the Coastal Plain. It may be described, as suggested above, as being an abrupt descent resembling a wave-cut cliff which has since been modified to a greater or less extent by subaerial erosion. The best localities for observing this type are to be found at Congress Heights just south of the Anacostia River in the District of Columbia, near Bryantown and Aquasco in Charles County, and at Charlotte Hall in St. Mary's County. Two only of these localities need be described. At Congress Heights the surface of the Lafayette terrace lies at an elevation of about 260 feet and that of the Sunderland at about 200. The descent between the two is accomplished by a cliff which is one of the most conspicuous features of the region and, in fact, of the entire Coastal Plain. There, as one stands on the unbroken Sunderland surface facing east, he may trace the cliff line separating him from the Lafayette terrace as it rises and runs off to the south until it is hidden from view by forest growth.

At Charlotte Hall and along the road running from Newmarket west over into Charles County, the surfaces of the Lafayette and Sunderland terraces approach very much nearer together than farther west. Throughout this region the Lafayette surface lies at an elevation of about 200 feet while the Sunderland rests about 20 feet below it at 180 feet. The descent from one to the other is here marked by a low scarp which does not exceed 20 feet in altitude, but while this topographic feature is less prominent than that at Congress Heights, it nevertheless partakes of the same character. Near Charlotte Hall there are a number of outliers of the Lafayette terrace which are separated from the Sunderland ter-

race beneath by scarps of a similar character to the one just described, although one or two of them blend with the surface beneath without a well pronounced scarp-line.

It seems probable that the Sunderland surface was at one time continuous and embraced all of its outliers. If such was the case, it will be possible to establish the present attitude of the terrace. In the vicinity of Elkton and on Elk Neck, the surface of the Sunderland terrace lies at an elevation of about 180 feet where it abuts against higher land and slopes down toward the surrounding waters to about 90 feet. In the vicinity of Baltimore the surface slopes from about 200 to 230 feet to about 90 feet. In the District of Columbia the surface of the Sunderland also lies at about 200 to 230 feet and slopes gently toward the surrounding waters until it sinks to about 100 feet. In the vicinity of Charlotte Hall about 30 miles distant the surface of the Sunderland terrace, where it envelops the Lafayette, lies, as already stated, at about 180 feet and slopes gently down to the southern point of St. Mary's County where, near Ridge, it has an elevation of about 60 feet. In Calvert County the surface of the Sunderland terrace lies at an altitude of 160 feet and slopes toward the surrounding waters until it sinks to an altitude of about 95 feet. When these figures are compared, it will be seen that the Sunderland terrace slopes away very gradually toward the water in all directions from the enclosed areas of higher land. Along the margin of the Piedmont Plateau, that is to say, in a direction nearly parallel to the present shore, the difference in elevation of this surface is inconsiderable and in this respect resembles the attitude of the Lafayette terrace throughout the same area. But in all directions away from the Piedmont Plateau and from the base of the Lafayette terrace, the Sunderland surface slopes away gradually and regularly toward either the Atlantic ocean or the Chesapeake Bay and its estuaries. As the Sunderland terrace is practically unrepresented on the Eastern Shore, no observations are to be secured from that region.

WICOMICO TERRACE.—Beneath the Sunderland terrace occurs the Wicomico terrace. It bears the same relation to the Sunderland as the Sunderland does to the Lafayette terrace in that it wraps about it as

a border, extends up into ancient stream valleys which enter it, and is separated from it by a well-defined line of low rises which, with the exception of the scarp-line cut by the present sea, constitute the most continuous topographic feature of the entire Maryland Coastal Plain. The distribution of the Wicomico terrace is somewhat different from that of the Sunderland and Lafayette terraces. It will be remembered that the Lafayette and Sunderland terraces found their greatest development on the divides of the peninsulas of southern Maryland. The Wicomico terrace, on the contrary, is best developed on the Eastern Shore. In that region it forms the flat, featureless surface of the divide, extending from Elkton southward to Salisbury and beyond, and from Chesapeake Bay on the west well over into Delaware toward the Atlantic Ocean on the east. From its surface, streams drain into both the Chesapeake Bay and the Atlantic. Outliers of this terrace are also found in great abundance along the Western Shore from Elkton down to Point Lookout. The greatest development on this side of the Bay is found in the region south of Baltimore between the Patapsco and South rivers. Beyond this territory, in the basins of the Patuxent and Potomac, the Wicomico terrace is developed in a manner strikingly different from that of the Eastern Shore. On the Eastern Shore, as was indicated above, it occupies a wide and almost unbroken territory. On the Western Shore it is developed as a narrow fringe around the base of the Sunderland terrace and as a floor of the ancient drainage valleys which penetrate the body of the Sunderland terrace as re-entrants. It was stated above that the scarp-line which separated the surface of the Sunderland from the Wicomico was one of the most prominent features in the Maryland Coastal Plain. This scarp-line has exactly the appearance of a wave-cut cliff which has been softened by subaerial erosion and resembles in every detail the similar topographic feature which has been described as separating the Lafayette and Sunderland surfaces. There are a large number of localities where this topographic feature may be seen, particularly throughout Calvert and St. Mary's counties. Perhaps four of the best and most accessible localities are located at Ridge in southern St. Mary's County not far from Point

FIG. 1.—VIEW OF TRIBUTARY OF THE CHOPTANK, TALBOT COUNTY.

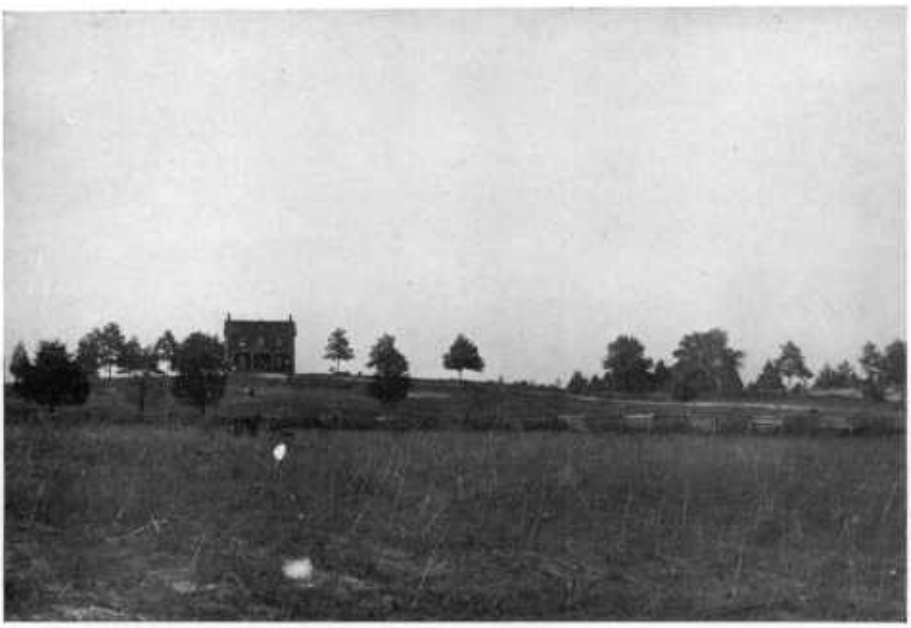


FIG. 2.—VIEW OF SUNDERLAND TERRACE SHOWING LAFAYETTE ESCARPMENT, ST. MARY'S COUNTY.

VIEWS OF COASTAL PLAIN SCENERY.

Lookout; at the turn of the road a mile and a half south of Frazier near the 80-foot contour in Calvert County; in the region to the north of Maryland Point in Charles County; and along the Principio road, 1½ miles northeast of Perryville, Cecil County. Where the Wicomico terrace approaches drainage ways, it loses its typical plain character and is modified by erosion into a rolling country, but back in the interior where streams have not yet approached, the surface is typically a plain. In this particular it again resembles the Lafayette and Sunderland terraces. On the whole it has suffered less from erosion than those which lie above it. If we reconstruct the Wicomico terrace by uniting its outliers, we find that the surface of the Wicomico terrace stands at an elevation of 90 feet in Cecil County where it abuts against the Sunderland terrace, and slopes away toward the surrounding water to an elevation of 60 feet. In the vicinity of Baltimore and Washington and on the peninsula of Calvert County, between the Patuxent River and Chesapeake Bay the same general relation holds; but in St. Mary's County, between the Patuxent and Potomac rivers, the altitude of the Wicomico terrace, where it abuts against the Sunderland, gradually sinks until at Ridge the surface of the Wicomico terrace stands at 45 feet and slopes away gradually to Point Lookout until it ends at an elevation of about 15 feet. On the Eastern Shore the surface of the Wicomico terrace stands at an elevation of about 90 or 100 feet in the vicinity of Elkton, and at about 45 feet in its extreme southern development a few miles south of Salisbury. It will thus be seen that the surface of the Wicomico terrace maintains a remarkable uniformity throughout its entire extent along the border of the Piedmont Plateau but slopes gently toward the surrounding waters.

TALBOT TERRACE.—Beneath the Wicomico terrace occurs the Talbot terrace. This is the lowest of the subaerial terraces. Like the other members of the series, it envelops the earlier terraces, penetrates them as re-entrants and is separated from those above it by a scarp-line. This scarp-line, although usually lower and less conspicuous than that separating the Sunderland and Wicomico terraces, is easily discerned and is very continuous throughout the region. It may be typically

seen at a large number of localities among which the following may be mentioned: along the borders of Elk River in Cecil County; on the road between Chestertown and Rock Hall in Kent County; in the vicinity of Brooklyn and Annapolis in Anne Arundel County; along the lower reaches of the Patuxent River in Calvert and St. Mary's counties, and about the flanks of Capitol Hill in Washington City.

This scarp has an average height of about 10 feet, although it at times disappears altogether and at other times may rise to 20 or 30 feet in altitude. The distribution of the Talbot terrace is similar to that of the Wicomico in that it finds its greatest development on the Eastern Shore although large areas are present along the western margin of Chesapeake Bay from Elkton southward to Point Lookout and in the valleys of all the estuaries. It has suffered less from erosion than any of the other terraces and maintains everywhere its original surface almost unmodified by the present drainage. The altitude of the Talbot terrace, where it abuts against higher land lies very constantly at an elevation of about 40 or 45 feet, except in southern St. Mary's County where it gradually declines southeastward to about 10 feet near Point Lookout. From its landward margin the Talbot terrace slopes away toward the surrounding waters where it either terminates in a wave-cut cliff or else passes down to tide-level and merges with the modern beach.

RECENT TERRACE.—Below the Talbot terrace is situated the Recent terrace. This is principally confined to the submarine division of the Coastal Plain and is co-extensive with it. It everywhere wraps around the subaerial division as a border and also extends up the river valleys as a terrace formed by Recent streams. Within the Bay and its estuaries it is identical with the wave-cut and wave-built terrace while along the Atlantic shore it forms the modern beach and extends seaward under the ocean as the surface of the continental shelf. Thus it appears that the Recent terrace is principally submarine. What is known regarding the contour of its surface has been determined by soundings. In this way it has been shown that the surface of this terrace is a plain, sloping gently from tide to a depth of 600 feet at a distance of about 100 miles off shore.

Up to this point in the discussion the various terraces have been described as wrapping around each other in concentric borders. This arrangement, although the typical one, is not always present, for frequently one or more terraces may be wanting in places where they would normally be expected to be present. At such times the descent from the surface of the highest to that of the lowest terrace present, amounts to the vertical distance which would normally be expected to exist between them. The best example of this is to be seen along the Bay shore from Chesapeake Beach southward to Drum Point. Throughout most of this distance the surface of the Sunderland terrace, lying at about 100 feet above tide, is separated from that of the Recent terrace at sea-level by a cliff 100 feet in height. The Wicomico and Talbot

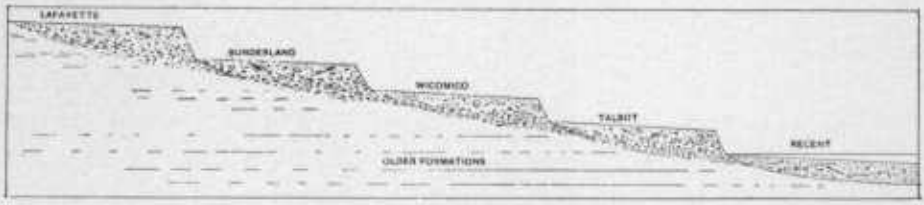


FIG. 4.—Diagram showing relative position of Coastal Plain Terraces.

terraces and their accompanying scarps are here absent and the descent from the Sunderland to the Recent terrace is accomplished by a precipice which makes the famous Calvert Cliffs.

Occasionally the surface of the Talbot and Wicomico terraces are modified by the presence of subordinate terraces separated by low scarplines. These secondary terraces are irregularly developed and, as a rule, are not extensive. They occur principally in the valleys of the important estuaries and along the banks of those tributaries which drain the surrounding upland. The most important of these minor scarps is developed on the Talbot terrace, facing the Atlantic Ocean, and extends from near Berlin northwestward to the vicinity of Newark, Delaware. It rises from 25 to about 35 feet and is a noticeable physiographic feature throughout the region where it is developed.

STREAM VALLEYS.

Within the Coastal Plain of Maryland there are discernible four generations of stream valleys. Three of these no longer contain the streams which cut them. They have been referred to in the discussion as re-entrants penetrating the various terraces. The first is found developed as a flat-bottomed drainage way of greater or less width and extent, running up into the Lafayette terrace. Its level bottom is an integral part of the Sunderland terrace. The second one of these drainage ways penetrates the Sunderland terrace in a similar way. Its characteristics are analogous to those entering the Lafayette terrace and its flat bottom forms an integral part of the Wicomico terrace. The third of these drainage ways cuts a re-entrant within the body of the Wicomico terrace and its level floor forms an integral part of the Talbot terrace. The fourth and last of these drainage ways is now in the process of formation. It is the system of valleys which are being cut by the Recent streams. Toward their headwaters these valleys are narrow and V-shaped, and if traced to their sources, are often found to start from intermittent springs surrounded by a steep-walled amphitheater from 5 to 10 feet in height. Toward their lower courses these valleys are broad and flat and are frequently filled with fresh or brackish water marshes. In the upper portions of their courses the valleys are being eroded. In the lower portions they are being filled. A glance at the map will serve to confirm the opinion which has been held for a long time, namely, that the rivers of the Coastal Plain of Maryland have been drowned along their lower courses, or, in other words, have been transformed into estuaries by the subsidence of the region. The filling of these valleys has taken place toward the heads of these estuaries. The headwaters of these Recent valleys are being extended inland toward the divides with greater or less rapidity.

Many of the tributary streams occupy the re-entrant valleys described above. The more energetic have succeeded in carrying out all of the ancient floors which formerly covered these valleys and formed a portion of the various terraces. Others have left mere remnants of these

valley accumulations along the margins while the less active streams have left the re-entrant valleys practically unmodified. In Southern Maryland the streams which drain into Chesapeake Bay from the eastern slope of Calvert County, as well as those which drain into the Patuxent River from St. Mary's and Prince George's counties, have shorter courses than those which drain into the Patuxent from Calvert County or into the Potomac from Prince George's, Charles, and St. Mary's counties. A similar contrast is obvious between the streams which enter the Atlantic Ocean from the Eastern Shore and those which enter Chesapeake Bay from the same region.

The cause of this shortening of streams on the northeast side of these divides is probably due not only to a tilting toward the southeast which is discussed elsewhere, but also in a great measure, particularly along the Bay shore, to rapid wave erosion. The streams draining the eastern slope of Calvert County and the northeastern slope of St. Mary's and Prince George's counties were at one time longer, but the recession of the shore line has shortened their courses by the cutting away of their lower valleys. This is very clearly shown along the Calvert Cliffs where the waves have advanced so rapidly on the land that the former heads of stream valleys are now left as unoccupied depressions along the upper edge of the cliffs, while other streams cascade from the top of the precipice to the shore beneath, and still others more active have been able to sink their valleys to the water's edge by a very sharp descent. Other investigations have suggested that rotation may have had some influence in bringing the streams mentioned above into their present position, and although the streams are short, it is possible that they have been somewhat affected by this influence.

ECONOMIC PHYSIOGRAPHY OF THE COASTAL PLAIN.

SOILS.—The various geological stages through which the Coastal Plain has passed have had considerable influence upon the soils, and through them upon the crops of the province. The early strata, those of Cretaceous and Eocene age, which are best developed in parallel belts

along the northwestern boundary of the Coastal Plain, are sandy loams which yield good returns of fruit and garden truck. In this belt the very prosperous peach—and other fruit—farms have been located, and large quantities of fine peaches are still shipped from the northern counties of the Eastern Shore. The same belt extends northeastward into Delaware and New Jersey where similar crops are raised. These strata carry with them a natural storehouse of valuable fertilizer in the form of greensand or glauconitic shell marl. In the early days of Eastern Shore farming, this marl was much used as a fertilizer, particularly in Cecil, Kent, and Queen Anne's counties.

In the central and southern counties the clayey loams which come from the Miocene or Chesapeake deposits afford extensive areas of good wheat, grass, and tobacco lands, which formerly were of great importance to the State. Since the rapid development of the wheat fields of the West, however, the yield of these lands has become comparatively insignificant, so that at present the farmers are not able to make wheat crops pay even by the aid of expensive fertilizers. Among the best-paying crops of the Coastal Plain are the products of the lighter sandy loams of the Pliocene (Lafayette) and Pleistocene deposits. These soils cover the whole Eastern Shore south of the Choptank and are also of importance on the more dissected Western Shore. Large and early crops of berries and melons are annually shipped from the cultivated areas of these soils, and the canning of tomatoes, corn, and other products constitutes one of the important industries of the province.

WATERWAYS.—The post-Lafayette and the post-Pleistocene submergences of the Coastal Plain have been of immense benefit to the inhabitants of Maryland. As a result of the drowning of the Chesapeake River ocean-going vessels are admitted as far inland as Georgetown, D. C., Baltimore, Havre de Grace, and Chesapeake City. Valuable harbors also are provided, so that much commerce has been attracted to Maryland shores. Besides interstate and international trade which is thus favored by the configuration of Chesapeake Bay with its deep exit to the high seas, trade within the State is greatly benefited by these waterways. That geologically recent submergence, whereby the river

valleys carved in post-Pleistocene times were drowned for more than half their length, gave to the inhabitants of the Coastal Plain the most favorable facilities for easy and cheap transportation of their crops. The estuaries then formed are the entrances to tidal streams that penetrate into the very heart of the rich lands. They are generally of sufficient depth to admit the light-draught steamers plying on the waters of Chesapeake Bay and the numerous wharves which are encountered on ascending any one of the navigable creeks testify to the readiness with which the people have availed themselves of their natural opportunities. In the proper seasons these wharves may be seen piled high with the crates of fruit and other products which are being sent to Baltimore for distribution among the neighboring states.

Besides thus affording easy paths of intercourse with other important sections of the State the estuaries yield peculiar and characteristic products of their own. The same streams which, during the summer, are the arteries and highways of a commerce based on the products of the soil, become in winter the fields of one of Maryland's greatest industries—the oyster fisheries. Great quantities of these oysters are annually sent to Baltimore, and their gathering has given rise to a race of hardy fishermen and expert sailors only excelled by the codfishers who sail every year to the Great Banks of Newfoundland. The oyster-canning industry, whereby the interior of the continent is supplied with canned oysters, has also arisen as an indirect result of the post-Pleistocene submergence. The diamond-back terrapin, the duck, and the other wild fowl of the littoral marshes also deserve a place among the list of resources which the geographic history of the province has bestowed upon this State.

RAILROADS.—While the many waterways which intersect the Coastal Plain have given boat traffic the best start among transportation facilities, railroads have been built to a number of points, thus connecting them more directly with the vigor and energy of the great commercial centers of Baltimore, Philadelphia, and New York. Generally the railroad, seeking as it does that course which requires the least modifications from the natural topography in order to make an easy grade, has to

pursue a more or less tortuous route. On the Eastern Shore the low and almost insignificant character of the divides and the shallow stream valleys permit the roads to run in very direct routes from one objective point to the next. A glance at the map of the State shows these routes and the indifference which they display towards the divides. It is also noteworthy that, although touching at several waterside towns, the railroads are confined on the whole to those wider portions of the small peninsulas where the hauling distance to the boat lines becomes something of a factor in the cost of transportation. By reaching these remoter points they are thus able to maintain a foothold in spite of the lower rates offered by the boat lines. On the peninsula of Southern Maryland the few railroads are compelled to hold pretty closely to the divides, as a short distance on either side the country becomes so cut up that it would be wholly impracticable to build a line.

EFFECT OF TOPOGRAPHY UPON THE INHABITANTS.—When the early settlers came to Maryland they found the tracts of the Coastal Plain occupied by peaceful tribes of Indians who lived by fishing in the deeply indented rivers and hunting through the pine and hard-wood forests which covered the inter-stream areas. The settlers themselves took to farming, encouraged by the rich soils, and also obtained plenty of fresh fish and oysters from the neighboring waters. Soon large and prosperous plantations grew up, which afforded by their products good incomes to their owners. The earlier inhabitants were thus mainly agriculturists. As the value of the oyster beds increased, and the demands for the oyster grew, the race of oystermen sprang up. These men naturally settled along the shores near their work. At present the two classes, which originally must have been somewhat mixed, can be clearly distinguished, the regular farmer keeping to the higher inter-fluviatile areas, while along the shores and in the vicinity of the large towns are the houses of the oystermen. On the Western Shore the dissection of the interior lands near the Bay has handicapped the farmer very decidedly, while the deep rivers and estuaries give good opportunity for the fishermen to ply their trade.

Thus the geological and physical features of the Coastal Plain, which

are the direct results of its geologieal history, are seen to have almost wholly determined the pursuits and the habits of its settlers and inhabitants.

THE PIEDMONT PLATEAU.

The Piedmont Plateau, whieh is the name applied to the hill eountry that borders the Coastal Plain on the west and extends thenee to the foot of the Appalaehian Mountains, is a low plateau of eomplex origin whose rolling surfaee is traversed by highlands and eut by valleys that at times treneh the uplands as deep gorges. From the faet that the physiographie features of the Appalaehian Region whieh lies to the westward are eontemporaneous in origin with those of the Piedmont Plateau it is reasonable to suppose that no sharp line ean be drawn between the two distriets. The boundary ean in faet with almost equal propriety be plaeed at the foot of North Mountain as at the foot of the Catoetin Mountain, although all things considered, it has seemed best in Maryland to divide the two regions at the point where the first pronouneed mountain range is reached.

To the northward the Catoetin and Blue Ridge highlands with their South Mountain extension in southern Pennsylvania, gradually deeline to the level of the lower plateau, and the surfaee of the Piedmont hill eountry with higher lands of ineonspieuous elevation extends to the foot of the Alleghany ranges. To the southward, on the other hand, the Great Valley is less pronouneed and the highlands of the Blue Ridge beeome a eonspieuous part of the great Appalaehian Region. In the south also the name Piedmont has become so widely intreneh ed in usage for the distriet lying to the eastward of the Blue Ridge mountains that it has seemed best to follow the same usage in Maryland.

THE DIVISIONS OF THE PIEDMONT PLATEAU.

The Piedmont Plateau is divided into two regions called respeetively the Eastern Division and the Western Division whieh are separated by Parrs Ridge that gradually rises to an elevation of several hundred feet above the general surfaee of the Piedmont Plateau. This highland has

an average elevation of 800 to 900 feet, rising to the northward in Carroll County and in the nearby regions of Pennsylvania to 1100 feet but gradually declining southward across Howard and Montgomery counties until it reaches the lowland elevations of the Piedmont Plateau toward the Potomac Valley.

Parrs Ridge forms the divide between the streams flowing directly into the Chesapeake Bay and those flowing into the Potomac River. Among the more important streams entering the Chesapeake from the eastern division of the Piedmont are the Susquehanna, Bush, Gunpowder, Patapsco, and Patuxent rivers. The western division is largely drained by the Monocacy River and its tributaries into the Potomac River.

THE PIEDMONT PENEPLAINS.

The Piedmont Plateau is made up of remnants of old plains cut out of the high plateau that formerly stretched across the district from the Appalachian Region and passed beneath tide just beyond the edge of the Coastal Plain where it now forms the floor on which the Coastal Plain sediments rest. The eastern division is much less deeply eroded than the western with the result that more frequently remnants of the oldest plains are found in the former than in the latter district. On the other hand, the later plains, but poorly developed along the eastern margin of the Piedmont, become gradually more pronounced westward, the youngest plains being well defined in the drainage basis of the Monocacy and along the Potomac. These old plains, now represented only by remnants of their earlier surfaces, are technically known as peneplains by physiographers. A *peneplain* is the name given to an area that has been reduced by erosion to approximately a level surface but little above the sea level of the period of its formation, but which may still have unreduced knobs or *monadnocks* in the inter-stream areas. Even where these monadnocks have largely wasted away the valley surfaces would naturally be somewhat lower than the divides and would rise slowly to the sides of the valleys as well as from the lower courses of all the streams to their heads. It is important to keep these facts in

mind when endeavoring to reconstruct the ancient peneplain surfaces from the remnants of the old plains that are still left in the Piedmont district. It so happens that after the formation of the oldest peneplain now represented, later erosion has only resulted in the partial development of new plains, highlands, sometimes of wide extent, still remaining as monadnocks in the inter-stream areas.

The several plains recognized in the Piedmont district are known as the Schooley, the Weverton, the Harrisburg, and the Somerville peneplains, all of which, like the district to which they belong, have been traced far beyond the confines of the State.

SCHOOLEY PENEPLAIN.—The Schooley peneplain, so named from Schooley Mountain in Pennsylvania, is represented in the higher crests of Parrs Ridge and throughout the eastern division of the Piedmont Plateau. A conspicuous remnant of this old plain is also shown in the crest of Sugar Loaf Mountain in the western division of the district while the same surface is continued westward in the more or less level crests of the Catoctin and Blue Ridge mountains. This old peneplain which has a nearly uniform elevation of 1800 feet throughout the eastern portion of the Appalachian Region, slopes more rapidly from the crest of the Catoctin Mountain eastward, being represented in Sugar Loaf Mountain at a height of about 1300 feet and in Parrs Ridge at an elevation of 1000 to 1100 feet, the greatest heights being found toward the Pennsylvania line. Across this western district the slope is about 30 feet to the mile. To the east of Parrs Ridge the Schooley peneplain declines more rapidly, being represented in Harford, Baltimore, and Howard counties at constantly lower elevations that finally reach 400 feet or less at the margin of the Coastal Plain where the slope has increased to 40 or 50 feet in the mile, as shown by the dip of the basal formations of the Coastal Plain series and by well-borings that have penetrated the later sediments to the Coastal Plain floor. An explanation for the much more complete preservation of the Schooley peneplain surface in the eastern portion of the Piedmont Plateau and particularly near the Coastal Plain margin must be sought largely in the lower elevation of this plain during the formation of the later plains, and no

doubt also in part from the fact that it was in a measure protected by the cover of Coastal Plain sediments which are known to have extended farther westward than at present.

The age of the Schooley peneplain is probably Jurassic. It must have been formed later than the deposition of the red sandstones and shales of Triassic age in the Frederick Valley and earlier than the deposits of the earliest Coastal Plain sediments which are either of late Jurassic or early Cretaceous age. At the time of the formation of the Schooley peneplain the land surface must have extended far to the eastward of its present known limits and such deposits as were laid down along its eastward margin must be now deeply buried beneath the Coastal Plain and may even have been deposited to the eastward of the present coast line.

WEVERTON PENEPLAIN.—The Weverton peneplain, so called from its development on the ridge of Weverton sandstone north of Weverton, has many broad level-topped remnants throughout the Piedmont district which vary in elevation from about 700 feet in Montgomery County to 850 feet in northern Carroll County. To the westward the surface rises on an average slope of about 30 feet in the mile and although imperfectly shown on the eastern flank of the Catoctin Mountain it may be clearly recognized along the crest of that mountain, in the Middletown Valley, and toward the Potomac River where it reaches an elevation of about 1200 feet. Eastward from the Parrs Ridge district it gradually declines across the central counties until it reaches an elevation of 300 feet or thereabouts along the Coastal Plain margin, being here represented in the broader valleys that trench the Schooley surface. This is admirably shown in the Green Spring and adjacent valleys in Maryland and in others beyond the State where the later Potomac formations lie directly on the limestone of the valley floors. At the margin of the Coastal Plain the Weverton peneplain can be no longer recognized with certainty and doubtless gradually merges into the older Schooley surface out of which it was carved. It is possible that some of the known inequalities of the Maryland Coastal Plain floor may be due to the eastward extension of some of the Weverton Valleys, although the low

elevation of this area, the gradual approach of the two surfaces and the cover of Potomac and later sediments make it extremely difficult to determine this point positively.

The age of the Weverton peneplain is doubtless late Jurassic or early Cretaceous since the later Potomac deposits rest upon its surface. Whether all of the Potomac deposits were laid down subsequent to the formation of this plain cannot be with certainty determined although the suggested extension of some of the Weverton valleys beneath the oldest beds renders this interpretation possible. Without more definite proof on this point, however, it is perhaps safer, as has been already done, to regard the Schooley surface as affording the floor upon which the earlier deposits were spread.

It is possible that a warping of the Schooley peneplain, during the formation of the Weverton plain and subsequently, affected the Coastal Plain floor throughout much of the western portion of that district, as shown by the non-marine Potomac deposits of the Maryland Region, indicating the exclusion of the basin of sedimentation by a land barrier.

HARRISBURG PENEPLAIN.—The Harrisburg peneplain, so named from its occurrence about Harrisburg, Pennsylvania, where level-topped surfaces representing this peneplain are well displayed, lies at an elevation of about 600 feet in the eastern part of the Appalachian district and thence gradually declines eastward, reaching about 500 feet in the lower Monocacy Valley. To the northward along the Monocacy drainage basin this level slowly rises toward the headwaters of the Monocacy as well as laterally to the interstream highlands represented by the Catoctin Mountain on the west and the Parrs Ridge district on the east. The broad highlands of the Weverton Plain apparently confined the surface of the Harrisburg peneplain to the western division of the Piedmont Plateau. Farther down the Potomac Valley the Harrisburg surface gradually declines to 400 feet, but its identity becomes largely obscured toward the Coastal Plain border where it probably merges into the older peneplains. At all events, it cannot be satisfactorily discriminated. Throughout most of the district to the east of Parrs Ridge the Harrisburg peneplain is evidently represented only by the deeper trenching of

the floors of the Weverton valleys although this cutting has been continued at various times until the present.

The marked change in slope shown by the Schooley and Weverton peneplains to the eastward of the Catoctin Mountain is for the most part lost in the case of the Harrisburg and Somerville peneplains, indicating that the elevation which went on subsequent to the formation of the Schooley and Weverton surfaces must have largely ceased by post-Harrisburg time.

The age of the Harrisburg Plain has been thought to be early Tertiary, deposits of supposed late Tertiary age having been found to rest upon it. The data necessary to determine closely the time of its formation are absent. A study of the Coastal Plain sediments has not afforded such results as to warrant a close correlation of this plain with the formations of that area.

SOMERVILLE PENEPLAIN.—The Somerville peneplain, so called from its development near Somerville, New Jersey, is not widely separated from the Harrisburg peneplain above discussed. It has an elevation of about 500 feet in the eastern part of the Appalachian district in the vicinity of Harpers Ferry, from which region it declines for some distance with about the same slope as that of the Harrisburg already described. Like the Harrisburg Plain, it can be traced up the Monocacy basin, gradually rising toward the headwaters and toward the divides to the east and west. Along the Potomac Valley it declines eastward to 350 feet, beyond which it evidently gradually merges with the older surfaces. Throughout the greater part of the eastern district of the Piedmont between Parrs Ridge and the Coastal Plain border it is only represented, as far as can be determined with certainty, by the deeper trenching of the valleys which had already commenced their cutting in the Weverton surface in Harrisburg time.

Both the Harrisburg and Somerville plains were doubtless developed along the drainage lines entering the region of the older Coastal Plain deposits although evidence of this extension is probably no longer apparent in the case of the Harrisburg. At least no satisfactory proof can at present be deduced for it. The revival of erosion with the elevation of

the Harrisburg surface may have resulted in the deposition of the coarser sediments of middle and late Tertiary time, while the revival of erosion in post-Somerville time is doubtless represented by the Columbia deposits which have been formed from the materials removed during successive epochs of post-Somerville denudation. The age of the Somerville Plain would, therefore, be late Tertiary.

STREAM VALLEYS.

The present streams are now found in valleys of variable depth that trench the peneplain surfaces. In the eastern division of the Piedmont where the Harrisburg and Somerville plains are at best but poorly developed the streams appear for the most part as trenches in the Weverton plain. In the western divisions, on the other hand, they are found trenching the later peneplains and in the lower Monocacy and Potomac valleys the relations of the streams to the Somerville peneplain are clearly defined.

Some of these streams are more or less adjusted to the underlying rocks as in the case of Jones Falls to the north of Baltimore but a large portion of them are discordant, that is, seemingly unaffected by the rocks over which they flow. In the eastern division of the Piedmont the streams flow down the eastern slope of Parrs Ridge in approximately parallel courses to the Chesapeake Bay and in many instances the streams cut across the rocks with little regard to their physical characters. In the case of the Monocacy and its tributaries we find that there has been little adjustment of the channels, the streams taking their courses across limestones, phyllites, and shales indifferently.

In general, both the main streams and their tributaries show drainage patterns similar to those of the Coastal Plain, and it is not impossible that the stream courses may have been in many instances superimposed on the rocks at no distant time in the past through a mantle of Coastal Plain sediments. Remnants of such a cover have been found far removed from the main body of the Coastal Plain, even as far westward as the Great Valley.

ECONOMIC PHYSIOGRAPHY OF THE PIEDMONT PLATEAU.

The physiography of the Piedmont Plateau has materially influenced the settlement and occupation of those who chose this region for their homes.

SOILS.—The early settlers, having to raise all their food, naturally sought out the best locations for their broad farms and beautiful estates. On their arrival they found two general classes of farm-lands.

The first class embraced the somewhat rolling but extensive tracts of the interstream upland areas. The soils were found to be good producers of corn, wheat, and grass, and the surface not so rough as to make its cultivation forbiddingly difficult. The long continuous tracts of these interstream areas also made travelling easy as long as one stayed on the upland, while the stream valleys were shut in and narrow. For these reasons, probably, the various stately manor lands were laid out where the upland expanses were greatest; and the mansions, surrounded by fine groves and broad fields, were located on the most promising of the small plateaus. In the earlier days the crops from these broad upland farms were among the richest in the State and rivaled those of the Eastern Shore.

The second class of farm-lands comprised the alluvial loams and sandy flood-plains along the streams. These lands are generally restricted in area, since the valley bottoms are usually narrow and limited in extent. Where streams have opened out lowlands on the marble and limestone areas rich lands of considerable extent offer most favorable farm sites. The lands along the streams have the advantage of running water and good springs from the hill-sides, they are not as well drained, however, as are the lands of the upland, and they are subjected to damaging floods. Comparatively few settlers chose the valley lands at first.

A marked exception to the above rule is found in the Monocacy Valley, where the farm-lands are all located on the several benches and terraces leading down to the river or on the low bottom-lands belonging to it. So little of the old upland is left that the conditions of occupation are quite different from those farther east.

FIG. 1.—PATAPSCO VALLEY AT THE MOUTH OF BRICE'S RUN, BALTIMORE COUNTY.

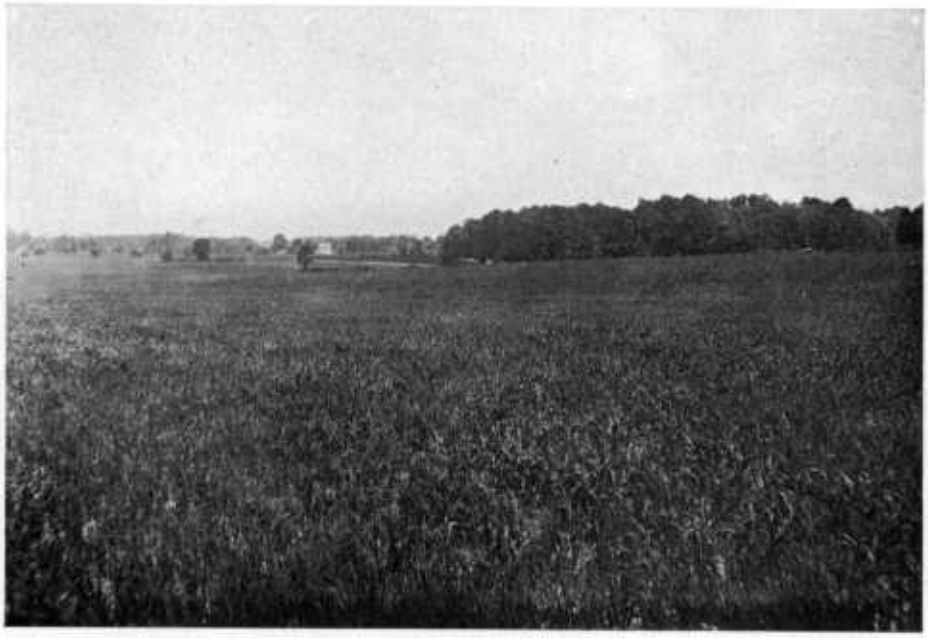


FIG. 2.—LEVEL SURFACE OF PIEDMONT PLATEAU AWAY FROM MAIN DRAINAGE LINES, CECIL COUNTY.

VIEWS OF PIEDMONT SCENERY.

STREAMS.—While the farming class were searching for good soils and favorable homestead sites, the manufacturers and millwrights were seeking favorable locations for mills, dams, and flumes. The streams of the Piedmont Plateau yielded a great abundance of water-power, and soon mills dotted the valleys. Each section early came to be supplied with its grist mill, and in due time cotton mills were also built. These industries in time became of great importance. The flour mills are now generally abandoned, however, only a few of the most favorably situated ones having been able to maintain themselves against western competition. The cotton mills have held out much better, because it has not been until recent years that southern cotton has been spun and woven at home.

The water-power which the Piedmont streams furnish is not the only wealth which they bring to the State. The land movements during late geological time have caused the streams to trench their courses considerably, and in so doing have rendered accessible the building stones which were previously hidden beneath the surface. The granite now extensively quarried at Port Deposit would not be so easily obtained and shipped had not the Susquehanna River cut its deep gorge. The locations of the serpentine quarries of Harford County are determined to a greater or lesser extent by the streams which intersect the rock. A formerly important soapstone quarry on Winter Run in the southeast corner of Carroll County was made possible only through the fact that the stream had there cut a deep gorge in a long band of steatitic serpentine. Along the Patapsco and Jones Falls many quarries of granite and gneiss have been located because the stream gorges offered favorable openings or transportation facilities.

It is interesting, by way of contrast, to compare the different conditions under which the Cardiff-Delta slates are quarried. As no stream cuts across Slate Ridge in the vicinity of those two settlements, the quarries have been located along the summit and are worked entirely from above. This is the most difficult way to attack the slates, and as there is no natural drainage for the quarries the water which is constantly accumulating in the pits greatly increases the cost of working.

LINES OF COMMUNICATION.—The valleys and ridges of the Piedmont Plateau furnish excellent examples of the way in which topographic features influence commerce and human activities.

One of the first acts of the early settlers of the Piedmont region was to lay out highways. These early roads were not always located advantageously with reference to the topography, but both the divides and the valleys were extensively employed. When the better turnpikes came to be built, however, they were almost without exception built along the divides. The reason for this was that fills and bridges were thereby avoided and better drained road-beds, not subject to floods, were obtained. Radiating in all directions from Baltimore, these old turnpikes may be followed into almost every corner of the State, and their location on the more elevated ridges enables the traveler to obtain beautiful views of the richly wooded, rolling uplands and tree-filled valleys.

With the advent of the canals and railroads more even grades were demanded and sought for. They were found by following the larger valleys.

The canals were built to overcome the obstructions to navigation which the "fall line" rapids occasioned, even in the larger streams such as the Susquehanna and the Potomac.

One of the early canals was the Susquehanna Canal, built along the east shore of the Susquehanna River in order to transport merchandise from the limits of navigation at Port Deposit northward along that stream to the Pennsylvania line. This canal has now wholly fallen into disuse.

Another early and successful canal was constructed around the Great Falls by the Potomac Company. To obtain the necessary water and the most favorable grades this channel, now part of the Chesapeake and Ohio Canal, was laid out along the north bank of the Potomac, taking advantage of the natural trenches cut by that river. This canal was long the cheapest and best means of transportation between the coal and wheat lands of Allegany County and tidewater.

Since the era of railway construction began every advantage has been taken of the topographic features of the country. The Baltimore and

Ohio Railroad crossing the Piedmont Plateau from tidewater found an easy exit from the depression about Baltimore and a gentle, though crooked, grade to the crest of the divide by following up the South Branch of the Patapsco River to Mount Airy, and then along the Monocacy drainage to Point of Rocks.

The Western Maryland Railroad, striking north and then westward, could not utilize the lower course of the North Branch of the Patapsco on account of its narrow valley and very crooked channel. By following the broad, well-graded valley of Gwynns Falls as far as Emory Grove, however, an easy descent was found into the more favorable upper course of the North Branch of the Patapsco and thence an easy grade led to the sag in the divide at Westminster. A branch of the Western Maryland road running north from Emory Grove follows the Gunpowder-Monocacy divide as far as Manchester.

The Northern Central Railway enters the State from the north by following down the main branch of the Big Gunpowder and does not leave this stream until at Ashland the broad marble lowlands about Cockeysville open out and offer an easy crossing to the valley and gorge of Jones Falls, which it follows down to Baltimore from Lake Roland.

A striking example is afforded by the Maryland and Pennsylvania Railroad which takes advantage of the gorge of Deer Creek to penetrate Rocky Ridge. Were it not for the aid thus rendered by the creek the engineers of the road would have been obliged to tunnel through the obstruction or else have gone a number of miles out of a direct course. Deer Creek would not have been located across the quartzite and so could not have cut the gorge had it not accidentally taken this position while flowing on the Coastal Plain covering from which it was doubtless superimposed upon the quartzite. Besides the railway a county road also utilizes this gap and there are reasons to suppose that before the advent of the white man the Indians also used it as a thoroughfare.

In conclusion it appears that the topography has very materially controlled the settlement and economic development of the Piedmont Plateau, by determining the location of the farms, the mills, and the railroads.

APPALACHIAN REGION.

The Appalachian Region borders the Piedmont Plateau upon the west and extends to the western limits of the State. It consists of a series of parallel mountain ranges with deep valleys which are cut nearly at right angles throughout much of the distance by the Potomac River. Many of the ranges exceed 2000 feet in elevation while some reach 3000 and more in the western portion of the district. The streams have been to a large extent adjusted to the rocks over which they flow, although this is less evident in cases of the master stream, the Potomac River, than of the tributaries.

THE DIVISIONS OF THE APPALACHIAN REGION.

The Appalachian Region is divided into three districts, known as the Blue Ridge district, the Greater Appalachian Valley, composed of the Great Valley and the Alleghany Ridges, and the Alleghany Plateau. Each district presents certain marked physiographic characteristics that separate it from the adjacent areas on the east and the west.

The Blue Ridge district consists of the Catoctin and Blue Ridge mountains uniting to form the greater highland of South Mountain in the southern part of Pennsylvania. Beginning with an elevation of 2000 feet at the Maryland line this highland gradually declines southward to the Potomac River where it has an elevation of less than 1500 feet at Maryland Heights overlooking the Potomac Valley. The eastern border of this district is formed by the Catoctin Mountain which extends as an almost unbroken highland from the Pennsylvania line to the Potomac River at Point of Rocks. Succeeding the Catoctin upon the west is the Middleton Valley which drains southward into the Potomac River through the Catoctin Creek. Along the western side of this district is the Blue Ridge Mountain proper. It extends as a sharply defined range from the South Mountain of Pennsylvania to the Potomac River which it reaches at Weverton. Its crests form the boundary line between Frederick and Washington counties. The Blue Ridge in Virginia is not the direct continuation of the mountain so named in Maryland but of a

smaller range, the Elk Ridge, which adjoins the Blue Ridge on the west and reaches the Potomac River at Maryland Heights opposite Harpers Ferry.

The Greater Appalachian Valley embraces all of the country lying between the Blue Ridge on the east and Dans Mountain or Alleghany Front on the west. It admits of a two-fold division into the Great Valley on the east and the zone of Alleghany Ridges on the west. The Great Valley, known as the Hagerstown Valley in Maryland, the Cumberland Valley in Pennsylvania, and the Shenandoah Valley in Virginia, is a broad lowland, the floor of which averages from 500 to 600 feet in elevation, gradually increasing in height from the Potomac Valley toward the Pennsylvania line. It extends from the Blue Ridge on the east to North Mountain on the west. It is drained by the Antietam River on the eastern side and the Conococheague River on the western side, both of these streams having their sources in Pennsylvania and flowing southward to the Potomac River. The Alleghany Ridges which extend from North Mountain to the Alleghany Front consist of a series of parallel ranges of varying elevations that extend from north to south across the State. Among the more important are North Mountain, Tonoloway Ridge, Sideling Hill, Town Hill, Green Mountain, Warrior Mountain, Collier Mountain, Martin Mountain, Nicholas Mountain, Shriver Ridge, and Wills Mountain. Between them are valleys that are drained mainly to the southward into the Potomac River. They vary in character, some being narrow and deeply trenched, while in others broad level-topped areas appear, the origin of which will be shortly discussed.

The Alleghany Plateau forms the western part of the Appalachian Region and extends from the Alleghany Front to the western limits of the State. This highland, like the districts which lie to the eastward, is continued far beyond the confines of the State. To the southward it can be traced through Virginia, Kentucky, and Tennessee to northern Alabama where it is known under the name of the Cumberland Plateau. In Maryland this district consists of a broad highland across which ranges of mountains extend from northeast to southwest, reaching eleva-

tions of 3000 feet and more at several points in Big Savage, Great Backbone, and Negro mountains. The leading ranges of the district are Dans Mountain, Big Savage Mountain, Great Backbone Mountain, Negro Mountain, Winding Ridge, and Laurel Hill. The streams flow in part to the southward or eastward, as the case may be, into the Potomac River and in part to the northward through the Youghiogheny Valley into the Monongahela River whence the waters reach the sea through the Ohio and the Mississippi. The latter district comprises much the larger part of Garrett County.

THE APPALACHIAN PENEPLAINS.

The Appalachian Region, like the Piedmont Plateau, is composed of remnants of old plains which have been cut out from the high plateau, now represented by the level-topped crests of the highest ranges. The several peneplains succeed each other at different elevations, being represented by the low crests or broad level-topped valleys that are here and there preserved in the highland region.

The peneplains found represented in the Appalachian Region are the continuations westward of the Piedmont peneplains and like them have here and there above the ancient surfaces unreduced knobs or monadnocks in what were probably interstream areas. As in the Piedmont district, the peneplain surfaces rise gradually up the old streams and toward the valley sides.

The Appalachian physiographic history is complicated by the fact that the drainage of the area has evidently changed during the period of peneplain development, the Potomac drainage having gradually encroached upon that of the Youghiogheny to the westward. It is probable, therefore, that the peneplains to the west of the Alleghany Front as well, perhaps, as those a short distance to the east of the same cannot be readily correlated with those farther eastward. On account of the higher gradient of the Potomac and its head-water tributaries compared with the Youghiogheny and the drainage basin of which it is a part an encroachment of the former would, in accordance with known physiographic laws, naturally result. In this way certain physiographic in-

congruities and even biological peculiarities in the distribution of the faunas of the present day may be explained.

The peneplains recognized in the Appalachian district are known as the Schooley, Weverton, Harrisburg, and Somerville plains, all of which are found in the Piedmont district to the east.

SCHOOLEY PENEPLAIN.—The Schooley peneplain which we have already found to be represented in the higher crests of the Catoctin and Blue Ridge mountains, where it has an elevation of about 1700 feet, is continued in North Mountain. To the west of this ridge it is again recognized in the level-topped crest of Town Hill where it still has an elevation of little more than 1700 feet, beyond which it rises gradually in Warrior Mountain to an elevation of about 1800 to 1900 feet, in Martin Mountain to an elevation of a little under 2000 feet, in Evitts Mountain to somewhat over 2200 feet, and in Dans Mountain to about 2500 feet. To the westward it is found in Big Savage and Great Backbone mountains at an elevation of about 3000 feet.

The Schooley peneplain is thus found to possess a different slope in the different portions of the Appalachian Region. Throughout the eastern portion of the area from Catoctin Mountain to Town Hill, a distance of nearly 50 miles, the peneplain surface is nearly horizontal while to the westward of this point it slopes at first gradually and then more rapidly to the crests of Great Backbone Mountain. The slope of the surface throughout the central portion of this region is from 30 to 40 feet in the mile but it rises to 60 feet in the mile in the western portion of the district.

The Schooley peneplain is closely related to the geology of the district in that the level-topped crests which to-day rise to the old Schooley surface consist of the hard unyielding sandstones that have withstood the processes of erosion while the associated shales and limestones have been gradually reduced by the elevation of the formations in subsequent periods.

WEVERTON PENEPLAIN.—The Weverton peneplain which is most clearly developed in the central Piedmont district, where it has an elevation of about 750 feet, is found represented in the crest of the Catoc-

tin Mountain toward the Potomac River at about 1200 feet as well as in the Blue Ridge near Weverton and in Elk Ridge at Maryland Heights, the latter having an elevation of about 1300 feet. From this point westward it remains nearly horizontal for many miles, in this respect corresponding to the Schooley plain already described. In Green Ridge it is still recognized at an elevation of somewhat over 1300 feet, in Boyer Knob at an elevation of about 1500 feet, and in Nicholas Mountain at an elevation of about 1800 feet.

The attitude of the Weverton plain has many points of resemblance to that of the Schooley peneplain already described. From the Catoctin Mountain westward it rises very slowly as far as eastern Allegany County, beyond which point it rises more rapidly throughout the central portions of that county at the rate of about 30 feet in the mile to its highest recognized level in Wills Mountain.

It is difficult to correlate this plain with the broad, level-topped upland in Georges Creek and in the glades of Garrett County which reach an elevation of about 2500 feet. It is probable, as earlier explained, that the drainage of the region has changed on account of the shifting of the divide westward. At the time the Weverton peneplain was formed it is not improbable that the divide stood at the present Alleghany Front in Dans Mountain, and possibly even farther eastward for a time. If that interpretation is the correct one the higher and less reduced character of the broad valleys below the Schooley peneplain may find an adequate explanation.

The Weverton peneplain, like the Schooley peneplain, is closely associated with the geology, remnants of the ancient surface being represented, as in the case of the Schooley peneplain, by level-topped sandstone ridges, frequently less fully consolidated in central Allegany County than those representing the older surface.

HARRISBURG PENEPLAIN.—The Harrisburg peneplain, which is found well developed in the western Piedmont Plateau in the Potomac Valley and throughout the Monocacy Valley at an elevation of about 500 feet, is observed in the Great Valley at about 600 feet, where it forms the tops of the low hills that rise above the lowlands of the valley. Through-

out western Washington County this plain gradually rises to 700 feet in the district to the north of Indian Springs and to 800 feet to the west of Hancock in the broad lowland lying along the eastern flank of Sideling Hill. Farther west between Green Ridge and Polish Mountain the Harrisburg peneplain is well developed over an extensive area at an elevation of 900 feet. This region furnishes perhaps the largest tract of the-but-slightly-dissected Harrisburg peneplain of any portion of the Appalachian district. Still farther westward remnants of the Harrisburg plain are found in the broad valley between Iron Ore Ridge and Martin Mountain at a height of 1200 feet. Beyond this remnants of the plain are observed in Shriver Ridge at an elevation of about 1500 feet. To this plain may also belong the ridge lying to the west of Wills Mountain although this may well have been formed under different conditions as previously explained.

SOMERVILLE PENEPLAIN.—The Somerville peneplain which has an elevation of somewhat over 450 feet in the western portion of the Piedmont district gradually rises to the westward, having an elevation of about 500 feet in the Great Valley adjacent to the Potomac River from the valley of which it slopes gradually northward toward the Pennsylvania line. Farther westward the Somerville plain slowly rises through Washington County, reaching an elevation of about 600 feet to the west of Hancock. In eastern Allegany County it has an elevation of about 700 feet, beyond which it rises somewhat more rapidly, as in the case of the Harrisburg peneplain, to 800 feet along the Potomac River in the central part of the county. From here it rises along the tributaries of the Potomac to the northward and also along the main stream westward to somewhat over 1200 feet to the north and northeast of Cumberland. The Somerville peneplain is very well shown at a large number of points throughout the Appalachian district in the Potomac Valley but gradually disappears up the valleys of the various tributaries.

STREAM VALLEYS.

The present valleys have trenched the peneplain surfaces to greater or less depths. Along the Potomac the trenching was mainly post-Somer-

ville, but up the tributaries, where the Somerville peneplain gradually disappears, the trenching was in part produced at the time of the formation of the Somerville peneplain itself and in some instances represents an even longer period of cutting.

The streams are to a considerable extent adjusted to the present structure, producing what has been described as a trellis or grape-vine system. At times wind-gaps are found cutting the crests of the mountains and representing the location of the streams across the hard rocks before they had been tapped by the tributary of some larger stream flowing along the softer beds, generally in a direction at right angles to the original system.

At the point where the streams cross the hard sandstone ridges deep gorges result, but in the softer beds the channels are frequently wider, with low banks on either side.

ECONOMIC PHYSIOGRAPHY OF THE APPALACHIAN REGION.

LINES OF COMMUNICATION.—The obstacles offered by the successive parallel ridges of the Appalachian province delayed the westward movement of the population in colonial days and restricted the east and west lines of travel to the valleys of the Potomac, the Susquehanna, and the James. The earliest inhabitants found these natural highways already selected as the lines of communication between the distant parts of the great Indian Confederacy, and accepted the experience of the aborigines by building their roads along the same lines.

As the population of the western portions of the State increased, the demand for more perfect highways became urgent, so that before the end of the eighteenth century several well-defined lines of travel had been established between the tidewater regions along the Atlantic and the Ohio drainage. The Cumberland road extended from Washington to Cumberland via Hagerstown and Hancock, and thus followed the line of easiest travel along the valley and across the divides at their lowest points. Beyond Cumberland the road was extended across Big Savage Mountain and the Alleghany Plateau, keeping on the divide between the Potomac and Youghiogheny until it entered the valley of the latter,

which it followed to the Monongahela, and thence down stream to Pittsburg.

Later the promoters of the Chesapeake and Ohio Canal gained the right of way up the Potomac Valley which is followed to Cumberland. The course of the Potomac at Harpers Ferry and Point of Rocks offered the easiest means of communication across the Blue Ridge district, and when once occupied the Chesapeake and Ohio Canal effectually stopped the westward progress of the Baltimore and Ohio Railroad along the same route until a compromise was effected in 1832. West of Cumberland the railroads crossing the State follow the valleys of the rivers, utilizing the courses of the Potomac River, Wills Creek, Georges Creek, Jennings Run, the Savage River, and the Youghiogheny River.

NATURAL RESOURCES.—The resources of the Appalachians are varied and valuable. The early settlers found the mountains clothed with dense forests of pine and hard wood, but they lacked the means for transporting the lumber to a ready market. Even now with a canal and several railroads the cost of hauling from the forest to the point of shipment is so great as seriously to reduce the profits of the lumbering trade.

The many varieties of soils in the Appalachians are closely related to the geological formations, and their distribution is clearly influenced by the geological structure. Since most of the higher hills and sharp ridges are due to the presence of heavy beds of siliceous sandstone, the soils of the upper slopes are generally sandy and poor. Beneath these strata come beds of shales which are sometimes calcareous, so that the lower slopes, hills, and *subsequent* valleys contain soils which, while somewhat stony, give fair yields in wheat, corn, etc.

The Great Valley, with its rich limestone soil and easy means of access from the north and south, forms a broad band of the most fertile lands in the State. If it had not been for the re-elevation of the Shenandoah plain this district would be most favorable to farming. As it is, the rolling surface and steep valley slopes are somewhat difficult to till with ease. The land is so rich, however, that the whole stretch of the valley is or might be under cultivation.

The chief sources of mineral wealth in the province are the deposits of coal, iron, and cement rock. The coal beds are the remnants of larger areas preserved by their depression below the limits of erosion during the formation of the Schooley peneplain. They have proved of inestimable value to the citizens of the State. The Clinton iron ores were formerly very valuable, but in the present state of the iron market they are of relatively little importance. The cement rock is obtained from certain portions of the Silurian limestones and is the basis of a growing industry. The exposures are favorably situated along the lines of travel, so that the mills have every advantage for the shipment of their product.

INHABITANTS.—The physiography, industries, and resources of the Appalachain province have strongly influenced the character and occupation of the inhabitants, who may be grouped into several well-marked classes. In the higher, more rugged and less populated portions of the area are the mountaineers, who gain their livelihood by lumbering and desultory farming. Gathered about the rich deposits of coal, iron ore, and cement are miners, who are occupied almost exclusively in the extraction of wealth from the underlying rocks. They present a class of marked characteristics in education, training, religion, and nationality. The valleys between the mountains, especially the Great Valley, and the larger, more level areas of the glades, furnish incentive and opportunity for farming communities, which are reasonably well recompensed for their efforts in the tilling of the soil. In the cities and large towns are concentrated those who serve as distributing agents for the products of the land and the necessities of the inhabitants.

GEOLOGY.

The geology of Maryland, as well as its physiography, shows an intimate relationship to the adjacent areas upon the north and south, so that its complete interpretation can be gained only by taking into consideration the great eastern border region of which the State is not only geographically, but geologically a part. Frequent reference will, therefore, be made in the succeeding pages to the general distribution and relations of the geological formations found represented within the limits of the State, although the detailed descriptions will be confined to those features more particularly characteristic of the Maryland area.

The State of Maryland is so situated as to display, in spite of its comparatively small size, less than 10,000 square miles of land area, a remarkable sequence of geological formations. The most ancient rocks which made up the earth's crust as well as those still in the process of deposition are here found, while between these wide limits there is hardly an important geological epoch which is not represented. It is doubtful whether any other State in the Union contains as full a history of the earth's past. To make the completeness of this record in Maryland somewhat more intelligible it is well to consider the basis on which geologists are able to determine the succession of deposits.

Geology in its broadest aspects must be regarded as the science of the earth from its earliest beginnings down to the present day, and as such stands in close relationship to the science of astronomy in its study of the origin of the solar system. In the absence of any other satisfactory theory, most geologists to-day accept the nebular hypothesis of Kant and Laplace to explain the evolution of the solar system. According to this hypothesis, the solar system was developed from a mass of nebulous matter, which extended far beyond the present orbit of the most distant planet, and was rotating slowly in the direction in which the planets now rotate. As a result of rotation this mass gradually contracted and increased its speed of rotation. It was formerly thought that suc-

cessive rings were thrown off which broke and contracted into the present planets; but by analogy with the many nebulæ which have become known in the last fifty years, it is now thought more probable that the planets originated in special points of condensation of the nebula. Comparisons of the spectra of the comets and nebulæ with those of meteors led Sir Norman Lockyer to the view that these bodies were made up of swarms of meteors whose temperature was raised by impact among themselves; and he contended that the solar system had its origin in such a swarm. Prof. George H. Darwin showed that such a swarm would probably act practically like a mass of gas and that the solar system under this hypothesis would develop in exactly the same way as under the hypothesis of a gaseous origin, a high temperature being caused by the impact of the meteors analogous to that produced by the contraction of the gas. This modification of the nebular hypothesis does not require any material change in the history of the solar system. As contraction and condensation proceeded, the ancestors of the planets became hotter and hotter, and finally reached a stage like that of our present sun; as they became still denser, their power of condensation diminished, and their comparatively small masses have allowed them to cool sufficiently to become solid, though the immense sun still retains enough heat to keep it in a gaseous or liquid state. In the case of the earth, as it continued to cool it is probable that the solid rock first formed at the surface, but on account of its greater density, sank through the underlying liquid, and gradually built up a solid foundation from the center to the surface. The very small conductivity of rock for heat has only allowed a very thin shell of the earth near the surface to cool appreciably below the temperature at which it first solidified. This view has been largely strengthened by the calculations of Lord Kelvin, who assuming that heat had not been developed within the earth since its solidification in sufficient quantities materially to alter the temperature gradiant near the surface, showed that the well-known increase of temperature underground could only be accounted for on the supposition that the earth was at one time hot enough to be liquid. Within a few years Prof. T. C. Chamberlin has advanced the suggestion that the earth was built up by the accumulation

of meteors which fell at such a slow rate that the heat of impact was dissipated *pari passu,* and that the internal heat of the earth is due to the compression of the earth under the weight of its own parts. Still more recently, Prof. E. Rutherford has suggested that the internal heat is produced by the radium distributed throughout the earth. The last two hypotheses deny the assumption which is the basis of Lord Kelvin's calculation, and thus cast discredit on the resulting age of the earth; but under any hypothesis we are forced to believe that many millions of years have passed since life first appeared on the earth. We get still further conception of the vast lapses of time which these early rocks imply, when we discover that, even after the waters had become suited for living beings, a greater part of the development and differentiation of organic life went on in forms which have left no trace of their existence. Hardly a more remarkable fact confronts us in geology than the variety and the complexity of types in the earliest rocks which contain any trace of life at all. The fact, which is all the more remarkable for being attested by the best evidence from all parts of the earth's surface, compels us to assign to the history of life before its first permanent record was made, a longer period perhaps than all the time that has since elapsed, unless the view more recently advanced that acceleration of development took place in the case of the earliest sea floor-dwellers is shown to be true. The earliest forms were either unsuited for preservation or else they have been obliterated in the subsequent alteration of the rocks containing them.

All of the oldest rocks which are to-day entirely without, or with only slight traces of former life, are referred to the first great division of geological history called *Archean Time.* These oldest rocks are largely crystalline in character, so that there can be but little chance of encountering organic forms, even had they earlier existed in the strata. Even the least altered deposits, although they have afforded a few scattered remains of archaic forms at certain points, contain nothing more than the merest traces of the organisms of this early time.

When, however, life does once appear in all its variety, it is well nigh the same in all the older rocks. In the most widely separated localities

the same types recur in rocks of the same age, and this furnishes us with the key to the succession of deposits. From the time when the oldest fossil-bearing stratum was deposited until now, the story of life-progress and development is told by the rocks with sufficient clearness to be unmistakable. Local differences of conditions have probably always prevailed, as they do now, but the same types of organisms have always lived at the same time over the entire globe, so their remains serve as sufficient criteria for the correlation of the strata which contain them. The sequence of life-forms once made out gives us, for the whole earth, the means for fixing the order of deposits even when this is most profoundly disarranged by foldings of the strata into mountains or by other earth movements.

Geologists distinguish three principal divisions in the history of life as read in the record of the rocks. During the earliest of these great time-divisions, archaic forms of life flourished—uncouth fishes, crustaceans, mollusks, and tree-ferns—most of them very unlike those now extant. On this account this is known as the period of most ancient life or *Paleozoic Time*. To this succeeded a long lapse of ages when enormous reptiles predominated, associated with other types more like those that now inhabit the globe. To this is given the name of middle life or *Mesozoic Time*. Finally living things began to assume the form and appearance with which we are familiar, so that this last grand time-division, which includes the present, is designated as the period of recent life or *Cenozoic Time*.

Each of these three grand divisions of geologic time is in its turn separated into shorter subdivisions called *Periods*, characterized by their own peculiar types of life; and the several periods themselves are divided into *Epochs*, which vary more or less in character according to the region where they are developed. For this reason the chronological and stratigraphical divisions require an independent nomenclature, although this duality of geological classification can in most instances be readily adjusted to the contingencies of each district. The stratigraphical divisions are usually designated by local terms.

In Maryland we have representatives not merely of the great time-

FIG. 1.—VIEW OF CUMBERLAND SHOWING THE NARROWS OF WILLS MOUNTAIN, ALLEGANY COUNTY.

FIG. 2.—VIEW OF THE VALLEY OF MONROE RUN CUT IN THE OLD PENEPLAIN, GARRETT COUNTY.

VIEWS OF APPALACHIAN SCENERY.

divisions, but of each subordinate period, as well as of many of the epochs. This may be best appreciated by referring to the accompanying geological map and to the table of geological formations which follows.

TABLE OF MARYLAND FORMATIONS.

SEDIMENTARY ROCKS.

Cenozoic.		
Quaternary.		
Recent.		
Pleistocene	Talbot	= Columbia Group.
	Wicomico	
	Sunderland	
Tertiary.		
Pliocene	Lafayette.	
Miocene	St. Mary's	= Chesapeake Group.
	Choptank	
	Calvert	
Eocene	Nanjemoy	= Pamunkey Group.
	Aquia	
Mesozoic.		
Cretaceous.		
Upper Cretaceous	Rancocas.	
	Monmouth.	
	Matawan.	
	Magothy.	
Lower Cretaceous	Raritan	= Potomac Group.
	Patapsco	
Jurassic (?)		
Upper Jurassic (?)	Arundel	
	Patuxent	
Triassic	Newark.	
Paleozoic.		
Permian	Dunkard	= Coal Measures
Carboniferous.		
Pennsylvanian	Monongahela	
	Conemaugh	
	Allegheny	
	Pottsville	
Mississippian	Mauch Chunk.	
	Greenbrier.	
	Pocono.	

Devonian.		
Upper Devonian	Hampshire.	
	Jennings.	
	Chemung.	
	Portage.	
	Genesee.	
Middle Devonian ...	Romney.	
	Hamilton.	
	Marcellus.	
Lower Devonian	Oriskany.	
	Helderberg.	
	Becraft.	
	New Scotland.	
	Coeymans.	
Silurian	Cayugan.	
	Manlius.	
	Salina.	
	Niagara.	
	Clinton.	
	Tuscarora.	
	Juniata.	
Ordovician	Martinsburg	? Peachbottom slate. ? Cardiff quartzite. Wissahickon phyllites and schists.
Cambrian	Shenandoah..... (upper part)	
	Shenandoah..... (lower part)	? Cockeysville marble.
	Antietam	
	Harpers	? Setters quartzite and mica schist.
	Weverton	
	Loudon	
Archean.		
Algonkian	Baltimore gneiss (in part).	

IGNEOUS ROCKS.

Mesozoic.	
Triassic	Diabase.
Paleozoic-Archean.....	Pegmatite.
	Peridotite, pyroxenite, and serpentine.
	Basic volcanics—Meta-andesite, meta-basalt.
	Acid volcanics—Meta-rhyolite.
	Granites.
	Gabbro, norite, meta-gabbro.
	Baltimore gneiss (in part).

As has been pointed out in the physiographic description of the State, Maryland's territory falls naturally into three sharply contrasted provinces: an eastern coastal plain bordering the Atlantic Ocean and surrounding the Chesapeake Bay; a central plateau; and a western region of mountains. These three main physiographic divisions were found capable of further differentiation into seven topographic belts, and these seven subordinate regions are each composed of a distinct series of geological formations. This may be perceived readily by examining the geological map.

The separateness of the formations is less pronounced in the two divisions of the Coastal Plain, although the northeast-southwest trend of the nearly horizontal beds produces a predominance of the later Cenozoic formations on the Eastern Shore and of the Mesozoic and early Cenozoic deposits on the Western Shore.

In the Piedmont Plateau the twofold character of the province is more marked geologically. On the eastern side of Parrs Ridge the ancient sediments are highly metamorphosed by a development of new textures and minerals due to the recrystallization of the material under great pressure. This division is also marked by the presence of large masses of granular igneous rock which consolidated at great depths beneath the surface of the earth. On the western side of the median ridge the sediments are less metamorphosed and less thoroughly recrystallized although their original textures have been more or less obliterated. There is also marked lack of deep-seated igneous rocks which are here represented by smaller masses of surface volcanics, both acid and basic, which have been less thoroughly recrystallized than their analogues in the eastern district. Along the western border of this western district, between the Monocacy and the mountains, the early Paleozoics have only slightly changed, the blue limestones of the Frederick Valley resembling the contemporaneous limestones of the Hagerstown Valley farther west. Immediately east of the mountains the earlier rocks are covered with the slightly inclined unmetamorphosed red and gray sandstones and conglomerates of Mesozoic age and intruded by the diabase dikes of the same period.

The threefold division of the Appalachian Region corresponds approximately to the threefold division in the sequence of the Paleozoic strata. The Blue Ridge and Great Valley are made up largely of Cambrian and Ordovician beds, in places so developed or eroded as to expose the associated igneous rocks; the Appalachian Mountains proper are made up of sharply folded Silurian and Devonian strata, each easily recognized by the characteristic life-forms; while the Alleghany Plateau is mainly composed of more gently folded later Devonian and Carboniferous deposits, carrying the valuable coal seams of the Cumberland basin.

Such, in brief, is the distribution of the geologic formations in Maryland and their connection with the easily recognized types of surface configuration occurring within the State. The sequence is of remarkable completeness and of great interest on account of the many types of topography and soils which the various formations produce. In the succeeding pages the geological history of each of the three provinces—plateau, mountains, and coast plain—will be traced out in more detail. A somewhat different sequence will be followed than in the preceding physiographic sketch, the Piedmont Plateau being considered first, as it is the oldest, and then in order the Appalachian Region, which is next in age, and finally the Coastal Plain, which is the youngest portion of the State. Constant reference to the geological map will be found of service in following the descriptions which will be given.

THE PIEDMONT PLATEAU.

A clear understanding of the various formations found within the limits of the Maryland portion of the Piedmont Plateau can only be gained through a consideration of the conditions present throughout the great Piedmont area of eastern North America, which, as already described, is well recognized as a broad upland lying at the eastern slope of the Blue Ridge, extending from Alabama northward as far as New York. Throughout this region are exposed numerous highly crystalline gneisses and schists associated with crystalline limestone, quartzites, and igneous rocks here and there covered by Triassic shales and sandstones. Northward from New York the physiographic unity of the

Piedmont Plateau is less evident but the same highly crystalline rocks may be traced across New England to the Maritime Provinces of Canada. Within this whole province the rocks are so crystalline as to make fossils rare, while their structure presents some of the most puzzling problems in American geology.

The deciphering of the various formations occurring within the Piedmont is still in progress and many areas are yet unstudied, but the areal distribution of the various deposits throughout the territory north of Virginia has been determined with sufficient accuracy to indicate the various types of rock present.

STRUCTURAL RELATIONS OF THE PIEDMONT FORMATIONS.

A knowledge of the character of the major structures along the eastern Atlantic coast from New Jersey southward and the position of the Maryland deposits with respect to these structures is also necessary for a proper understanding of the structural relations of the Piedmont deposits of Maryland. The facts given below are familiar to students of American geology, but it seems desirable to restate them in relation to the Piedmont rocks under discussion.

Among the more striking features of the continental structure along the eastern coast of the continent is the generally northeasterly trend of the folds in the rocks constituting the Appalachians. This structure holds for most of the territory from Alabama to Maryland and from New York City northward to the Canadian boundary. In the regions of Maryland and Pennsylvania, however, there is a marked deflection of these parallel folds, with the result that they are found to trend in Pennsylvania almost due east and west from the Maryland line to the Delaware. Beyond the Delaware the formations gradually resume their northerly trend.

Starting on the west with the faulted and sharply folded anticlines of the Blue Ridge, bordered on either side by Cambrian rocks and associated igneous masses, one may pass successively eastward through Maryland across the gently eastward sloping limestones of the Frederick Valley, which in turn, appear to dip under the so-called semi-crystallines

or phyllites of the Piedmont. Between the eastern limits of the limestones and the western boundary of the marbles of the eastern division of the Maryland Piedmont, in Frederick, Howard, and Carroll counties, is an area which needs more study before its structure can be adequately described. Preliminary work has, however, shown a vast mass of more or less metamorphosed rocks including old volcanics, both acid and basic, gneisses and schists, limestones and phyllites which are similar to the rocks of the eastern division of the Piedmont. These various rocks show the same order of occurrence, but the manner in which this sequence is repeated again and again has not yet been deciphered. While the detailed structure is not fully known, it seems probable that there exists in this part of the State a very open general structure by which the beds lie almost horizontal in their major folds, with a much compressed and occasionally overturned subordinate structure, which, because of the numerous minor folds, give to the rocks an appearance of highly inclined and complicated folding.

East of Parrs Ridge the rocks are more crystalline and the folding is a little more pronounced in its general features, with a change in the strike of the axes of the major folds in conformity with the change of direction in the continental folding previously described. Between the area of more open folding, just mentioned, on the northwest and the cover of Coastal Plain deposits on the southeast one may readily recognize in the Maryland area the broad synclinal trough of the eastern phyllite belt and that of the Cockeysville marble, separated by a dome-like anticline of the Baltimore gneiss extending approximately from Reisterstown to Jarrettsville. Still farther east, separated from the Cockeysville synclinorium in part by a southern anticlinal border of Baltimore gneiss, is a broad zone of igneous rocks composed of gabbros, granites, and other plutonic types which occupy most of the eastern border of the Piedmont between Wilmington, Delaware, and Laurel, Maryland.

Minor igneous masses are found with the same general trend, and these are seen to be rather closely associated with the structure lines of the region, occupying as they generally do anticlinal axes. This rela-

tion to the structure lines is particularly well shown in the case of the long belt of serpentines extending from Lancaster County, Pennsylvania, across the Susquehanna River almost to the nose of the northern anticline of the Baltimore gneiss. Farther to the southwest, almost on the strike of this antielinal axis, begins a long and somewhat narrow body of granite extending from Sykesville, on the Baltimore and Ohio Railroad, southward past Washington and thence continuing probably as far as the region about Fredericksburg, Virginia.

METAMORPHISM.

The older rocks of the Piedmont have suffered more or less recrystallization and textural modification since their formation. This metamorphism has not been uniformly distributed over the entire region, but is much accentuated in the eastern portion of the Maryland area, where the rocks are thoroughly recrystallized and often lack in great measure their original textures. The original clays and sands of the sedimentaries have been changed to micaceous schists, gneisses, and quartzites and the various igneous rocks have been greatly modified in texture and occasionally in mineralogical composition. The textural change which is most evident is a marked development of lamination or schistosity which is to be noticed in all of the rock types. The change from massive to schistose rocks has not been uniform over the entire district or even over the more metamorphosed eastern section, but seems to be locally accentuated along lines which probably indicate zones of greater dynamic action.

The schistosity developed in the rocks of the Piedmont partakes of the general northeast-southwest trend of the province and varies in dip, sometimes to the eastward and sometimes to the westward. It is present in both the sedimentary and igneous rocks. In the latter, it is sometimes so strongly developed that the resulting rocks, in small areas, present the appearance of metamorphosed sediments, although one may find all gradations between the unaltered massive types and the equivalent fissile schists. In the sedimentary rocks the schistosity is developed to a de-

gree which greatly obscures the original bedding and oftentimes renders the determination of bedding-planes impossible.

The development of schistosity is accompanied by a recrystallization of the affected rocks, which may simply result in a new development of the mineral species found in the original rock or in a molecular rearrangement producing many new minerals. Thus the gneisses are composed of recrystallized quartz, feldspar, and micaceous material, while the feldspars of some of the granites, the meta-rhyolites, gabbros, and diorites have been changed to epidote, and the pyroxenes to fibrous or compact hornblende. The new minerals usually lie with their longer axes parallel to the planes of schistosity. In the case of the mica-schists, phyllites, and slates the original material has been changed to muscovite, chlorite, and quartz with accessory minerals such as garnet, staurolite, cyanite, etc.

RELATIONS OF THE EASTERN AND WESTERN DISTRICTS OF THE PIEDMONT.

The division of the Piedmont Plateau into an eastern district composed of much metamorphosed, highly crystalline rocks, and a western district characterized by less metamorphosed, so-called "semi-crystalline," rocks has long been recognized but was first sharply emphasized by the late Professor Williams in 1891, who regarded the eastern area as composed of rocks far more ancient than those in the western district and that they extended westward, forming a floor upon which the younger phyllites were deposited. He also believed that the eastern district had already been much folded and metamorphosed before the phyllites had been laid down. As a conclusive argument against the identity of age of the semi-crystalline rocks of the western district and the holocrystalline rocks of the eastern district, he summarized five points which have been much weakened by later more detailed work in the area. There remain, however, many noticeable differences between the rocks of the region about Baltimore and those of Carroll, Howard, and Frederick counties and the division into districts is still retained in the present discussion

because of these differences, and also because the amount of knowledge gained by the present Geological Survey is very different in respect to the two districts. The eastern district has been mapped in detail and the facts regarding the geology of this region are now sufficient to determine many of the problems which this exceedingly complex region presents. The western district, on the contrary, because of the lack of suitable maps, is much less completely understood and the statements concerning it must be regarded as based upon much less satisfactory information.

The rocks of the Piedmont of Maryland as a whole, may be divided into several groups, the highly crystalline metamorphic sedimentaries of the eastern district, with their associated igneous rocks, their less altered equivalents of Cambro-Ordovician age in the western district, with their associated volcanic rocks and the much younger sedimentary and igneous rocks of the Mesozoic. The various rocks which are most prominently developed will be more fully discussed in the succeeding pages.

EASTERN DISTRICT.

The rocks of the eastern district of the Piedmont show a clearly established sequence which may also be recognized, in part at least, at many points in the less well-known western district. Similar sequences in rocks of known age are recognized at many points in the Piedmont areas of adjoining states and, while there are yet many unexplained difficulties, the assignments of geological age given in the accompanying table appear to be those most in harmony with all the facts now at hand.

FORMATIONS OF THE EASTERN PIEDMONT PLATEAU.

SEDIMENTARY ROCKS.

Paleozoic.	
Ordovician (?)	**Peachbottom slate.**
	Cardiff quartzite.
	Wissahickon phyllites and schists.
Cambro-Ordovician (?)	**Cockeysville marble.**
Cambrian (?)	**Setters quartzite and mica schist.**
Archean.	
Archean or Algonkian (?)	**Baltimore gneiss (in part).**

IGNEOUS ROCKS.

Mesozoic.	
Triassic	Diabase.
Paleozoic-Archean	Acid volcanics (meta-rhyolite).
	Pegmatite.
	Peridotite, pyroxenite, and serpentine.
	Granites.
	Gabbro, norite, and meta-gabbro.
	Baltimore gneiss (in part).

Highly Metamorphosed Sedimentary Rocks.

The rocks lying east of Parrs Ridge and forming the eastern district of the Piedmont, with the exception of a few dikes of Mesozoic diabase, consist of metamorphosed sediments, and a diversified complex of intruded igneous rocks which have themselves been more or less metamorphosed from their original massive condition to schistose or laminated rocks. Each of the metamorphosed formations, beginning with the oldest, will be discussed in turn and then the various igneous rocks which represent one or more periods of igneous activity in a common parent magma.

THE BALTIMORE GNEISS.—The oldest formation in Maryland is the Baltimore gneiss, which occurs in several well-defined areas between the Susquehanna and Potomac rivers. The easternmost of these Baltimore gneiss occurrences is within the area of Cecil County, east of the Susquehanna River, and extends from this point southwestward, widening to an area of five miles or more in breadth where it is overlain by Coastal Plain deposits in Harford County. This formation is limited on either side by igneous rocks. A northern outlier a mile or less in width extending for several miles southwestward from the Susquehanna River probably represents a detached portion of this larger mass lying a little to the south.

The second area of Baltimore gneiss is found in an anticlinal dome, 15 miles long and 5 miles broad, lying on either side of the Northern Central Railroad 10 miles south of the Mason and Dixon Line and 20 miles north of Baltimore. Three smaller areas occur in the vicinity of

Baltimore. Two of them are portions of anticlinal domes which are either completely enclosed by overlying sediments or cut off by faults and igneous rocks, while the third, underlying the northwestern part of Baltimore City, is entirely surrounded by gabbro and other igneous masses and is overlain in great measure by the Coastal Plain deposits.

The rocks in each of these areas consist of highly crystalline gneisses composed of quartz, feldspar, and mica, with accessory minerals, which are so distributed as to produce well-marked, gray banded-gneisses, the individual bands of which vary from a fraction of an inch to several feet, the average thickness, however, being quite slight. Some of these bands are highly quartzose, resembling a micaceous quartzite; others are rich in biotite or hornblende, producing dark schists, which in a hand specimen are indistinguishable from metamorphosed igneous masses. Within the areas of Baltimore gneiss are also numerous small bodies of metamorphosed granites and more basic igneous rocks, which have been intruded into the gneiss and subsequently metamorphosed until they are practically indistinguishable from it. The differences in character can now and then be recognized, but it has not been found possible to carry the mapping of these small igneous intrusions from one exposure to another.

Sometimes separated by an appreciable unconformity and at other times separated by no apparent line, the Baltimore gneiss, unless bounded by igneous rocks or faults, is overlain by the next succeeding formation.

THE SETTERS QUARTZITE.—The Setters quartzite occurs usually as a narrow rim on the flanks of the areas of Baltimore gneiss, but is not continuous or always present. Thus in the easternmost areas of Baltimore gneiss previously described no Setters quartzite is recognized. It is found, however, skirting the anticlinal dome of Baltimore gneiss in northern Baltimore County, where it occurs as a single band on the eastern end of the dome and as a series of somewhat parallel ridges on the northwestern slope of the anticline, where the contact between the underlying gneiss and the quartzite is near the present surface of the country. On the southern slopes of the dome the quartzite is frequently lacking along the western half, but is found in varying thickness along

the eastern part of the anticline. The quartzite also occurs in the smaller anticline about a granite mass in the vicinity of Warren, just south of the previously described anticlinal dome.

Quartzite in Setters Ridge occurs as a continuous belt about the small anticlinal dome lying 10 miles northwest of Baltimore between the Northern Central and Western Maryland railroads. The formation here is of rather uniform thickness and stands at a steep, sometimes overturned, angle on the flanks of the gneiss. Across the valley of Lake Roland is a similar, though less well-defined, anticlinal arch of more complicated structure, along the side of which may be seen the Setters quartzite, extending from the Northern Central Railroad on the west, eastward as far as the nose of the anticline at Glenarm, where it passes under the overlying formations, or is cut off by igneous rocks.

On the western side of the Baltimore area, extending southward through Howard County, may be found occasional exposures of Setters quartzite between the gneiss and the marble. The work in this area has not been completed, but it seems quite probable that the quartzite will be found developed as a more or less continuous stratum lying between the Baltimore gneiss on the east and the overlying marble on the west, as it has already been recognized in this position at many points.

The quartzite is a fine-grained, somewhat saccharoidal, thin-bedded rock of white or cream color in its typical development along Setters Ridge. At this point the beds are usually separated by thin films of muscovite or sericite in small sparkling flakes. On the surface between the individual beds are black tourmalines, which have been more or less disturbed, as is shown by the stretching which they have undergone. The Setters quartzite as a formation is, however, somewhat more variable than was at first supposed from the study of the original locality on the south side of Green Spring Valley. Locally, the rock may become very vitreous and massive. At other times, it becomes more argillaceous, with a development of garnets, staurolite, and other accessory minerals. The development of such minerals causes this quartzite formation to simulate in lithologic character the overlying Wissahickon mica-schist, and at times occasions considerable confusion. The more quartzose

layers may be intimately interbedded with the more micaceous and garnetiferous ones toward the center of the formation, and the upper portion of the formation when well developed may be highly micaceous and garnetiferous. The development of this micaceous phase of the Setters formation is especially marked along the valley at Stringtown, in the northeastern extension of the limestone valley near Glenarm, and in the small anticline at Warren, especially near the mouth of Royston Branch. In all of these instances the micaceous member of the quartzite is seen to *underlie* the marble and to overlie or to be interbedded with the more quartzose phases of the Setters formation.

THE COCKEYSVILLE MARBLE.—The maximum development of the Cockeysville marble is found in the synclinorium lying between the anticlines of Baltimore gneiss and quartzite about 10 miles north of Baltimore City, and on the flanks of the anticlinal dome northeast of Reisterstown. It is here found underlying the Wissahickon mica-schist, and overlying the quartzite, the various formations recurring at the surface through numerous foldings, the contact between the marble and the adjacent formations lying very close to the present surface of the country. Southwest from these larger areas of Cockeysville marble the formation may be traced with little or no interruption in well-defined valleys to the vicinity of Clarksville, in Howard County. The details regarding the southwestern exposure of the Cockeysville marble are not all worked out, and it seems quite probable, from the facts at hand, that there is a fault striking northwest and southeast and extending southeastward to a point near Laurel.

The marble occurring in these areas is in the majority of instances rich in magnesium and should be called a dolomite. This is particularly true at the type locality, Cockeysville, but there are frequent changes in the amount of magnesium present, and one often finds magnesium-free, or magnesium-poor rocks in proximity to the dolomitic varieties. The changes in composition are sharp and generally easily recognized by the quarrymen, who are assisted by the fact that the dolomitic marble averages finer grained and richer in magnesium-mica than the better-burning, magnesium-poor rocks. Attempts have been made by acid tests in

the field to recognize some stratigraphic distribution of the magnesium and calcium-rich rocks, but these have failed. On the contrary, it has been found that there are rapid, sharp alterations of the two types in a way which strongly suggests that whatever dolomitization occurred must have taken place prior to emergence from the sea and probably contemporaneously with the formation of the deposit. No fossils have been found in the marbles, and as they are highly crystalline, it is very doubtful if any will be found.

THE WISSAHICKON PHYLLITES AND SCHISTS.—The position which this formation holds in the stratigraphic sequence of rocks appears very clear in the district under discussion, where in each instance it is apparently younger than the marble and consequently younger than both the Setters quartzite and the Baltimore gneiss. In contiguous areas there are phenomena which suggest that this is not the true sequence and that this formation is really older even than the Baltimore gneiss. Until this suggested abnormal sequence can be established beyond reasonable doubt, it seems wiser to hold to the relations which the Maryland area suggests. The difficulty arises from two facts regarding the Wissahickon formation as recognized in Maryland. The first is that while the apparently older marbles and quartzites show few intruded igneous masses, the more crystalline phases of the Wissahickon show them in abundance. This is contrary to what might be expected but is, of course, a possible circumstance. The second difficulty arises from the occurrence of highly crystalline garnet-mica-schists and gneisses and less crystalline chlorite and sericite schists. The line of separation between those two phases may be drawn but the gradual change from one phase to the other is more indicative of a gradation than of a fault such as would be required if these rocks are older than the Baltimore gneiss; and the frequently crenulated line of the contact, as found by Keith in Howard and Carroll counties, also points to the adopted relationship.

The more crystalline garnet-mica gneisses and schists of the Wissahickon lie east of the broad phyllite, or less crystalline phase, which extends southwestward from the Susquehanna River to southeastern Carroll County. The formation in this part of its development broadens

from a narrow band at the Susquehanna River by increased folding about the anticlines of Baltimore gneiss and synclines of Cockeysville marble into a belt 10 to 15 miles broad as it crosses the Northern Central Railroad. From this point it narrows somewhat to the southwestward, and the area is occupied in large part by the large mass of granite passing from Sykesville southwestward to Washington and extending thence many miles southward into Virginia.

North of the phyllite occurs a corresponding mass of the more crystalline Wissahickon schist. When, however, this is compared with the rocks of the southern limb of the synclinorium, it is found that these rocks average slightly less crystalline and less metamorphosed than the corresponding rocks on the south. There is also a corresponding lack of deep-seated igneous rocks. That they represent the same horizon seems to be well established by the areal distribution of the various masses, although it has been found impossible to carry the mapping of individual beds more than a few miles along the strike, and hence it has seemed inadvisable to attempt detailed representation on the maps. The Wissahickon schists on the west side of the syncline of phyllites passes southwesterly across the State, narrowing considerably in the southern portion of Carroll County and widening somewhat in passing southward to the Potomac River.

The areal distribution of the Wissahickon suggests an increased crystallinity eastward and decreasing crystallinity westward. To the eastward are the deeper igneous rocks in large masses, on the west smaller areas of surface volcanics. It remains to be seen whether the occurrence of the more crystalline phases with deep-seated igneous rocks is the cause of the increased crystallinity or not.

The band of *phyllite,* sericitic, and chloritic schists forming a synclinal trough extending from the Susquehanna southward, enters the State from York County, Pennsylvania, continues as a belt, varying from 5 miles in breadth at the Susquehanna to about a mile at Whitehall, on the Northern Central Railroad, whence it gradually widens southward to an average breadth of 3 miles in the southern part of Carroll County. The areal distribution indicates a synclinal trough of considerable extent

and well-defined character, which is warped at its center, and plunging northeastward and southwestward and reaching its maximum depth in the vicinity of Delta, Pennsylvania, where the Cardiff quartzite-conglomerate and Peachbottom slates are found folded within it. The southern termination of this phyllite belt has not been mapped in detail and the limits given on the geological map are provisional.

The rocks constituting the phyllite portion of the Wissahickon formation are essentially sericitic, chloritic, and occasionally talcose schists, which clearly show their sedimentary origin, and have been less metamorphosed than the Wissahickon schists already described. Two views are held regarding their relations to the contiguous formation. They may be regarded as an infolded considerably younger series, as held by the late Professor Williams, or they may represent a less metamorphosed upper portion of the Wissahickon formation. It seems probable that there is truth in both views, and during recent years the impression has developed that in Maryland they represent the upper portion of the Wissahickon formation, which has been less metamorphosed, but that they are not separated by any great interval from the more crystalline Wissahickon schists which border them on either side, and from which they cannot be separated by any sharp line.

When crossing the boundary between the two formations one may recognize within comparatively short distances that a boundary has been passed, but up to the present no sharp contacts between the two portions of the Wissahickon formation have been found.[1]

THE CARDIFF QUARTZITE.—The Cardiff quartzite and quartzose conglomerate occur as a small and rather insignificant formation in the northeastern part of Harford County. They form a narrow band apparently resting on the phyllite and underlying the Peachbottom slate,

[1] The interpretation of the phyllites here discussed does not necessarily or even probably apply to the more extensively developed phyllites of the western district, though some of the latter may be equivalent to the phyllites of the eastern district. Nor does it apply in more than a general way to the corresponding Hudson schists of Pennsylvania which are found as a continuation of this belt on the south side of the Chester Valley in Lancaster and Chester counties where the more schistose and less crystalline rocks are found immediately above the limestone.

GEORGES CREEK VALLEY, NEAR BARTON, ALLEGANY COUNTY.

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wrapping around the latter and extending beyond its southwestern limits to the valley of Broad Creek. It is this formation which yields numerous boulders along the base of Slate Ridge. It is seldom well exposed and is of limited extent.

This formation may be represented in Rocky Ridge at the Rocks of Deer Creek, but it has not been possible to establish this point and many facts militate against the probability of such a correlation.

THE PEACHBOTTOM SLATE.—The Peachbottom slates extend as a narrow strip within the limits of the Cardiff quartzite and pass beyond it across the Susquehanna River into Lancaster County, Pennsylvania. This formation is composed entirely of characteristic blue-black slates, similar to the material put on the market, and the homogeneity of the formation is now so complete that it is impossible to perceive within it any succession of sedimentary beds. It is usually considered, however, that the central portion of the ridge differs somewhat from the sides, and that this portion represents the uppermost member in a tightly pinched syncline.

The Peachbottom slates have been somewhat questionably assigned on doubtful fossil evidence to the Hudson River horizon of the Ordovician. It may even be that these slates and the Cardiff quartzite beneath are only local variations in the great mass of phyllites or micaceous and chloritic schists of contiguous areas.

Igneous Rocks.

The metamorphosed sedimentary rocks already described constitute only part of the area of the eastern district of the Maryland Piedmont. Into them have been intruded vast masses of molten material which have consolidated for the most part into two main types, gabbro and granite, with smaller masses of peridotite, pyroxenite, and their alteration product serpentine, allied to the gabbros, and other smaller masses of pegmatite and meta-rhyolite allied to the granite.

The geological period in which these masses were intruded is still somewhat uncertain, depending upon the final determination of the age of the Wissahickon formation, but the manner in which they were formed is rather satisfactorily established to be as follows:

A large reservoir of molten material, slightly more silicious than the gabbro, existed beneath the Piedmont region from New Jersey southward at a great depth below the ancient surface of the earth and much below our present surface. During geologic time this material was gradually separated into masses poorer and richer in silica than the average. The former gradually cooled into what is now gabbro, the latter into our present granite. The process of separation into parts continued producing ultimately the extremely basic peridotites and allied rocks, and the correspondingly highly silicious pegmatites and meta-rhyolites. The gabbroic material was intruded in the then existing rocks in huge masses, one of them extending over much of the territory from Trenton, New Jersey, to Laurel, Maryland. The granitic material consolidating slightly later formed the extensive areas of granite, and still later, toward the end of this igneous activity, the more basic peridotites and pyroxenites were produced, and lastly the highly silicious residue formed pegmatite dikes which are widely scattered over the area in small masses. These rocks consolidated many thousand feet beneath the existing surface, only the meta-rhyolite consolidating near what was then the surface of the country.

Subsequent to the formation of all these rocks the overlying material was removed by the degrading action of the streams, bringing the deeply-buried masses to the surface as they now appear.

THE GABBRO, NORITE, AND META-GABBRO.—The oldest, as well as the most extensive, of these igneous rocks which intruded the Baltimore gneiss and other existing rocks is the gabbro. There are three main areas of these rocks within the limits of the State—the Stony Forest area of Harford and Cecil counties; the great belt or sheet which extends from the north of Conowingo, on the Susquehanna River, in a south-southwest direction to Baltimore City; and the irregular intrusive area which is mainly developed to the west of Baltimore and extends thence as far south as Laurel.

The gabbro and norite are rather fine-grained aggregates of hypersthene, diallage, plagioclase (bytownite), and magnetite, with varying

amounts of apatite and brown hornblende. The unaltered gabbros are usually massive, heavy, and dark colored. With the alteration, the color changes through a pale buff to the characteristic deep, reddish brown. By an increase in magnesia the gabbros pass by transition towards the peridotites and pyroxenites; or in alumina, to highly feldspathic rocks; or in silica, to others which have free silica forming blue grains.

The action of pressure which has caused the recrystallization of the gneiss and marble is also well marked in the gabbros. It has caused the iron constituent, pyroxene, to change to another green mineral hornblende; and has in some cases left the rock as massive as at first, or in other cases rendered it schistose. The resulting rock is called *metagabbro* or gabbro-diorite. The change has always been most complete where the mass of gabbro is small, as in the narrow beds which connect the larger areas. This change is well shown along the Belair road near Baltimore and in the Mt. Hope cut of the Western Maryland Railroad.

The gabbro offers great resistance to the ordinary processes of decomposition, and hence its boulders are strewn abundantly all over the area, which it occupies. It is at the same time so hard, so heavy, and so jointed that it could not be quarried to any advantage as a building stone. The loose blocks are much used for constructing stone walls or foundations, and occasionally whole buildings are erected of them. This rock when crushed furnishes one of the best road-metals found in the State.

THE GRANITES.—The second in extent and the first in commercial importance among the igneous rocks of the eastern Maryland Piedmont are the granites. They are found in richest development about Port Deposit and Frenchtown on the Susquehanna River; at Woodstock and Ellicott City on the Patapsco River; at Guilford on one of the branches of the Patuxent River; near Washington on the Potomac; and in the great lenticular area extending northward from the latter point to Sykesville on the main line of the Baltimore and Ohio Railroad. In these areas are active quarries furnishing high-class building stone. Besides these major masses are smaller ones, as at Cockeysville and Franklinville, which have not been developed commercially.

The term granite is here used in its broader and more familiar sense

for the large and common group of granular rocks which are usually of a somewhat mottled light gray or pink color and almost always carry two minerals, quartz, and feldspar, as essential constituents. Besides these which constitute the mass of the rock, there are dark colored iron-bearing minerals, such as black mica, or biotite, hornblende, and occasionally pyroxene. Each of these may be distinguished by the eye unaided by the lens, and besides there are many others only recognizable with the aid of the microscope. The term includes rocks technically known as granite, granitite, monzonite, diorite, et cetera.

The areal distribution and economic characteristics of the granites are more fully treated under the discussion of the building stones among the Mineral Resources of the State.

THE PERIDOTITE, PYROXENITE, AND SERPENTINE.—The third type of eruptive rocks which penetrated the gneiss complex is younger than the preceding, but genetically allied to the gabbro. These two types are connected by many intermediate varieties; and these more basic rocks, which break through the gabbros as well as through the gneiss, may be regarded as having resulted from the gabbro magma which had become relatively poor in alumina, or in alumina and silica. The absence of alumina would prevent the formation of feldspar, and hence in the first case crystallization produced an aggregate of pyroxene (bronzite and diallage) called *pyroxenite* (websterite); while in the second case an aggregate of olivene and pyroxene with more or less magnetite was the result. This type is called *peridotite* (lherzolite).

The two non-feldspathic types of eruptive rocks, pyroxenite and peridotite, are peculiarly subject to alteration. The pyroxene, when it occurs alone, tends to pass into secondary hornblende, and this in turn gives rise to talc. This is the origin of some of the extensive beds of steatite in eastern Maryland and Virginia. The talc is always mixed with more or less pale fibrous hornblende (tremolite) and chlorite. When, as in the peridotite, olivene accompanies the pyroxene, especially if it is bronzite, the rock tends to form serpentine instead of talc. The serpentine also contains secondary hornblende formed from the diallage.

Both types of non-feldspathic eruptives are very intimately associated.

They usually do not cover large areas, but occur in small lenticular patches. Varieties intermediate between the two extremes are common, so that the two alteration products, steatite and serpentine, are even more intimately mingled than the rocks themselves. These ultra-basic rocks are most abundantly developed in the serpentine area of Harford County which extends southwesterly across a corner of Cecil County from the "State line" serpentine area of Lancaster County to the vicinity of Jarrettsville. Other areas of considerable extent occur northwest of Baltimore, as at Bare Hills and Soldiers Delight, and in Montgomery County in the vicinity of Gaithersburg.

THE PEGMATITE.—The pegmatites, which are coarse-grained aggregates of quartz, feldspar, and occasional accessory rarer minerals, probably represent the last products of the consolidation of the magmatic reservoir from which all the igneous rocks of this region were originally derived. They are the richest in silica, alumina, and the alkalies, poorest in iron and magnesium, and coarsest in grain. These features suggest that they were formed when the residual magma, still highly heated, was scarcely more than an aqueous solution of the constituents which these rocks contain. They fill the cracks due to the contraction of the cooling rocks or orogenic movements, and are found most abundantly along the borders of the other igneous masses. This is especially true for the edges of the serpentine and gabbro masses and on the borders of the granitic areas. They occur irregularly through the rocks and their presence is usually indicated by an abundance of boulders or white chalk-like streaks in the roadside cuttings. They are abundantly developed in the valley of the Patapsco in Baltimore, Howard, and Carroll counties and along the Susquehanna in the vicinity of Castleton and Conowingo; where they are of sufficient size and purity to become of some commercial importance as the source of feldspar and "flint" used in pottery works.

THE ACID VOLCANICS (META-RHYOLITE).—Along the lower Susquehanna gorge in the vicinity of Frenchtown and Havre de Grace are a few dark colored rocks of greenish hue due to their contained epidote. These "greenstones" occur in small dikes cutting the adjoining rocks

and may be traced away from the river on either side but especially to the eastward in Cecil County where they are more abundantly developed in the Principio Valley and at "Gilpin Rocks" near Bay View. At first sight, they appear rich in iron-bearing minerals and not unlike the gabbro, but chemical and microscopical analyses show that they are in reality old lavas of the composition of granite, i. e., rhyolites, which have been changed by the vicissitudes to which they were subjected during the long history of earth changes which this region has undergone. They are of little areal importance but are of considerable interest since they represent almost the only evidence of former volcanic activity in the eastern district of Maryland.

THE MESOZOIC DIABASE intrudes all of the older crystalline rocks in a series of dikes that may be traced with occasional interruptions across the entire eastern district of the Piedmont. The first of these series enters Cecil County from Pennsylvania and extends into Harford County. A second series enters the State near the Harford-Baltimore County line and may be traced across the latter county into and across Howard County. The rock is a typical Mesozoic diabase presenting no unusual features. It is seldom well-exposed, the courses of the dikes being marked by deep red soil and dark red or brown rounded boulders of "trap." Occasionally these are sufficiently abundant to warrant their consideration as a source of road metal.

WESTERN DISTRICT.

The rocks of the western district, while much less thoroughly known than are those of the eastern district, show among themselves a sequence which is strikingly in harmony with that discovered in the eastern district. Although the separation into two districts may be either temporary or permanent according to the results of later work, it seems advisable at the present time to retain them and the line is drawn arbitrarily along a geological line traced by Mr. Keith in his work in Montgomery and Frederick counties. On the eastern side of the western district the rocks are scarcely distinguishable from those of the eastern district, but in the western part of the district the rocks are much less

metamorphosed. There the limestones of the Frederick Valley and the underlying quartzite of the mountains are indistinguishable from the corresponding rocks on the western side of the Blue Ridge. Moreover, the limestones are fossiliferous and show clearly that their age is Cambro-Ordovician—the same as that of the limestones of the Shenandoah Valley. The rocks of the eastern side of the district are progressively more metamorphosed eastward and are practically devoid of fossils, although a few doubtful forms were found near Frederick Junction years ago. The natural interpretation is that these rocks are younger than the limestones of the Frederick Valley since the latter are dipping to the eastward beneath the mass of micaceous argyllites and sandstones. The frequent appearance of limestone valleys indicates that the structure is not simple and the finding of volcanic rocks similar to those of the Blue Ridge requires that judgment regarding the actual age of these eastern rocks be held in abeyance until the area has been mapped in detail.

At the present time it is possible to recognize the following types of rocks:

FORMATIONS OF THE WESTERN PIEDMONT PLATEAU.

SEDIMENTARY ROCKS.

	WESTERN SIDE.	EASTERN SIDE.
Mesozoic.		
Triassic	Newark Formation.	
Paleozoic.		
Cambro-Ordovician	Shenandoah Limestone	Schists and Argyllites Marbles and Limestones.
Cambrian	Weverton Sandstone.	Quartzites and Schists.

IGNEOUS ROCKS.

Mesozoic.		
Triassic	Diabase.	Diabase.
Archean	Basic volcanics. Acid volcanics.	Basic and Acid volcanics.

The succeeding discussion for completeness includes a few statements regarding the rocks of the Blue Ridge, the eastern base of which is gen-

erally considered the western limit of the Piedmont Plateau. A complete discussion of this region has already been given by Mr. Keith and a summary statement may be found in the succeeding pages.

Sedimentary Rocks.

THE QUARTZITES AND SCHISTS.—Areas of quartzite, chiefly in ridges more or less timbered, have been occasionally found in the preliminary study of the western district of the Piedmont. They appear to be similar lithologically to the Weverton sandstones of the mountains on the west. The stratigraphic position of these silicious rocks with relation to the marbles and limestones has not been established. At times they appear to be above the latter and at other times below them. The more detailed work of the future will probably show their true positions and it is quite possible that there are several quartzose layers situated at different horizons.

The schists of the region include many of the more metamorphosed areas of what were formerly called phyllite, and future work will doubtless show considerable diversity of character in the rocks which are here united as a single unit. It is known that among them are both acid and basic volcanics, some of which have been distinguished upon the map. The main mass is composed of highly argillaceous micaceous rocks which, on disintegration and decomposition, form the "isinglass" soil of the region.

THE MARBLES.—The highly calcareous rocks here referred to embrace those lying east of the Frederick Valley. They are more crystalline than are those of the latter locality and are, so far as is known, devoid of fossils. Whether or not they are local areas of more highly metamorphosed limestones of Shenandoah age has not been definitely settled, but this conclusion appears to be the one naturally suggested by the areal distribution of the marble exposures.

These marbles, which are frequently beautifully colored, occur in long narrow valleys, especially in the region of the Western Maryland Railroad. Exposures are few, owing to their relative weakness, and most of the areas underlain by these rocks are excellent farming lands. In

the marbles, especially when they are associated with volcanic rocks, are small deposits of lead and copper, but no one of these appears to be profitable under present market conditions.

THE SCHISTS AND ARGYLLITES.—Clearly overlying the marbles and separated from them by unconformities are certain schists and argyllites, part of the mass formerly called phyllites. The areal distribution of these overlying argillaceous rocks has not been determined and even the lithologic criteria for separating them from the older schists lying unconformably under the marbles have not been recognized. The work of discriminating these two lithologically similar formations and the determination of their areal distribution cannot be accomplished until topographic maps have been made for Carroll, Frederick, and Montgomery counties. Until that is done it is necessary to regard them as members of a complex whose relationships are yet to be deciphered.

THE WEVERTON SANDSTONE.—Isolated areas of quartzitic sandstone similar to the sandstone of the mountains are developed along the eastern side of the Monocacy Valley in Frederick County. The most extensive deposit of this formation occurs in Sugar Loaf Mountain, near the boundary of Montgomery County. Here the sandstone is very homogeneous, fine grained, and compact, and very light in color. This formation continues towards the north in a few insignificant patches, and similar quartzites of undetermined correlation occur at several points in the western Piedmont.

THE SHENANDOAH LIMESTONE.—Along the extreme western border of the plateau country in the Frederick Valley is an extensive development of Shenandoah limestone similar to the more extensive development of this formation in the Hagerstown Valley. This limestone has been largely worked for agricultural and structural lime and by its disintegration high-class farming lands have been produced.

THE NEWARK FORMATION.—The rocks of Triassic age are mainly confined to the western margin of the Piedmont Plateau and are represented by both sedimentary and eruptive materials. The deposits of the Newark formation unconformably overlie the limestone and phyllite which have been above described and cover a considerable area. Be-

ginning as a belt some ten miles in width in northern Carroll and Frederick counties, the formation gradually narrows toward the south, until in the region of Frederick its full width does not exceed one mile, while at one point directly to the west of Frederick the continuity of the beds is completely broken. Farther southward in western Montgomery County the belt of Newark deposits again broadens to a width of several miles.

The rocks of this formation consist largely of red and gray sandstones and conglomerates of both silicious and calcareous varieties. The finer grained and deeper colored deposits generally have their individual elements united by a ferruginous cement, while the calcareous conglomerate, which is largely made up of rounded limestone pebbles, is generally imbedded in a reddish matrix. All of the deposits present structures which indicate that they were formed in shallow water, the coarse conglomerates, the ripple-marked surfaces, and the tracks of animals all pointing indisputably to this conclusion.

Igneous Rocks.

THE BASIC VOLCANICS in the Piedmont and in the mountains seem to be remarkably alike. They are essentially bluish-green with white masses of epidote and quartz which on exposure become dull gray or yellow. The honeycombed or amygdaloidal character of many of the masses increases the individuality of these rocks which usually form rough surfaced ledges or areas thickly strewn with characteristic boulders. The original character of these basic volcanics was that of a diabase or andesite, but the subsequent metamorphism which they have suffered has often rendered them schistose and obscured their original appearance. Several more or less parallel and extended areas of these epidotic rocks will doubtless be found in the western district of the Piedmont, where they are usually noticeable as low ridges or rocky outcrops.

THE ACID VOLCANICS.—When only slightly metamorphosed, as in certain localities in the Blue Ridge, the acid volcanics are close-grained, dark bluish-gray or purplish rocks, frequently speckled with small feldspar phenocrysts. In the Piedmont occurrences, however, these highly

silicious volcanics have usually been modified by pressure until, in extreme instances, they are fissile slates. In the quarry, they may appear solid and massive and flecked with feldspars, but even here the schistosity is generally evident. The more metamorphosed phases of these acid volcanics—meta-rhyolites—have often been overlooked among the phyllites, and subsequent detailed mapping in Frederick and Carroll counties will doubtless show them more abundant than has hitherto been thought. They usually carry more or less potash, which fact, with their easy disintegration, explains the excellence of the soils which they produce.

These same rocks occupy considerable areas in the mountains but here their higher altitude and inaccessibility render them less important. The unconformity between these phyllitic meta-rhyolites and the overlying rocks is seen by the frequent absence of one or more of the younger formations.

THE DIABASE.—The sandstones and shales of the Newark formation, as well as the rocks of earlier age, are found penetrated by dikes of the igneous rock diabase. These dikes extend across the area, for the most part, in a north-south direction, and throughout central Frederick and Carroll counties, where the covering of sandstones and shales has been removed, are found penetrating the limestones and phyllites. It seems probable that the dikes, referred to as occurring in the eastern division of the Piedmont Plateau, are of contemporaneous origin. The diabase is holocrystalline and is composed chiefly of plagioclase and pyrozene with olivene and magnetite. The rocks penetrated have been at times considerably metamorphosed by the molten rock, which was forced into their fissures, generally with a hardening of the beds by partial solidification and re-crystallization. The diabase decomposes with considerable rapidity, although the surface is generally covered with large boulders of undecayed material which show characteristic weathering.

THE APPALACHIAN REGION.

The geology of the Appalachian Region, as in the case of the Piedmont Plateau, cannot be fully comprehended without taking into consideration the great belt of which it forms a part. The beds of sediments which

form the limestones, sandstones, and shales of the Appalachian mountains were deposited in a wide, long trough, which once extended from north to south throughout the region now occupied by the mountains. This trough was undergoing gradual depression through most of Palæozoic time, until many thousands of feet of conformable beds had accumulated in it, mainly as the debris of a continental mass lying to the east.

This vast accumulation, at the close of Palæozoic time, was so compressed as to be forced up into a series of great folds. The present Appalachians are merely the remains of these ancient folds worn down by natural processes through many successive periods. It is by no means certain that the mountain crests ever stood higher than at present, for from the moment the land rose above the sea the forces of denudation became active, and with varying intensity have continued to the present day. The great folds have been from time to time planed down, to be again sculptured as the result of elevatory movements. The compressive force which raised these mountains probably acted from the east toward the west, since the most intense disturbance is always observable in the eastern portion of the range and dies away gradually into the central plains. A secondary result attributed to this action from the east, is that all the folds are tipped toward the west and all the great faults show a thrust in the same direction. In consequence of this the older sediments are toward the east and the younger toward the west, although the more or less abrupt folds into which they were thrown, when raised into a mountain chain, have since been cut off by erosion in such a manner as to show a repeated succession of strata and at the same time to present in portions of the eastern border area rocks of still earlier age.

The section made by Maryland across the Appalachian system between the Frederick Valley and the western line of Garrett County presents an almost complete series of these various formations. As has been already pointed out, the mountain system of Maryland is divisible into three distinct physiographic and geologic districts, but as the features of each division appear to some extent repeated in that which is adjacent to it, it seems more desirable to treat the geology of the Appalachian Region as a unit, and describe under each formation its distribution,

character, and structure. Reference to the map will show the relations which these formations bear to the several geographic divisions.

The following divisions are recognized in the rocks of the Appalachian Region:

FORMATIONS OF THE APPALACHIAN REGION.

SEDIMENTARY ROCKS.

Paleozoic.		
Permian (?)	Dunkard	= Coal Measures.
Carboniferous.		
Pennsylvanian	Monongahela	= Coal Measures.
	Conemaugh	= Coal Measures.
	Allegheny	= Coal Measures.
	Pottsville	= Coal Measures.
Mississippian	Mauch Chunk.	
	Greenbrier.	
	Pocono.	
Devonian.		
Upper Devonian	Hampshire.	
	Jenuings.	
	Chemung.	
	Portage.	
	Genesee.	
Middle Devonian	Romney.	
	Hamilton.	
	Marcellus.	
Lower Devonian	Oriskany.	
	Helderberg.	
	Becraft.	
	New Scotland.	
	Coeymans.	
Silurian	Cayuga.	
	Manlius.	
	Salina.	
	Niagara.	
	Clinton.	
	Tuscarora.	
	Juniata.	
Ordovician	Martinsburg.	
	Shenandoah (upper part)	
Cambrian	Shenandoah (lower part)	
	Antietam.	
	Harpers.	
	Weverton.	
	Loudon.	

IGNEOUS ROCKS.

Paleozoic-Archean.....	Granites.
	Basic volcanics.
	Acid volcanics.

SEDIMENTARY ROCKS.

The Cambrian Period.

The rocks of the Cambrian are confined to the eastern division of the Appalachian Region, previously described as comprising the Blue Ridge and Great Valley, and cover considerable areas in Frederick and Washington counties. They consist of sedimentary materials that have been much metamorphosed since they were deposited, and also subjected to marked structural disturbances, rendering their relations at times difficult of interpretation. Five divisions have been recognized in the sequence of Cambrian deposits, known respectively as the Loudon, Weverton, Harpers, Antietam, and Shenandoah formations, the latter, however, being also in part of Ordovician age.

THE LOUDON FORMATION.—The Loudon formation, so called from its typical development in Loudon County, Virginia, is represented in Maryland in long narrow belts of rock accompanying the mountain ridges, and is found in the Catoctin Mountain, the Blue Ridge, and the Elk Ridge. The deposits consist largely of a fine dark slate with limestones, shales, sandstones, and conglomerates. The coarser and thicker deposits are found in narrow synclines upon the surface of the pre-Cambrian rocks; the thinner and finer beds are in the synclines, which are overlain by the Weverton sandstone. The limestones occur in the form of lenses in the slate and are best developed along the eastern side of the district just to the west of the Catoctin Mountain, where they are generally highly metamorphosed. Beds of sandstone occur in the Loudon formation, although more prominently developed to the south of the Potomac River. The thickness of the formation is very variable, ranging from a few to over 500 feet.

The formation as a whole has been much metamorphosed, alteration being most apparent in the argillaceous beds, which have been changed

into slates and schists, all traces of the original bedding being frequently lost. The slate readily decomposes, forming low ground, but the more silicious rocks commonly occur as small hills or ridges.

THE WEVERTON FORMATION.—The Weverton formation, so called from its occurrence near Weverton, at the point where the Blue Ridge reaches the Potomac River, consists of massive beds of fine, pure sandstone, quartzite, and conglomerate. They are usually white, the coarser beds somewhat gray. In the Blue Ridge the sandstones are streaked with black and bluish bands. The deposits are mainly composed of quartz grains, which are well worn and are washed quite clean of fine argillaceous materials. They at times show cross-bedding, which indicates that the formation was largely laid down in shallow water. The thickness of the formation is quite variable, between 200 and 300 feet.

The Weverton sandstone has been subjected to but little metamorphism, as the quartz particles which comprise the deposits do not afford materials which admit of much alteration. Slight schistosity is evident in the southern part of the Catoctin Mountain. The sandstone decays slowly and generally forms projecting ledges on the surface of the country.

THE HARPERS FORMATION.—The Harpers formation, so called from its typical occurrence at Harper's Ferry, is composed largely of sandy shales with a few sandstone layers imbedded in its upper portion. The shales are of a dull bluish-gray color when fresh, and weather to a light greenish-gray. Argillaceous materials predominate, with frequent small grains of quartz and feldspar, while other materials derived from the pre-Cambrian volcanics appear sparingly. The thickness of the Harpers formation is difficult to determine, owing to the absence of any complete section of it. Its outcrops are everywhere included between faults which have cut off intermediate thicknesses. It has been estimated, as the result of a number of measurements, to have a probable thickness of 1200 feet.

The shales have been subjected everywhere to considerable alteration, the feldspathic materials being partially re-crystallized into quartz and mica, with the development of schistosity. The metamorphism is much

more pronounced along the eastern border, in the Catoctin area, where the change has proceeded so far as to produce a mica-schist in which small quartz lenses are developed between the layers. Decomposition has affected the shale to considerable depths, the argillaceous materials furnishing a sufficient amount of clay to produce a soil of some value, but on steep slopes it is easily washed.

THE ANTIETAM FORMATION.—The Antietam formation receives its name from Antietam Creek, along the tributaries of which the deposits of this formation are most typically developed. The rock is a sandstone which grades below by gradual transitions into the Harpers shale. The sandstone is composed of small grains of white quartzite well worn and sorted, and it contains a small percentage of carbonate of lime. Its color is almost invariably of a dull brown. It is more fossiliferous than the other Cambrian formations, remains of trilobites being not uncommon. The formation has a thickness of about 500 feet.

The Antietam sandstone shows little alteration in its typical area, but east of Catoctin Mountain there are some very siliceous schists that may possibly represent it. The more calcareous varieties weather readily, but numerous blocks of the sandstone generally strew the surface.

THE SHENANDOAH FORMATION (lower part).—The Shenandoah formation, so called from the fact that it forms the floor of the Shenandoah Valley, a part of the Great Valley above described, is composed of a series of blue and gray limestones and dolomites in which are locally slates and sandy shales imbedded. In certain places in eastern Washington County beds of pure fine-grained white marble are also found. The thickness of the entire Shenandoah formation is estimated to reach approximately 5000 feet. The upper part of this formation is of Ordovician age as shown by numerous fossils, while the lower part is to be referred to Cambrian time. The recent work of G. W. Stose of the U. S. Geological Survey in the near-by regions of Pennsylvania has shown the possibility of dividing the Shenandoah formation into independent stratigraphic units so that the term Shenandoah formation will probably in time be retained only as a group name. The following divisions have been referred to Cambrian time.

FIG. 1.—GRANITE QUARRY NEAR WOODSTOCK, BALTIMORE COUNTY.

FIG. 2.—CONTORTED SCHIST ABOVE BALD FRIAR, CECIL COUNTY.

VIEWS SHOWING GEOLOGICAL FORMATIONS OF THE PIEDMONT PLATEAU.

Tomstown Limestone.—Drab to white magnesian limestone. Thickness of this and following division 1500 feet.

Waynesboro Shale and Sandstone.—Purple to gray shale and flaggy sandstones. Lower Cambrian fossils at the top.

Elbrook Limestone.—Massive bluish gray magnesian limestone with some red and green shale and chert beds. 2000 feet thick.

Knox Limestone (lower part).—Drab magnesian and silicious limestones with limestone conglomerate at the base. Upper Cambrian fossils below. Entire division 1000 feet thick.

The limestone deposits have been but little altered, but the shaley beds have been generally more metamorphosed with the production of mica, which causes a more or less clearly defined schistosity. The decay of the limestone through solution has left an insoluble residuum of red clay, through which protrude at times beds of harder materials. The more rapid solution of the Shenandoah limestone than the rocks of the other formations has produced the broad fertile Hagerstown Valley. Similar deposits also underlie much of the Frederick Valley as well.

The Ordovician Period.

The rocks of the Ordovician period occur in both the Frederick Valley and the Great Valley in association with the Shenandoah formation (lower part) just described. They consist of sedimentary materials that have been on the whole less metamorphosed than the Cambrian rocks. They have been much folded and at places are faulted. This period comprises two divisions known respectively as the Shenandoah (upper part) and Martinsburg formations.

THE SHENANDOAH FORMATION (upper part).—The Shenandoah formation, which has already been described in the previous paragraphs as in part of Ordovician age, contains an abundant fauna of fossil brachiopods, gastropods, corals, and crinoids in its upper members. The line of separation between the Cambrian and Ordovician portions of this formation cannot always be definitely determined.

The upper part of the Shenandoah limestone of Ordovician age has been divided as follows by Mr. Stose:

Knox Limestone (upper part).—Drab magnesian and silicious limestones containing Beekmantown fossils. Entire division 1000 feet thick.

Stones River Limestone.—Homogeneous, dove-colored, pure limestone, somewhat fossiliferous, 900 feet thick.

Chambersburg Limestone.—Crystalline fossiliferous limestone of Black River age 200 feet thick.

THE MARTINSBURG FORMATION (Utica-Hudson River), so called from its typical development in the vicinity of Martinsburg, West Virginia, occurs in several areas along the western border of the Hagerstown Valley and in the region immediately adjacent to it upon the west. This formation consists of sandstone and of black and gray calcareous and argillaceous shales which are fine grained and show but slight variations within the limits of the State of Maryland. The shales bear from five to twenty per cent of carbonate of lime. The deposits were formed in shallow seas which abounded in graptolites, corals, brachiopods, and trilobites which have left abundant fossil remains. The fauna comprises that of the Utica and Hudson River shales of New York. The thickness of the formation varies from 700 to 1000 feet.

There has been but slight alteration in the shale, which is usually not sufficient to obscure the bedding which, however, was never sharply marked. The rocks of this formation have suffered considerable decay as the result of the solution of the carbonate of lime contained in them.

The Silurian Period.

The rocks of the Silurian period occur to the west of the deposits of Ordovician age just described, entering into the formation of the Appalachian Mountains in association with strata of Devonian age. They have been less metamorphosed and less faulted than the strata of the older formations. Five divisions have been recognized in the sequence of Silurian deposits, known respectively as the Juniata, Tuscarora, Clinton, Niagara, and Cayuga formations.

THE JUNIATA FORMATION (red Medina), so called from its typical occurrence upon the Juniata River in Pennsylvania, is limited to the western portion of the central division of the Appalachian Region, in

western Allegany County. It is best developed in "The Narrows" of Wills Mountain, to the northwest of Cumberland. The formation consists of alternating shales and sandstones of a deep red color. No fossils have been observed in it in Maryland. The formation has a thickness in Wills Mountain, of at least 550 feet.

THE TUSCARORA FORMATION (white Medina), so called from its typical development in Tuscarora Mountain in Pennsylvania, is found at widely separated points in the Appalachian district. Upon the east it enters into the formation of North Mountain, the most eastern ridge of the central Appalachians, and upon the west forms Wills Mountain just to the west of Cumberland, and also occurs at several points in the intervening country. The rock is chiefly sandstone, which is hard and massive, generally white or gray in color, and consists for the most part of coarse quartz grains. Few fossils have been found in the Tuscarora formation, but it is the probable equivalent of the white Medina sandstone of the north. The thickness of the formation is 287 feet on Wills Mountain. The deposits of the Tuscarora formation have been subjected to little alteration and the hard sandstone stands out as ridges upon the surface.

THE CLINTON FORMATION (Rockwood) is named from its typical exposure at Clinton, New York. It is confined to the central Appalachian Region, occurring in three, narrow, isolated belts west of Hancock, Washington County, and in three V-shaped areas in Allegany County about the Wills Mountain, Evitts Mountain, and Tussey's Mountain anticlines. It is composed of shales of a grayish-olive to reddish color interbedded with thin sandstones, which give place to thin-bedded limestones near the top of the formation. Two beds of iron ore (hematite) of a deep red color are contained in it, one 6 inches to 30 feet thick occurring near its base, and another about 1 foot thick near its summit. The latter usually overlies a heavy quartzitic sandstone. The original character of these two bands of iron ore was probably that of a highly ferruginous fossiliferous limestone from which the calcium carbonate has been removed by solution. The shale between the iron-ore beds usually suffers much erosion, producing characteristic valleys. Fossils

are numerous in the iron ores and occur very abundantly in the upper shales and limestones. The thickness of the formation varies from 500 to 600 feet.

THE NIAGARA FORMATION (Lewistown, lower part), is named from its typical exposure at Niagara Falls, New York. It overlies the Clinton formation, surrounding the outcrops of the latter at the localities cited above. Its lower part consists of thin-bedded, blue limestones with partings of greenish-gray to black shale. The shales become thicker and preponderate over the limestones in the upper part of the formation, its summit being formed by a heavy bed of sandstone which is often very ferruginous and which weathers into characteristic ridges. This formation contains numerous fossils, which occur chiefly in the calcareous shales and limestones, being especially abundant in the latter. The Niagara formation has a thickness of about 250 feet.

THE CAYUGA FORMATION (Lewistown, middle part), is named from its typical exposure at Cayuga Lake, New York. It is confined to the central Appalachian Region, occurring in Washington County both east and west of Hancock, and in Allegany County upon the Wills Mountain, Evitts Mountain, and Tussey's Mountain anticlines. It consists of impure limestones and shales. Two divisions are recognized in it, termed respectively the Salina and Manlius members of the Cayuga formation.

The Salina member, so named from its typical exposure at Salina, New York, is the lower division of the Cayuga formation. It consists of impure limestone and shales, the latter having a prevailing greenish tone. It contains four cement beds, some of which have been extensively worked for the manufacture of cement, rendering the Salina formation of much commercial importance. In the region about Hancock the lower strata of this member have a deep red color, a feature not observed further west. Minute crustacea, termed Ostracods, abound in certain strata, other fossils being rare. An excellent exposure is to be seen at Pinto, Allegany County, where the Salina has a thickness of 1125 feet.

The Manlius member is named from its typical exposure at Manlius, New York. It overlies the Salina member with which it is associated

at the localities named above. It consists of thin-bedded, impure limestones, which become shaly in their lower third. It passes into the Salina beneath and into the Helderberg formation above, without marked change, being separated from them by differences in its fossils. The latter are numerous, including many new and interesting species of Cystids. Excellent exposures occur at the Devil's Backbone in Allegany County and in the quarries at Keyser, West Virginia. This member has a thickness of about 110 feet.

The Devonian Period.

The deposits of Devonian age enter, together with the Silurian rocks, into the formation of the central division of the Appalachian Region, and together with the Carboniferous deposits, into the formation of the Alleghany Plateau. They consist of sedimentary materials that have been but little altered since they were deposited, although in places subjected to considerable structural disturbances. Three divisions are recognized in the strata of Devonian age known respectively as the Lower Devonian, Middle Devonian, and Upper Devonian.

Lower Devonian.

The deposits of Lower Devonian age comprise two divisions known respectively as the Helderberg formation and the Oriskany formation.

THE HELDERBERG FORMATION (Lewistown, upper part), is named from its typical exposure in the Helderberg Mountains, Albany County, New York. It occurs in the central Appalachian Region, being exposed west of North Mountain and west of Hancock in Washington County, and upon the Wills Mountain, Evitts Mountain, and Tussey's Mountain anticlines in Allegany County, in association with the formation last described. It consists of limestones usually purer and more massive than those of the Cayuga formation, together with some shales. Numerous fossils occur in it, many of which are characteristic of the Helderberg formation of New York. It comprises three divisions in Maryland, known respectively as the Coeymans, New Scotland, and Becraft mem-

bers of the Helderberg formation. Of these members, the last is restricted to the region about Cherry Run, West Virginia. This formation is frequently referred to the Silurian period. Its thickness is about 260 feet.

The Coeymans member, so called from its typical exposure at Coeymans, New York, consists of heavy-bedded limestone bearing, at some localities, chert near its base. Among its fossils are very large Stromatopora, which weather into curly, nodular masses. Its thickness is about 110 feet.

The New Scotland member, so called from its typical exposure at New Scotland, New York, consists of massive gray limestones with bands of chert. In some localities the limestone passes above into a shale. The thickness of this member is about 65 feet.

The Becraft member, so called from its typical exposure at Becraft Mountain, New York, consists of dark-blue, arenaceous limestone containing lumps of black chert. Its thickness is about 85 feet.

THE ORISKANY FORMATION (Monterey) is named from its typical exposure at Oriskany Falls, New York. It is confined, like the Silurian formations, to the central division of the Appalachian Region in western Washington and Allegany counties. The deposits of the Oriskany formation are typically rather coarse-grained, somewhat friable sandstones, white or yellow in color. At times the materials become very coarse-grained, resulting in a clearly defined conglomerate, while at other times, especially in the western portion of the area, the materials are fine-grained, with here and there interstratified layers of coarser materials. These deposits afford excellent glass sand. The sandstone is very fossiliferous and carries the typical Oriskany fauna of the north. The formation has a thickness of about 350 feet.

Middle Devonian.

One division is recognized in the Middle Devonian deposits, known as the Romney formation.

THE ROMNEY FORMATION, so called from its typical exposure at Romney, West Virginia, is confined to the central division of the Appalachian

Region, and occupies very much the same areas as those given above for the Oriskany sandstone. It comprises two divisions known respectively as the Marcellus and Hamilton members of the Romney formation. Its thickness is about 1600 feet in its central area, diminishing to 500 to 600 feet west of Wills Mountain.

The Marcellus member, so called from its typical exposure at Marcellus, New York, consists of thin, fissile, black shales, which weather into thin, flat, black plates. Several thin bands of limestone frequently occur some distance above its base. It contains numerous fossils characteristic of the Marcellus formation of New York. Its thickness is about one-third that of the entire Romney formation.

The Hamilton member, so called from its typical exposure at Hamilton, New York, consists of black shales containing, usually, two heavy beds of sandstone, one of which is near the middle and the other near the top of this division. The upper part of the shales weather into yellow to brown, hackly fragments which are highly characteristic of the Hamilton. The lower part weathers into thin dark plates often closely resembling those of the Marcellus shales. Eastward near Elbow Ridge, a conglomerate developes in this member, while west of Wills Mountain the entire Romney formation thins, the sandstones becoming greatly reduced in volume. Fossils abound in this division, especially in its upper half, including many species characteristic of the Hamilton of New York. Its thickness is about two-thirds that of the entire Romney formation.

Upper Devonian.

The strata of Upper Devonian age contain two divisions termed respectively, the Jennings and the Hampshire formations.

THE JENNINGS FORMATION, so called from its typical development at Jennings Gap, Virginia, is found both throughout the central and western divisions of the Appalachian Region. Within the Appalachian Mountains proper it is frequently repeated throughout western Washington and Allegany counties and occurs as the oldest formation represented in the Alleghany Plateau of Garrett County. It underlies the well-known "glades." It comprises three divisions known respectively as

the Genesee, Portage, and Chemung members of the Jennings formation. Its thickness is about 3800 to 4000 feet.

The Genesee member, so named from its typical exposure on the Genesee River in New York, occurs at the base of the Jennings formation throughout its extent in Allegany County, but is lacking in Washington County. It consists of a deep-black, fissile shale weathering into flat, black plates, and often exhibits the pronounced jointing so characteristic of the Genesee of New York. It abounds in the small fossils of the Naples fauna of New York. Its thickness is about 90 feet.

The Portage member, so named from its typical exposure at Portage, New York, consists of olive-green to gray shales, alternating with thin, fine-grained micaceous sandstones, the latter occasionally becoming 2 feet thick. The shales weather into thin, flat plates which contrast with the hackly fragments of the Romney shales below, while it is also more resistant to weathering than the Romney shales. It contains few fossils at most localities. The forms found are closely related to those of the Naples and Ithaca faunas of the Portage of New York. Its thickness is about 2000 feet.

The Chemung member, so named from its typical exposure at the Chemung Narrows in New York, consists of olive-green to brownish-red shales and sandstones. A conglomerate occurs near its base in Washington County, while a second conglomerate is found 500 to 600 feet below its summit in numerous localities, forming well-marked ridges in many instances. Certain strata abound in fossils which are closely related to those of the Chemung formation of New York. Its thickness is about 1700 to 1800 feet.

THE HAMPSHIRE FORMATION (Catskill in part).—The Hampshire formation, so called from Hampshire County, West Virginia, occurs, like the Jennings formation, both in the central and in the western portion of the Appalachian Region. It is best developed in the western portion of Allegany and Garrett counties, where excellent sections occur along the Alleghany Front, and may also be seen to good advantage in Jenning's and Braddock's runs west of Cumberland. From these latter points the strata dip beneath the Carboniferous rocks of Georges Creek Valley,

occurring again in a broad Y-shaped belt which extends northeast to southwest across Garrett County. The deposits of the Hampshire formation consist principally of thin-bedded sandstones, separated by fine-grained shales, although at times the sandstones become thick-bedded, and may merge gradually into the shales. Shales predominate in the upper portion of the Hampshire. The formation is for the most part of a reddish color although at times the strata may be brown or gray. It yields a characteristic red soil. No fossils have as yet been obtained from the Hampshire formation in Maryland, but it is undoubtedly the equivalent of the Catskill of the North. Its thickness is about 2000 feet.

The Carboniferous Period.

The rocks of the Carboniferous period are confined to the western division of the Appalachian Region, where they largely constitute the Alleghany Plateau, and are found in western Allegany and Garrett counties. Two divisions are recognized in it, known respectively as the Mississippian and the Pennsylvanian.

Mississippian.

Three divisions are represented in the deposits of Mississippian age known as the Pocono, Greenbrier, and Mauch Chunk formations.

THE POCONO FORMATION.—The Pocono formation, so called from Pocono, Pennsylvania, is the basal member of the Carboniferous and directly overlies the Hampshire formation above described. It occurs in a series of narrow belts which extend from northeast to southwest through western Allegany and Garrett counties. The Pocono formation consists mainly of hard, thin-bedded, flaggy sandstone which is seldom coarse-grained, although in a few instances slightly conglomeritic. Thin layers of black shale and coaly streaks, in which plant remains are sometimes preserved, occur in some localities, although not a conspicuous feature of the formation. The sandstones have afforded good flagging materials. The thickness of the formation varies from 258 to 300 feet, but the deposits are seldom well exposed. The sandstone is, however, a factor in the topography, and usually forms a line of foothills along the flanks of the mountains.

THE GREENBRIER FORMATION.—The Greenbrier formation, so called from Greenbrier County, West Virginia, occurs in very much the same areas in western Allegany and Garrett counties as above described for the Pocono sandstone, and outcrops above the line of foothills just described. The deposits consist mainly of limestone strata in which are interbedded shales and some sandstones. The limestones are more sandy toward the base. The limestones near the upper portion of the formation are of compact structure and gray in color. They are also at times marly in their upper layers and these marly strata are frequently fossiliferous. The limestone is burned locally for building and agricultural purposes. The formation has a thickness of about 225 feet.

THE MAUCH CHUNK FORMATION (Canaan). The Mauch Chunk formation, so called from Mauch Chunk, Penusylvania, flanks the ridges of western Allegany and Garrett counties and grades gradually downward into the Greenbrier deposits. The strata consist chiefly of red shales, interstratified with flaggy, red-brown, fine-grained sandstones. The sandstone is at times micaceous. Thin beds of dark carbonaceous shales occur at times near the top of the formation. The deposits have a thickness of about 800 feet.

Pennsylvanian.

Four divisions are recognized in the strata of Pennsylvanian age known as the Pottsville, Allegheny, Conemaugh, and Monongahela formations.

THE POTTSVILLE FORMATION (Blackwater), so called from Pottsville, Pennsylvania, is the lowest division of the Coal Measures and forms the mountain ridges which border the coal basins. The Pottsville formation consists of beds of sandstone and conglomerate interstratified with sandy shales in which thin beds of coal are locally developed. The sandstones and conglomerates are mainly composed of fine quartz grains and pebbles which are commonly cemented by means of silicious materials. These coarse deposits are also frequently cross-bedded and are very irregular both in their extent and sequence. The more prominent subdivisions recognized in Maryland occur from top to bottom as follows:

Homewood sandstone.
Mount Savage or upper Mercer coal.
Mount Savage fire-clay.
Lower Mercer coal.
Upper Connoquenessing sandstone.
Quakertown coal.
Lower Connoquenessing sandstone.
Sharon coal.
Sharon sandstone.

The Pottsville formation has a thickness of 330 to 380 feet.

THE ALLEGHENY FORMATION (Savage and Bayard, lower part), is approximately the same as the division formerly termed the Lower Productive Coal Measures. It is named from its typical exposure upon the Allegheny River, Pennsylvania. It is the lowest of the coal-bearing formations in western Allegany and Garrett counties and occupies the basal portion of the basins within the synclines which are outlined by the Pottsville conglomerate. It consists of a series of sandstones, shales, limestones, and coal seams, of which the more prominent from above downward are as follows:

Upper Freeport coal or "Three-foot" coal.
Upper Freeport limestone and Bolivar fire-clay.
Upper Freeport sandstone.
Lower Freeport coal.
Lower Freeport limestone.
Lower Freeport sandstone.
Upper Kittanning coal.
Middle Kittanning coal.
Lower Kittanning coal. or "Six-foot" coal.
"Split-six" coal.
Kittanning sandstone.
Ferruginous limestone.
Clarion sandstone.
Clarion coal.
Brookville coal.

Of these coal seams, the Middle and Lower Kittanning ("Six-foot" coal) are next in importance to the "Big Vein" of the Monongahela formation. The Allegheny formation has a thickness of 260 to 350 feet.

THE CONEMAUGH FORMATION (Bayard, upper part and Fairfax), is approximately the same as the division formerly known as the Lower Barren Coal Measures. It receives its name from its typical exposure along the Conemaugh River in western Pennsylvania. It overlies the Allegheny formation, with which it is associated at the localities cited in the discussion of that formation. It consists of a series of sandstones, shales, conglomerates, limestones, and coal seams, the more prominent of which from above downward are as follows:

Little Pittsburg coal.
Lower Pittsburg limestone.
Connellsville sandstone.
Franklin or Little Clarksburg coal.
Clarksburg limestone.
Morgantown sandstone.
Elklick coal.
Ames or Crinoidal limestone.
Crinoidal coal.
Saltsburg sandstone.
Bakerstown coal or "Four-foot" coal.
Lower red shales.
Upper Cambridge limestone.
Buffalo sandstone.
Lower Cambridge limestone.
Masontown coal.
Upper Mahoning sandstone.
Mahoning coal.
Mahoning limestone.
Lower Mahoning sandstone.

The Conemaugh formation has a thickness of 600 to 700 feet.

THE MONONGAHELA FORMATION (Elkgarden) is approximately the same as the division formerly called the Upper Productive Coal Measures. It is named from its typical exposure along the Monongahela River in Pennsylvania. In Maryland this formation is restricted to the Georges Creek-Potomac basin. It consists of a series of shales, sandstones, limestones, and coal seams, of which following subdivisions arranged from top to bottom are the more prominent:

Waynesburg coal.
Waynesburg limestone.
Uniontown sandstone.
Uniontown coal.
Sewickley sandstone.
Upper Sewickley or Tyson coal.
Lower Sewickley coal.
Sewickley limestone.
Redstone coal.
Redstone limestone.
Pittsburg coal, or "Big Vein," or "Fourteen-foot" coal.

The Pittsburg coal, known in Pennsylvania as the "Pittsburg Vein," is the most important coal-bearing seam in Maryland, affording coal of high quality and great purity, that has been a source of great wealth to the State. The Monongahela formation has a thickness of 240 to 260 feet.

The Permian Period.

The rocks which are here questionably referred to the Permian are confined to the central portion of the Georges Creek Valley in western Allegany County, where they rest with apparent conformity upon the Carboniferous deposits below. The single formation recognized in these rocks is denominated the Dunkard formation.

THE DUNKARD FORMATION (Frostburg) is approximately the same as the division formerly known as the Upper Barren Coal Measures. It is named from its typical exposure on Dunkard Creek, Pennsylvania. Its strata apparently conformably overlie the Monongahela formation of

Carboniferous age. It occurs in patches along the center of the Georges Creek Valley where erosion has left fragments capping the top of the higher lands. It consists of limestones, sandstones, shales, and coal seams, the more prominent of which arranged from above downwards are as follows in Maryland:

Jollytown limestone.
Jollytown coal.
Upper Washington limestone.
Washington coal.
Waynesburg "A" coal.
Waynesburg sandstone.

The formation was referred to the Permian period by Fontaine and I. C. White who recognized among its fossil plants species of Permian age. The thickness of the Dunkard formation is about 390 feet.

IGNEOUS ROCKS.

The igneous rocks of the Appalachian district are limited to the eastern division of the Blue Ridge and Catoctin mountains. No rocks of igneous origin have been found in the part of Maryland lying west of the Hagerstown Valley. The igneous rocks of the Blue Ridge-Catoctin area are similar to those already described and may be classified under the heads of Acid volcanics, Basic volcanics, and Granites.

The Acid Volcanics.

The acid volcanics of the Appalachian district of Maryland occupy an irregular area north and northeast of Myersville near the head of the Middletown Valley between the Blue Ridge and Catoctin mountains. They form the higher slopes of the headwaters of Catoctin Creek and extend well up to the state line. They are closely related to similar masses in Pennsylvania and Virginia and are represented in several smaller outlying masses, some of which have already been described. The rocks are closed-grained, usually completely crystalline mixtures of quartz and feldspar which often show characteristic flow, spherulitic and even

lithophysal textures. They were evidently formed by the eruption of a silicious magma to or near the surface under conditions similar to those shown by the more recent volcanic rocks of the far west. During the long periods of time since their eruption they have been much changed in character. The original glass has been changed to a mosaic of quartz and feldspar by slow crystallization thereby changing the luster of the rocks from vitreous to stony. Their color, when fresh, is dark-blue or gray or occasionally red and when long exposed to the weather light gray or pinkish white. The rocks included here have been called "porphyry," quartz-porphyry, quartzite, aporhyolite, metarhyolite, etc., and have occasioned much discussion as to their origin and probable content of copper because of their similarity to the copper-bearing rocks of Lake Superior.

The Basic Volcanics.

The basic volcanics of the Maryland Appalachian district are more wide-spread than the acid volcanics, occupying between two and three times as much surface as the latter. Like them they are also represented in masses of similar rock to the north and south of Maryland, and in detached bodies to the east of Catoctin Mountain, as already described. They were formed by intrusions of basic material both before and after the formation of the acid volcanics. The products of these intrusions, which were originally quite similar, have been changed by the varying conditions to which they have been subjected since they were first formed. The present rocks have been classed by Keith, who has studied them most carefully, as "Andesite" and "Catoctin schists." The andesite is found in adjacent areas in Virginia but has not been recognized in Maryland where the sole representative of the basic volcanics is the Catoctin schist. This schist forms practically all of the region between the eastern flanks of the Blue Ridge and the western flanks of Catoctin Mountain, except the central area occupied by acid volcanics and the southwestern part of the Middletown Valley along the Potomac where the volcanic rocks seem almost crowded out by the numerous intrusions of granite. The

Catoctin schist in fresh exposures is light bluish-green in color and its presence is usually indicated by a surface strewn either with gray or yellow slabs of the weathered schists or by blocks of quartz and epidote. Keith has shown that the original rock was a diabase which has now lost most of its characteristic features through the metamorphism which has developed the marked schistosity. The volcanic character of the original rock is occasionally attested by the presence of amygdaloidal varieties which resulted from cooling near the surface.

The Granites.

Intimately intermingled with and cutting the acid and basic volcanics already described are intricately anastamosing bodies of granite which occur in long narrow belts varying in breadth from a yard to six miles, with an average width of perhaps 100 yards. By far the greatest development is in the valley lands north of the Potomac River in the Middletown Valley. The granites vary somewhat in the coarseness of their grain and show marked evidences of metamorphic modification, the rocks sometimes resembling silicious schists. They carry only a moderate amount of mica and are frequently garnet, or epidote-bearing, the garnet-bearing variety being well exposed along the Potomac River between Weverton and Harpers Ferry.

THE COASTAL PLAIN.

The area of low land which borders the Piedmont Plateau on the east and passes with constantly decreasing elevation seaward has already been described under the name of the Coastal Plain. It is part of that great belt of low country which extends from New Jersey to the Gulf and is made up of geological formations of younger date than those which have been hitherto described. These later formations stand in marked contrast to the strata in other portions of the State in that they have been but slightly changed since they were deposited. Laid down one above another upon the eastern flank of the Piedmont Plateau when the sea

FIG. 1.—VIEW OF FOLDED SILURIAN ROCKS NEAR HANCOCK, WASHINGTON COUNTY.

FIG. 2.—VIEW OF HORIZONTAL CARBONIFEROUS SANDSTONE, SWALLOW FALLS, GARRETT COUNTY.

VIEWS SHOWING GEOLOGICAL FORMATIONS OF THE APPALACHIAN REGION.

occupied the present area of the Coastal Plain, these later sediments form a series of thin sheets which are inclined slightly to the seaward so that successively later formations are encountered in passing from the inland border of the region toward the coast. Oscillation of the sea floor with considerable variation both in the angle and direction of the tilting, went on, however, during the period of Coastal Plain deposition. As a result the stratigraphic relations of these formations, which have generally been held to be of the simplest character, possess in reality much complexity along their western margins, and it is not uncommon to find that intermediate members of the series are lacking, as the result of transgression, so that the discrimination of the different horizons, in the absence of fossils, often requires the most careful investigation.

The Coastal Plain sediments, deposited after a long break in time between the red sandstones and shales (Newark formation) of Triassic age (hitherto described as overlying the crystalline rocks of the western division of the Piedmont Plateau) and the lowermost of the series now to be considered, complete the sequence of geological formations found represented in Maryland. From the time deposition opened in the coastal region during late Jurassic or early Cretaceous time to the present nearly constant sedimentation has apparently been going on, although frequent unconformity appears along the landward margins of the different formations.

The formations of the Coastal Plain consist of the following:

FORMATIONS OF THE COASTAL PLAIN.

SEDIMENTARY ROCKS.

Cenozoic.			
Quaternary.			
Recent.			
Pleistocene	Talbot	}	= Columbia Group.
	Wicomico		
	Sunderland		
Tertiary.			
Pliocene	Lafayette.		
Miocene	St. Mary's	}	= Chesapeake Group.
	Choptank		
	Calvert		
Eocene	Nanjemoy	}	= Pamunkey Group.
	Aquia		

Mesozoic.		
Cretaceous.		
Upper Cretaceous	Rancocas.	
	Monmouth.	
	Matawan.	
	Magothy.	
Lower Cretaceous	Raritan	= Potomac Group.
	Patapsco	
Jurassic (?)		
Upper Jurassic (?)	Arundel	
	Patuxent	

SEDIMENTARY ROCKS.

The Jurassic (?) Period.

The formations which are here doubtfully referred to the Jurassic period find their chief development in Maryland and Virginia where they directly overlie the crystalline rocks of the Piedmont Plateau.

The Upper Jurassic (?).

The deposits must unquestionably be referred to the Upper Jurassic if they ultimately prove to antedate the Cretaceous. The reference of the beds to this horizon is based on the Dinosaurian remains which do not in the present state of our knowledge afford final proof as to age, although some vertebrate paleontologists, among them one of our leading authorities, are quite certain that they should be regarded as earlier than the Cretaceous. The plant remains likewise are not distinctive enough to make it possible to say whether the beds are certainly late Jurassic or early Cretaceous. Until these questions are finally settled, however, the deposits will be tentatively placed in the Upper Jurassic.

The Potomac Group (Lower Division).

The formations here described include the lower part of what was long known as the Potomac formation, so called from the Potomac River, in the drainage basin of which the deposits of this age are well shown, but which is now recognized as representing several quite distinct stratigraphic units. These lower formations have only been found in the middle Atlantic coastal area while the upper formations extend both

to the northward and southward and in the highest members reach across New Jersey in the one direction and into the South Atlantic and Gulf states in the other. The Potomac was deposited largely under estuarine conditions, although marine forms begin to appear before the close of the period in New Jersey, indicating the temporary breaking of the seaward barrier.

The Potomac group is divided into the Patuxent and Arundel formations of possible Upper Jurassic age and the Patapsco and Raritan formations of Lower Cretaceous age.

THE PATUXENT FORMATION.—The Patuxent formation, so called from its typical development in the upper valleys of the Little and Big Patuxent rivers, is the basal formation of the Coastal Plain series, and is found lying directly upon the crystalline rocks of the Piedmont Plateau. It appears near the landward margin of the Coastal Plain and has been traced as a narrow and broken belt from Cecil County across Harford, Baltimore, Anne Arundel, and Prince George's counties to the border of the District of Columbia.

The deposits consist mainly of sand, sometimes quite pure and gritty, but generally containing a considerable amount of kaolinized feldspar, producing a clearly defined arkose. Clay lumps are at times scattered in considerable numbers through the arenaceous beds. Frequently the sands pass over gradually into sandy clays, and these in turn into argillaceous materials, which are commonly of light color, but often become highly colored and are locally not unlike the variegated clays of the Patapsco formation. The more arenaceous deposits are cross-bedded, and the whole formation gives evidence of shallow-water origin. The dip of the beds is about 40 feet in the mile to the southeast. The Patuxent formation is estimated to attain a thickness of about 350 feet, but it may be considerably thicker at some points.

The fossils which are poorly represented as compared with those of the overlying formations, consist chiefly of plants, including ferns, cycads, and conifers. The numerous silicified trunks of cycads which have been found scattered over the formations of the Potomac group in Maryland were probably originally preserved in the Patuxent sands.

In Virginia in strata along the James River which Lester F. Ward correlates with the Patuxent formation of Maryland there occur a few primitive types of dicotyledonous leaves. The fauna is limited to a single Unio and the remains of a fish.

THE ARUNDEL FORMATION.—The Arundel formation, so called from Anne Arundel County, where the strata are well developed, consists of a series of large and small lenses of iron ore-bearing clays which occupy ancient depressions in the surface of the Patuxent formation and are unconformable to that formation. These lenses have been traced all the way from Cecil County to the border of the District of Columbia. The clays are highly carbonaceous, lignitized trunks of trees being often encountered in an upright position with their larger roots still intact. Scattered through the tough dark clays are vast quantities of nodules of iron carbonate, at times reaching many tons in weight, and known to the miners under the name of "white ore." In the upper portion of the formation the carbonate ores have changed to hydrous oxides of iron, which the miners recognize under the name of "brown ore." The largest lenses have been found to reach a thickness of nearly 125 feet.

The fossils thus far found consist of Dinosaurian remains, which some regard as indisputable proof of the Upper Jurassic age of the deposits, although others have questioned this reference. Among the plant fossils which are much more abundant than in the underlying Patuxent formation, a considerable number of dicotyledonous leaves have been found, associated with an assemblage of ferns, cycads, and conifers, the latter groups showing mixed affinities with certain basal Cretaceous or Jurassic floras of other areas. Both the physical and paleontological characteristics of the deposits point to swamp conditions as affording the only satisfactory explanation of the origin of this formation. This could have been brought about by landward tilting of the continent accompanied by a clogging of the drainage lines.

The Cretaceous Period.

The formations referred to the Cretaceous comprise representatives of both the Lower and Upper Cretaceous, a clearly marked unconformity

occurring both at the base of the series as well as between the two groups of formations. The Cretaceous is better developed in the district embracing Maryland and New Jersey than in any other portions of the Atlantic border area.

The Lower Cretaceous.

The Lower Cretaceous formations overlie the Upper Jurassic deposits unconformably and in portions of the area transgress them on to the crystalline rocks below. They contain highly characteristic floras with clearly marked Neocomian features. They constitute the upper part of the Potomac group.

The Potomac Group (Upper Division).

The leading features of the Potomac group have been already described in the paragraphs devoted to the Lower Division.

THE PATAPSCO FORMATION.—The Patapsco formation, so called from its typical occurrence in the valley of the Patapsco River, forms the lowest division of the Cretaceous deposits here described. It extends entirely across the State from the Delaware border to the Potomac River, and throughout this distance is one of the most important members of the Cretaceous series.

The deposits of this division consist chiefly of highly colored and variegated clays which grade over into lighter colored sandy clays, while sandy bands of coarser materials are at times interstratified. The sands frequently contain much decomposed feldspar and rounded lumps of clay also occur. The sands are often cross-bedded, and all the deposits give evidence of shallow-water origin. The formation is estimated to reach a thickness of 200 feet. The deposits rest unconformably upon the Arundel below and dip from 35 to 40 feet in the mile to the southeast.

The fossils obtained from this formation consist entirely of plant impressions and a few indeterminate molluscan shells. The flora is very rich both in species and individuals and contains a considerable representation of dicotyledonous types. The general assemblage is distinctly Lower Cretaceous.

THE RARITAN FORMATION.—The Raritan formation, so called from its typical development in the valley of the Raritan River in New Jersey, extends across that state into Maryland. It is found in Cecil and Kent counties and extends thence southwestward along the eastern border of Harford and Baltimore counties into Anne Arundel County, where it broadens out and occupies a large extent of country along the Severn River. Beyond the Patuxent Valley the area of outcrop narrows, as the result of the transgression of the overlying Upper Cretaceous strata.

The deposits of the Raritan formation consist chiefly of thick-bedded and light colored sands, which at times become gravels. Frequently in the lower portion of the formation the sands grade over into the clays, which are generally light in color and highly siliceous, although they are sometimes deeply colored. The thickness of the Raritan formation reaches about 400 feet. The deposits overlie unconformably the Patapsco sediments below and dip about 35 feet in the mile to the southeast.

The fossils are quite distinct from those which are found in the Patapsco formation and abound much more largely in the remains of dicotyledonous types of vegetable life. Most of the species are identical with those found in the Amboy clays of New Jersey which form the northern extension of the formation as developed in Maryland.

The Upper Cretaceous.

The formations referred to the Upper Cretaceous overlie the Lower Cretaceous deposits unconformably. The lowest formation is of estuarine origin in Maryland while the highest formations are distinctly marine. They apparently represent the Cenomanian and Senonian with possibly the lower portions of the Danian of Europe.

THE MAGOTHY FORMATION.—The Magothy formation, so called from the Magothy River in Anne Arundel County, overlies the deposits of the Potomac group unconformably. It extends as a narrow belt from New Jersey southward along the eastern margin of the earlier formations. To the northward near the Raritan Bay in New Jersey it contains marine fossils but farther southward the fossils where present are confined to plant remains, the deposits having apparently been laid down in estuarine

waters. The formation is evidently transitional between the Potomac group below and the distinctly marine deposits which characterize the Upper Cretaceous. The Magothy formation crosses Cecil and Kent counties on the Eastern Shore and Anne Arundel and Prince George's counties on the Western Shore.

The materials consist of sands and clays which change rapidly both horizontally and vertically. The sands are commonly of light color, although lenses with bands of darker sands occur. The clays often appear finely laminated with sand layers between and are occasionally nearly black in color due to the presence of vegetable matter. The thickness of the Magothy formation in Maryland is very variable, ranging from 90 feet down to 20 feet or less. Its average thickness is probably about 50 feet. The formation has a dip of 30 to 35 feet in the mile to the southeast. The fossil leaves of the Magothy formation represent a later flora than that of the Raritan, and apparently one of Cenomanian age.

THE MATAWAN FORMATION.—The Matawan formation receives its name from Matawan Creek, New Jersey, in the vicinity of which it is extensively developed. It lies along the eastern margin of the Magothy formation upon which it rests unconformably. The Matawan formation is the most widely extended of the Upper Cretaceous deposits and reaches from the shores of the Raritan Bay across New Jersey, Delaware, and Maryland to the Potomac River. Within the limits of Maryland it forms a narrow belt which crosses southern Cecil and northern Kent counties and then re-appears upon the Western Shore in Charles and eastern Anne Arundel counties and thence continues southwestward with constantly narrowing confines across Prince George's County until it is represented only by a bed of a few feet in thickness on the bank of the Potomac River. It does not outcrop so far as known in Virginia, the Eocene deposits having completely overlapped the marine Cretaceous beds.

The deposits of the Matawan formation consist mainly of dark colored micaceous sandy clays which at times are somewhat more sandy in the upper portions and more argillaceous in the lower portions, although in general the formation is very homogeneous throughout, from Kent County

southward. The formation has an average thickness of about 50 feet on the Eastern Shore but gradually thins southward until it is not over 10 feet in thickness in southern Prince George's County. The deposits have a dip of from 20 to 30 feet in the mile to the southeast. The fossils of the Matawan are highly characteristic of its Upper Cretaceous age. Numerous marine mollusca, among them several characteristic species of ammonites, are found among its fauna. The formation does not show the division into members which are recognized in the New Jersey region to the northward where four well-marked beds appear that can be traced across that State to the Raritan Bay.

THE MONMOUTH FORMATION.—The Monmouth formation, so called from its typical development in Monmouth County, New Jersey, overlies the Matawan formation conformably and extends from New Jersey southward across Delaware into Maryland, but is very much less extensively developed in the State of Maryland than to the northward, although some of its chief characteristics still prevail. The Monmouth formation lies to the east of the Matawan deposits already described and forms a narrow belt crossing Cecil, Kent, Anne Arundel, and portions of Prince George's counties but gradually disappears before the valley of the Potomac is reached as a result of the trangression of the Eocene deposits.

The divisions of the Monmouth formation, so typically developed in central and northern New Jersey, are lacking in Maryland, although the beds are rather more glauconitic in the upper portions than in the lower. The deposits as a whole are deficient in glauconite as compared with those of the New Jersey region, the materials appearing as reddish and pinkish sands with glauconitic beds locally developed. The deposits have a thickness of somewhat less than 100 feet upon the Eastern Shore which gradually diminishes until the formation finally thins out altogether in Prince George's County. The beds dip at an angle of from 20 to 30 feet in the mile to the southeast. The fossils of the Monmouth formation show some marked differences from those of the Matawan formation, particularly in the advent of *Belemnitella*. The fauna on the whole is much more closely associated with the Matawan than with the overlying Rancocas. Like the Matawan the deposits belong to the Upper Cretaceous and are to be correlated with the Senonian of Europe.

THE RANCOCAS FORMATION.—The Rancocas formation, so called from its typical occurrence in the valley of Rancocas Creek in southern New Jersey where it conformably overlies the Monmouth formation, is well developed throughout that state and in Delaware, but due to the transgression of the basal Eocene deposits is wholly lacking so far as known, on the Eastern Shore of Maryland. A few localities in eastern Anne Arundel County in the valley of the Severn River contain fossils characteristic of this formation farther north and may represent small remnants of the Rancocas in that area, although it is possible that the materials may have been reworked and may now constitute part of the basal beds of the Eocene.

Farther to the north in Delaware the Rancocas formation consists of greensand marls which are frequently highly calcareous. The deposits are in general quite arenaceous and on the whole less glauconitic than the Sewell marls in New Jersey to which horizon they evidently belong. The formation has a thickness of about 20 feet in central Delaware but gradually thins out toward the Maryland line where the Eocene deposits have transgressed the Rancocas and directly overlie the Monmouth formation.

The Tertiary Period.

The Tertiary deposits of Maryland form part of a complex series of formations that extend from New Jersey southward to the Gulf. At no point in the middle Atlantic region is the series more complete or better exposed than in the Chesapeake Bay district and the bluffs along the Maryland and Virginia streams have been classic ground for the study of American Tertiary strata. These Tertiary beds unconformably overlie the Cretaceous deposits which they gradually transgress landward. The Tertiary of Maryland is chiefly represented by the Eocene and Miocene, although deposits of presumably Pliocene age also occur.

The Eocene.

The deposits of Eocene age lie above and to the east of those previously described. They strike across the State from northeast to southwest and

can be traced southward into the State of Virginia. In the Potomac Valley they dip at about 12½ feet in the mile to the southeast. Eocene deposits of different character appear farther southward and can be traced thence through the Gulf region. The beds are marine and fossils are numerous. The deposits constitute a single group known as the Pamunkey group.

The Pamunkey Group.

The Pamunkey group, so called from the Pamunkey River in Virginia, has an extensive development both in Maryland and Virginia. The surface of the Pamunkey group is largely covered by deposits of later date. Numerous outcrops occur along the streams, particularly in the valley of the Potomac River, the interstream portions of the country being generally covered by later deposits. The Pamunkey group has been divided into the Aquia and Nanjemoy formations.

THE AQUIA FORMATION.—The Aquia formation, so called from Aquia Creek which enters the Potomac from the Virginia side about 50 miles below Washington, is found unconformably overlying the Cretaceous deposits from Cecil County, Maryland, southwestward and southward as far as southern Virginia. From Cecil County it crosses Kent and the northern portion of Queen Anne's County on the Eastern Shore and thence extends across Anne Arundel, Prince George's, and Charles counties on the Western Shore, being particularly well exposed in the valley of the Potomac.

The deposits which consist chiefly of greensands and greensand marls, at times highly calcareous and less frequently argillaceous, have a thickness of about 100 feet at the point where the beds disappear below tide. From the records of well borings it is known that the beds thicken somewhat to the eastward. The fossils of the Aquia formation are numerous and distinctive and consist of characteristic lower Eocene mollusca and corals. The Aquia formation has been divided into the *Piscataway* and *Paspotansa* members each about 50 feet in thickness. The former is divided into 7 zones and the latter into 2 in the Potomac River area.

THE NANJEMOY FORMATION.—The Nanjemoy formation, so called from Nanjemoy Creek which enters the Potomac River from the Maryland side in Charles County, is found conformably overlying the Aquia formation. So far as known it is confined to the Western Shore, outcropping at various points across southern Anne Arundel, northern Calvert, southern Prince George's, and central Charles counties. The most extensive sections of the Nanjemoy formation in Maryland are in the vicinity of Upper Marlboro, along the Patuxent River, and along the Potomac River in southern Charles County from Popes Creek northward. The best part of this section is opposite Charles County along the Virginia bank of the Potomac to the east of Potomac Creek.

The deposits consist of greensands, often highly argillaceous and less frequently calcareous than the lower beds, and with here and there layers containing abundant crystals and crystallized masses of gypsum. The thickness of the deposits is about 125 feet where best exposed, although the beds thicken to some extent eastward. The fossils of the Nanjemoy formation as in the case of the Aquia formation are numerous and distinctive, and although many are common to the Aquia formation, some are confined to the Nanjemoy formation alone. They are mainly marine mollusca. The Nanjemoy formation has been divided into the *Potopaco* and *Woodstock* members, the former 60 to 65 feet in thickness and the latter 50 to 60 feet. The Potopaco member is divided into 6 and the Woodstock into 2 zones in the Potomac region. The lowest zone of the Potopaco member is a very argillaceous bed and has been referred to as the Marlboro clay.

The Miocene.

The Miocene deposits of Maryland form part of a broad belt of middle Tertiary formations that extend from New Jersey southward to the Gulf. The strata attain considerable thickness and constitute the most important element in the Coastal Plain series with the possible exception of the Cretaceous formations. The deposits are mainly if not wholly marine and fossils are numerous at most horizons. They constitute a single group known as the Chesapeake group.

The Chesapeake Group.

The Chesapeake group, so called from the characteristic development of the deposits in the Chesapeake Bay region, occupies a wide area of distribution throughout the eastern and southern counties of the State. It overlies the Eocene formations unconformably and in places along the western margin transgresses them to the Cretaceous deposits below. The surface of the Chesapeake group is for the most part covered by the deposits of later date. Fine outcrops, however, occur along the larger stream channels and in the bluffs bordering the Chesapeake Bay and its estuaries. The Chesapeake group has been divided into the Calvert, Choptank, and St. Mary's formations.

THE CALVERT FORMATION.—The Calvert formation, so named from Calvert County, where in the Calvert Cliffs the best sections of Miocene deposits on the Atlantic border are found, extends across the State from northeast to southwest in a belt from 20 to 30 miles in width. Beginning in southern Kent County near the Delaware line, it crosses Queen Anne's and thence extends into the northern portions of Caroline and Talbot counties. On the Western Shore it forms a considerable portion of northern Calvert and St. Mary's counties, much of Charles County, and the southern portions of Anne Arundel and Prince George's counties.

The beds, which consist largely of sands, clays, marls, and diatomaceous earth, have a total thickness of about 200 feet, although it becomes less than this westward, while at the same time it thickens along the dip to the eastward. The dip is about 11 feet in the mile. The fossils are numerous, particularly in the upper member of the formation. The Calvert formation is divided into two clearly defined members, the *Fairhaven diatomaceous earth* below and the *Plum Point marls* above. The Fairhaven diatomaceous earth is very largely made up of the tests of diatoms imbedded in a very finely divided quartz matrix. The Plum Point marls consist of series of sands, clays, and marls, some of the beds being packed with molluscan shell remains.

THE CHOPTANK FORMATION.—The Choptank formation, which receives its name from the Choptank River on the northern bank of which the deposits of this age are well exposed, extends in a belt across the

State to the east of the Calvert formation and is found in Caroline, Talbot, and Dorchester counties on the Eastern Shore, in Anne Arundel, Calvert, Prince George's, Charles, and St. Mary's counties on the Western Shore. Like the preceding formation the deposits are deeply buried and few exposures are observable on the Eastern Shore. The Choptank formation overlies the Calvert formation unconformably and completely transgresses the latter to the northward in New Jersey where it rests directly on the Upper Cretaceous.

The deposits consist of sands, clays, and marls, with here and there indurated ledges. The fossils are very abundant and at times make up largely the beds in which they are found. The formation has a thickness of 125 feet, which like the Calvert formation thins to the westward and thickens down the dip to the eastward. The dip is about 10 feet in the mile toward the southeast. The numerous marine fossils, which are largely mollusean shells, afford a satisfactory basis of separation of the beds from the underlying and overlying formations.

THE ST. MARY'S FORMATION.—The St. Mary's formation, so called from St. Mary's County where the formation is well developed, especially along the St. Mary's River in the vicinity of St. Mary's City, crosses Maryland from northeast to southwest to the southeast of the Choptank formation. On the Eastern Shore it is buried beneath a mantle of later deposits. While it evidently occurs in Caroline, Talbot, Wicomico, and Dorchester counties no outcrops are known. On the Western Shore it has been found only in Calvert and St. Mary's counties. The deposits consist of clay, sand, and sandy-clay, the latter typically greenish-blue in color and bearing large quantities of fossils. Locally the beds have been indurated, and at times clusters of radiating gypsum crystals are found. The formation has a thickness of 150 feet, although it thins down to the northwestward and thickens seaward below tide, as shown by well borings. Its average dip is 10 feet to the mile. The fossils which consist largely of marine forms, among which mollusca predominate, are very numerous and afford a satisfactory basis for separating this formation from the other Miocene formations below it.

Pliocene.

The only formation which has been referred to this period within the State of Maryland is the Lafayette. Its age has been long in doubt and there are not yet sufficient data to refer it definitely to any period. All that can be said is that it is younger than the Miocene which it covers and older than the oldest Pleistocene beds found in the same vicinity. Within this region no fossils have been found, and elsewhere the fossil plants and animals alleged to have been obtained within its limits are not of a character sufficiently definite to determine its age. The correlation, therefore, can only be regarded as provisional and more definite evidence is needed before the question can be regarded as settled.

THE LAFAYETTE FORMATION.—The Lafayette formation, first named by Hilgard in Mississippi for deposits found well developed in Lafayette County in that State, has been traced around the continent border northward and is supposed to be represented in the deposits hitherto called by that name in Virginia, Maryland, and Pennsylvania where the last remnants of the formation are recognized. Within Maryland it crosses the State from northeast to southwest and is confined to the eastern margin of the Piedmont Plateau and the western border of the Coastal Plain. Throughout this area it is believed to have once extended as a continuous mantle westward over a considerable surface of the Piedmont Plateau and eastward over the Coastal Plain. At the present time it has suffered so much from erosion that in Maryland it has been reduced to a mere fragment of its former extent. The largest area is located on the Coastal Plain southeast of Washington where it forms the divide between the Patuxent and Potomac rivers as far south as Charlotte Hall. This area has been much dissected by stream erosion and around its borders there are many outliers which were separated from the larger mass by the removal of the material which once connected them. To the east of the Patuxent River at Marriott Hill and on the highest hills of Elk Neck at the head of the Bay are other scattered patches of Lafayette gravels which also rest on Coastal Plain deposits. Along the eastern slope of the Piedmont Plateau there is a long line of outliers which rest either on beds of Potomac or directly on the crystalline rocks of the

Piedmont. The most important of these are located in the western part of the District of Columbia, near Burtonville, at Catonsville, near Lochraven, near Stockton, and on the Piedmont area of Cecil County near Woodlawn.

The materials composing the Lafayette formation consist of clay, loam, sand, and gravel which are often highly ferruginous, the iron being present in the deposits as a cement binding the loose materials together in ledges of local development. The Lafayette materials were imperfectly sorted in the waters of the Lafayette sea and are now found intermingled in varying proportions. Although there is a rough bipartite division in the deposits as a whole whereby the gravel occurs in greater abundance at the base and the sand and loam at the top of the formation yet these elements are mixed together in a confusing manner. Irregular beds or lenses of loam, sand, and gravel are locally developed throughout the formation. Taken as a whole the gravel is considerably decayed and fine-grained, but in the vicinity of the Piedmont Plateau it becomes very coarse and is imbedded in a compact sand and stiff reddish clay loam. Usually the upper portion of the Lafayette is composed of a deposit of loam varying in thickness from a few inches to 10 feet or more. At times it is highly argillaceous; at other times decidedly arenaceous, but as a general rule it is of very fine texture. Along the Piedmont border this loam contains considerable iron and has a marked orange color. In southern Maryland it changes to a buff or yellow.

The Lafayette formation is chiefly developed as a terrace lying irregularly and unconformably on whatever older formation chances to be beneath it. These range from pre-Cambrian and Paleozoic (the metamorphic rocks of the Piedmont Plateau) up into the later beds of the Miocene series. Although the oldest of surficial deposits, the Lafayette formation lies topographically highest and at the center of a concentric border of younger terrace formations which wrap about it. The Lafayette formation has a thickness on the average of less than 50 feet, although at some points a thickness considerably greater has been observed.

The Quaternary Period.

The Quaternary deposits of Maryland and adjacent states form an extensive veneer throughout all but the highest portions of the Coastal Plain frequently burying from view the deposits of earlier age in the interstream areas. The Quaternary is represented by both the Pleistocene and the Recent.

The Pleistocene.

Superficially overlying most of the older formations throughout the greater part of the Coastal Plain and extending in places on to the Piedmont Plateau are beds of Pleistocene age which, with marked variations in thickness, composition and structure, extend from the glacial deposits of northern New Jersey through the south Atlantic and Gulf states to the Mexican border. The Pleistocene deposits in Maryland belong to a single division known as the Columbia group.

The Columbia Group.

The Columbia group, so called from the characteristic development of the deposits in the District of Columbia, is widely extended as surficial deposits throughout the eastern and southern counties of the State as well as along the main stream channels that extend into the region of the Piedmont Plateau. These deposits form a series of terraces that wrap about the Lafayette and the higher portions of the older formations and thence extend as fluviatile deposits up the stream courses. The Columbia group has been divided into the Sunderland, Wicomico, and Talbot formations.

THE SUNDERLAND FORMATION.—The Sunderland formation, so called from the hamlet of Sunderland in Calvert County, was formerly developed as a nearly continuous deposit of the Coastal Plain region of Maryland below the Lafayette highlands, but erosion has now removed it over wide areas. Like the Lafayette it finds its greatest development in Southern Maryland where it forms the divide of Calvert County and of Charles and St. Mary's counties west and south of the Lafayette area. Numerous outliers occur to the westward as in the case of the Lafayette formation.

FIG. 1.—VIEW OF MIOCENE BEDS, COVE POINT, CALVERT COUNTY.

FIG. 2.—VIEW OF PLEISTOCENE BEDS SHOWING FOSSIL SHELLS, CORNFIELD HARBOR, ST. MARY'S COUNTY.

VIEWS SHOWING GEOLOGICAL FORMATIONS OF THE COASTAL PLAIN.

A few of them are found within the body of the Coastal Plain region while many others occur either on the Piedmont Plateau or on the margin between it and the Coastal Plain. At the head of the Bay on Elk Neck it is developed as a fringe about and a little lower than the Lafayette.

The materials which compose the Sunderland formation consist of clay, loam, sand, gravel, peat, and ice-borne blocks. These as a rule do not occur in well defined beds but grade into each other both vertically and horizontally. The coarser materials, with the exception of the ice-borne boulders, are usually found with a cross-bedded structure while the clays and finer materials are either developed in lenses or are scattered throughout the formation and may occur in the gravel beneath or in the loam above. There is distinguishable throughout the formation a tendency for the coarser materials to occupy the lower portion and the finer the upper portion of the formation, but the transition from one to the other is not marked by an abrupt change and coarser materials are frequently found above in the loam and finer materials below in the gravel. As a whole, the material is coarser in the Potomac and Susquehanna basins than elsewhere.

The sources from which the Sunderland sea derived the materials for its deposits were principally confined to the Coastal Plain, although the rivers also brought in contributions from the Piedmont Plateau and the mountains of western Maryland. The thickness of the Sunderland formation is very variable. The average thickness probably does not exceed 25 feet, although at some points it reaches a thickness of from 60 to 80 feet. A few plant fossils have been recognized in the clay beds but the fossiliferous localities in the Sunderland formation are much fewer than in the later deposits of Pleistocene age.

THE WICOMICO FORMATION.—The Wicomico formation, so named for the Wicomico River in southern Maryland, has been developed as a broad terrace below and fringing the Sunderland, at times completely filling and largely obliterating the bottoms of the ancient stream valleys that trenched the Sunderland surface. It has at the present time a much larger areal development than the Sunderland and has been much less

dissected by erosion than the latter, with the result that the terraced surface has been far better preserved. Its largest development is on the Eastern Shore where it forms the watershed throughout the center of the region, extending as far southward as Worcester County.

The materials which constitute the Wicomico formation are similar to those found in the Sunderland and in fact many of them have been derived from that formation. They consist of clay, loam, sand, gravel, peat, and ice-borne boulders. The distribution of these materials is similar to that described in the Sunderland in that they grade one into the other both vertically and horizontally, but with the preponderance of the coarser materials at the base of the formation while the finer deposits are largely developed toward the top.

The Wicomico sea derived its materials in much the same way as that of the Sunderland. The waves eroded the borders of the Lafayette and Sunderland formations, frequently reaching the deposits beneath and these reworked materials, together with sediments brought from the Piedmont Plateau and Appalachian Mountains, comprise the deposits laid down. The average thickness of the formation is somewhere from 25 to 30 feet, although it attains a thickness of about 70 feet at Turkey Point in Cecil County. Carbonaceous deposits of considerable thickness have been found in southern Maryland in which recognizable plant remains have been discovered.

THE TALBOT FORMATION.—The Talbot formation, the name for which is suggested by Talbot County where the formation is widely developed, occupies in Maryland the area between the margin of the older surficial deposits and the seashore. It wraps about the Wicomico and other terrace deposits as a border and extends up re-entrant valleys as a veneer. Erosion has attacked this terrace to such a slight extent that it may be considered as continuous, although here and there small areas have been separated from the otherwise unbroken surface. Like the Wicomico formation it finds its greatest development on the Eastern Shore and particularly in the southern portions of that area where it forms broad flats which decline lower and lower until they pass into marshes and blend imperceptibly with the beach. On the Western Shore it also has an extensive development, particularly toward the head of the Bay.

The materials which compose the Talbot formation consist of clays, loam, sands, gravel, peat, and ice-borne boulders. As in the Sunderland and Wicomico formations these materials grade into each other, although a bipartite division of the coarser materials beneath and the finer materials above is present in the Talbot as in the others. There is on the whole much less of decayed materials than in the preceding formations which gives to the Talbot a younger appearance. Cross-bedding is very common. In the western portions of the area throughout the Potomac and Susquehanna valleys the Talbot deposits frequently show large numbers of ice-borne boulders. These are also common in the upper portions of the Eastern Shore. The Talbot formation has an average thickness of about 30 feet which at times increases to 80 or 90 feet or thins down until it finally disappears. Many clay lenses containing remains of marine and estuarine animals and land plants occur near the main channels. Among the most important of these may be mentioned the clay beds of Bodkin Point containing huge cypress knees and stumps, and the marine deposits near Cornfield Harbor at the mouth of the Potomac River which contain a large assemblage of marine molluscan shells. These clay lenses are supposed to be deposits formed by lagoons which subsequently became filled. The fossils contained in these beds are in the main identical with those found at the same horizon in other states to the north and south of Maryland.

Recent.

The Recent deposits embrace chiefly those being laid down today over the submarine portion of the Coastal Plain and along the various estuaries and streams. To these must also be added such terrestrial deposits as talus, wind-blown sand, and humus. In short, all deposits which are being formed under water or on the land by natural agencies belong to this division of geological time.

The Recent terrace now under construction along the present ocean shore-line and in the bays and estuaries is the most significant of these deposits and is the last of the series of terrace formations which began with the Lafayette, the remnants of which today occupy the highest levels

of the Coastal Plain and which has been followed in turn by the Sunderland, Wicomico, and Talbot.

Beaches, bars, spits, and other formations are built up on this terrace belt and are constantly changing their form and position with the variations in currents and winds. Along the streams flood plains are formed that in the varying heights of the water suffer changes more or less marked. On the land the higher slopes are often covered with debris produced by the action of frost and the heavy downpours of rain which form at times accumulations of large proportions known as talus and alluvial fans. An illustration of the former is seen in the Devil's Race-course on the western slope of the Blue Ridge, the heavy blocks in this instance being separated by the action of frost and subsequently precipitated down the steep mountain side.

A deposit of almost universal distribution in this climate is the humus or vegetable mold which being mixed with the loosened surface of the underlying rocks forms our agricultural soils. The intimate relationship therefore of the soils and underlying geological formations is evident.

The deposit of wind-blown sands more or less important everywhere, as may be readily demonstrated at every period of high winds, is especially marked along the sea-coast in Worcester County where sand dunes of considerable dimensions have been formed. Other accumulations in water and on land are going on about us all the time and with those already described represent the formations of Recent time.

NOTE.—Plates showing characteristic fossils for each of the geological periods represented in Maryland will be found facing pp. 252-260.

A map showing the areal distribution of the geological formations and agricultural soils of the State will be found at the end of the volume.

MINERAL RESOURCES.

The mineral resources of Maryland have yielded a great variety of products, some of which afford the basis for important commercial enterprises, while others give promise of prospective value. Many of the Maryland minerals have been worked since early colonial days, especially the brick clays and the deposits of iron carbonate. The Maryland coal deposits also were early discovered, and have been the basis of an important industry for more than half a century. Still other mineral products have been developed within quite recent years, the annual value of the Maryland mineral output being steadily on the increase. The ancient crystalline rocks, confined for the most part to the Piedmont region between the Catoctin Mountain and the Chesapeake have afforded the most varied mineral substances. Here occur the most important building-stones; the slates of Delta and Ijamsville; the granite of Port Deposit, Woodstock, Ellicott City, and Guilford; the gneiss of Baltimore; the marble of Cockeysville and Texas; the crystalline limestone of Westminster; and the serpentine of Cardiff, Broad Creek, and Bare Hills. In these oldest rocks occur also the ores of gold, copper, chrome, lead, and zinc. Iron ore is also found here while all the flint, feldspar, kaolin, and mica in the State must be sought for in these rocks. These older rocks also appear in the Blue Ridge district where they form the Middletown Valley and have yielded traces of copper, antimony, and iron.

Rocks of later age, forming what geologists call the Paleozoic system, constitute the western section of the State. They furnish much sandstone and limestone suitable for building purposes, the latter also being burned extensively for agricultural uses. There are also important deposits of cement rock that have afforded the basis for an extensive industry. At the top of this Paleozoic system of rock formations are situated the coal beds of the famous Cumberland-Georges Creek coal basin, including the " Big Vein " that is universally thought to furnish the highest quality of steam and smithing coal. These same rocks also contain im-

portant deposits of fire-clay and iron ore, the former affording the basis for a very important fire-brick industry.

The post-Paleozoic formations of the State, although not as rich in mineral products, are not devoid of deposits of economic value. The interesting variegated limestone breccia, known as Potomac marble, and the brown sandstone of Frederick and Montgomery counties belong to the oldest of these post-Paleozoic strata. The series of still unconsolidated beds representing much of the remainder of post-Paleozoic time and comprising all of Eastern and Southern Maryland, and known as the Coastal Plain, furnishes the chief supply of brick, potter's and tile clay; of sand, marl, and diatomaceous earth (silica); and much of the iron ore. The clay industry, particularly, is one of the most important in the State and is largely based on the clays of this region.

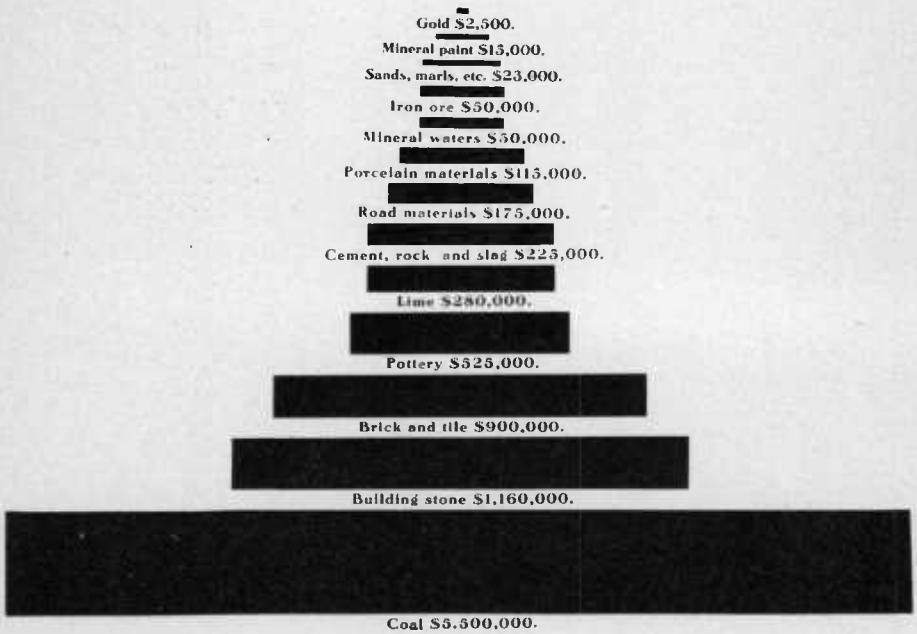


FIG. 5.—Diagram showing relative annual values of Maryland Mineral Products.

The various economic products will be briefly considered in the following pages.

TABLE OF AVERAGE ANNUAL VALUES OF MARYLAND MINERAL PRODUCTS.

Coal		$5,500,000
Clays and clay products:		
Brick and tile	$900,000	
Pottery	525,000	
Raw clays	10,000	
		1,435,000
Porcelain materials:		
Kaolin	$10,000	
Flint	85,000	
Feldspar	10,000	
		105,000
Sands		15,000
Marls		3,000
Silica or tripoli		5,000
Building stone:		
Granite and gneiss	$800,000	
Limestone	100,000	
Slate	125,000	
Marble and serpentine	100,000	
Sandstone	25,000	
Gabbro	5,000	
Miscellaneous	5,000	
		1,160,000
Cement, rock and slag		225,000
Lime (agricultural and building)		280,000
Iron ore (carbonate and hematite)		50,000
Mineral paints		15,000
Gold		2,500
Road materials		175,000
Mineral waters		50,000
Total		$9,020,500

THE COALS.

The coal deposits of Maryland are confined to western Allegany and Garrett counties and constitute a part of the great Appalachian coal field which covers portions of Pennsylvania, Maryland, Virginia, West Virginia, Ohio, Kentucky, Tennessee, and Alabama. Throughout the western portion of this field the rocks with their contained coal beds lie nearly horizontal, but to the eastward low folds that gradually increase in intensity are developed until the "canoe-shaped" basins of central Pennsylvania, western Maryland, and eastern West Virginia

are reached. As a result of this increased folding eastward the coals have been metamorphosed through heat and pressure with a relative reduction in the amount of volatile carbon, the coals gradually changing from the soft bituminous to the semi-bituminous varieties with a further change to the hard anthracite still farther eastward in the anthracite field of Pennsylvania. In general the coal beds are thickest along

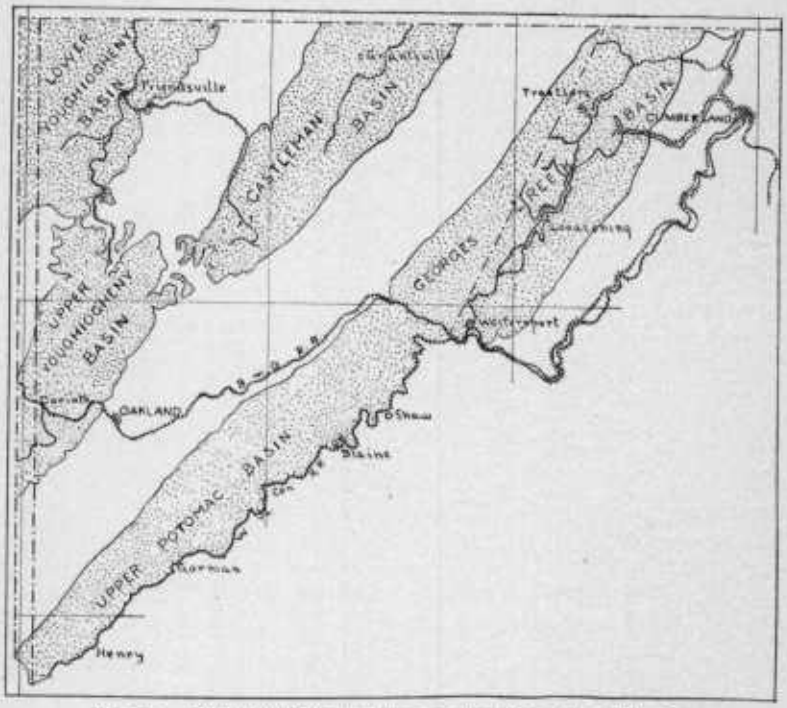


FIG. 6.—Map showing location of Maryland Coal Basins.

the eastern margin of the field and thin westward. Many of the coal seams can be traced continuously over thousands of square miles, while others have only a local development.

The Maryland coals belong to the group of semi-bituminous coals and possess great value for steam and smithing purposes. They are used extensively as fuel for locomotives, steamboats and factories, finding a ready market in Baltimore, New York, and elsewhere along the Atlantic border.

The Maryland coals occur in five basins, known as the Georges Creek basin, the Upper Potomac basin, the Castleman basin, the Lower Youghiogheny basin, and the Upper Youghiogheny basin. The present production of coal for the market is almost exclusively confined to the first two basins. The far greater prominence of the Georges Creek basin has led to the application of the name "Georges Creek coal" to most of the coal shipped from the State. Until within recent years practically all of this coal came from the Pittsburg seam or "Big Vein," but the gradual exhaustion of this wonderful seam has led to the exploitation with most satisfactory results of many of the "Small Veins" both above and below the chief seam. There are many companies to-day mining the smaller seams either exclusively or in conjunction with the large seam. There is unquestionably a great future for these smaller seams in Maryland, especially in the Upper Potomac basin in southern Garrett County, where they reach their greatest thickness. The total amount of coal in these small seams exceeds many fold that originally contained in the "Big Vein."

The many coal seams in the Maryland Coal Measures are shown on the accompanying vertical section. The figures given represent the thickness of the seams from roof to floor including the coal, bone, slate, etc.

The most important of the seams after the Pittsburg or "Big Vein" are the Upper Sewickley, the Bakerstown, the Upper Freeport, and the Middle and Lower Kittanning, all of which are being successfully mined at the present time.

THE FOLLOWING ANALYSES SHOW THE AVERAGE VALUES OF THE LEADING MARYLAND COALS.

Coal Seams.	Molsture.	Volatile Carbon.	Fixed Carbon.	Ash.	Sulphur.	Calorimetric Values in Calories.	Calorimetric Values in B.T. U.
Upper Sewickley or "Tyson".....	.83	20.22	70.09	8.86	1.40	7784	14.011
Pittsburg or "Big Vein".....	.70	18.78	73.13	7.12	1.02	7920	14.256
Bakerstown or "Four-foot".....	1.10	18.64	70.32	9.94	2.07	7757	13.973
Upper Freeport or "Three-foot".	1.21	19.47	68.70	10.17	1.73	7764	13.975
Lower Kittanning or "Six-foot"...	1.26	19.52	67.20	12.01	2.13	7484	13.471
Brookville.....	.91	21.04	68.83	9.22	1.30	7729	13.912

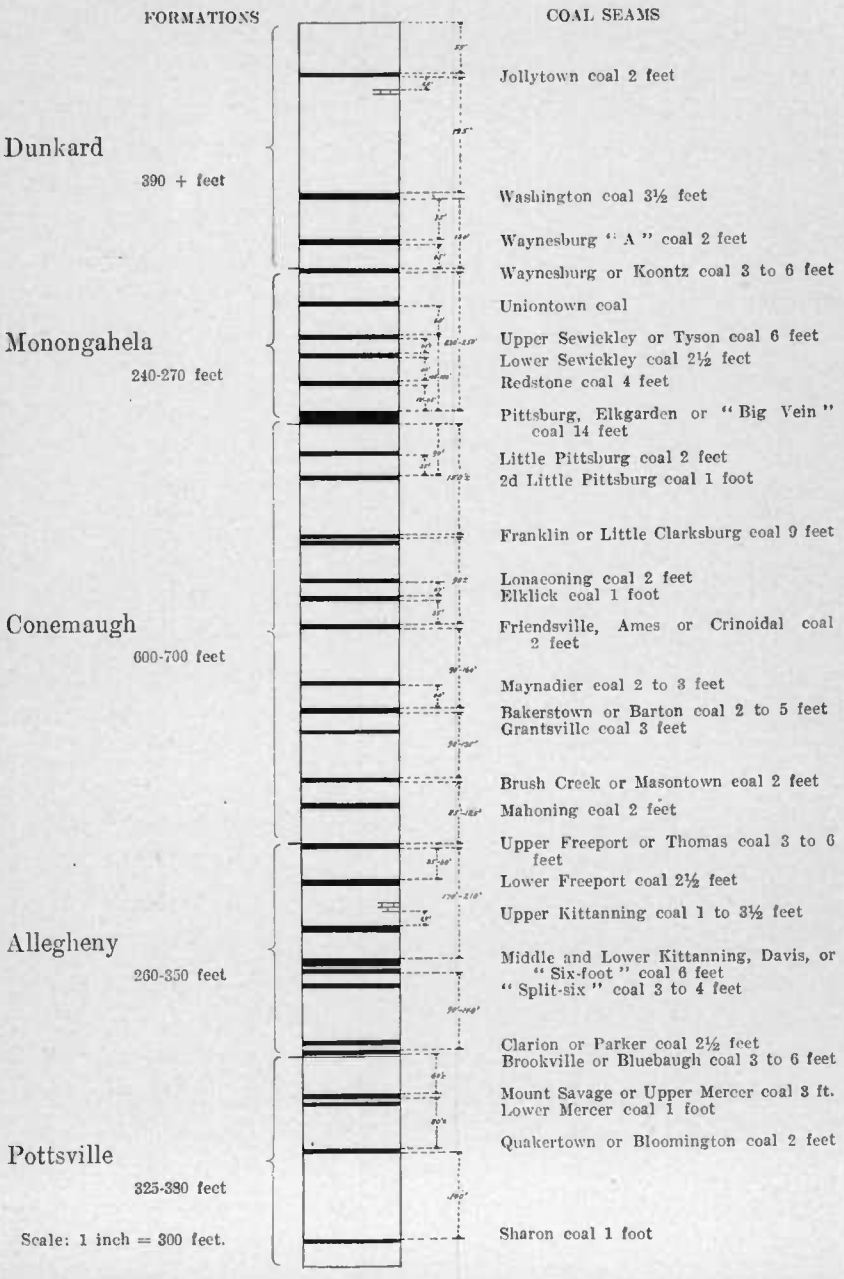


FIG. 7.—Generalized section showing relative positions of Maryland coal seams.

Although coal was discovered in the Georges Creek basin as early as 1782, the first eastern shipments from the Maryland coal district were not made until 1830, when small amounts were transported by barges down the Potomac River. The first company was incorporated in 1836. Since the construction of the Baltimore and Ohio Railroad in 1842 and of the Chesapeake and Ohio Canal in 1850, the output from the Maryland mines has very rapidly increased, and more than 30 companies are now engaged in the mining of coal.

The average value of the output of the Maryland coal mines in recent years has amounted to $5,500,000 annually.

THE BUILDING STONES.

The rocks of the State of Maryland present many varieties of excellent building and decorative stones. The greatest amount of the product is obtained from that portion of the State north of Washington and east of Harper's Ferry, West Virginia, which has been termed the Piedmont Plateau, and which includes some of the oldest rocks found in the State. The central location of this area, traversed by two main railroad lines and several local ones, places it within convenient distance of the prominent cities and towns of the Middle Atlantic coast and renders the products both valuable and available wherever the local conditions are otherwise favorable. Counteracting the value of this central location, however, is the fact that the State of Maryland represents but a section across a series of geological formations, which are present in Pennsylvania and Virginia, where there are offered similar opportunities for quarrying building stone. In some instances operations were commenced in these areas earlier than in Maryland, with the result that trade has been diverted to neighboring States which might be gained for Maryland by more energetic and intelligent action on the part of the local operators. At the present time the operations in the area are in no wise commensnrate with the supply of material at hand, and the demand which might be developed if sufficient forethought and care were expended to make the output nniform and the quarrying economical.

The rich variety in the rocks adapted to structural and decorative

purposes renders a description of each variety out of the question, and it becomes necessary to treat the occurrences under the following heads: The Granites and Gneisses. The Marbles, Serpentines, and Limestones. The Quartzites and Sandstones. The Slates.

THE GRANITES AND GNEISSES.

Granite is the broad family name that is applied to a large and common group of rocks, which are usually of a somewhat mottled light gray color, and almost always carry two minerals, quartz and feldspar, as

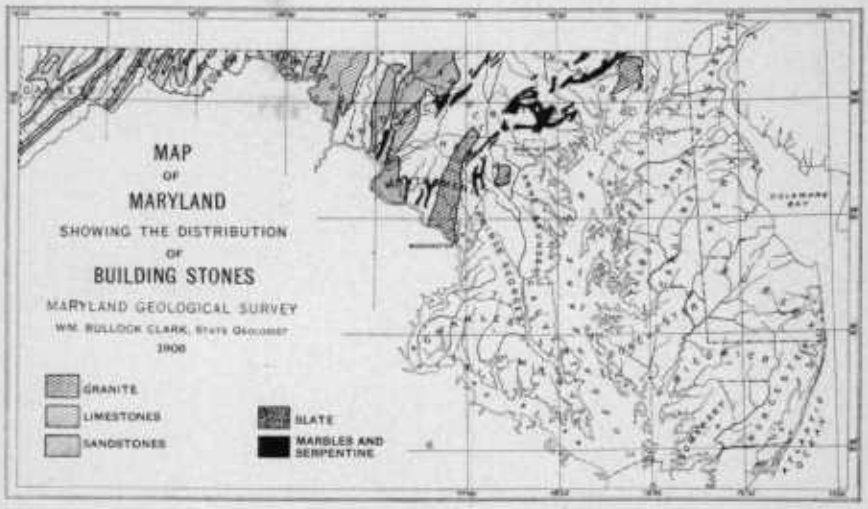


FIG. 8.—Map of Maryland showing the distribution of building stones.

essential constituents. Beside these, which make up the mass of the rock, there are dark colored iron-bearing minerals, such as black mica, or biotite, hornblende, and occasionally pyroxene. Each of these may be evident to the eye without the aid of a lens.

The foregoing minerals usually form irregular aggregates, in which the individual grains interlock in such a way that the cohesive strength of granite is relatively high. The constituent grains vary very widely in size, from individuals two or more inches in diameter to those which are scarcely separable with the unaided eye. The arrangement of the

different mineral grains is irregular and without any prominent lines of distribution, when the granites are unmodified products of crystallization from a molten state. Subsequent action on the rock, however, through pressure or recrystallization, generally arranges the constituent minerals in some regular order, such as in parallel or wavy interlocking lines. It is in this way that many granite gneisses originate from granites, as at Port Deposit. True gneisses, however, usually result from the recrystallization of rocks laid down under water, and still retain their banded character. Since in the trade granites and gneisses compete for the same work, and since, when well sorted, there is little difference in their practicability for building purposes, they will be treated together in the present discussion, the differences between the two being shown in the order of grouping in the discussion of the principal quarries.

The regions in Maryland where the granite and gneiss are most extensively worked are at Port Deposit, in Cecil County, in the vicinity of Baltimore, at Woodstock in Baltimore County, and at Ellicott City and Guilford in Howard County. Other areas in Howard and Montgomery counties and in the District of Columbia contain some good stone, but it is there quarried only for local use.

Granites.

PORT DEPOSIT.—The Maryland granite which is perhaps best known outside of the limits of the State is that quarried in the vicinity of Port Deposit. This town is situated on the Susquehanna River three miles above its mouth at Havre de Grace. It is one of the principal towns of Cecil County and has good railroad connections with Philadelphia, Baltimore, Washington, and Harrisburg. It is possible also for light crafts to ascend the Susquehanna as far as the town and receive their loads directly from the quarry. The value of the granites of this area was early recognized, and the rock was used by the settlers for the foundation of some of the oldest colonial dwellings. The industry arising from the quarrying of the rock is, however, of somewhat later origin.

The Port Deposit granite is cut by several series of joints or parting

planes which are so situated as to greatly facilitate the extraction of blocks of any desired size. Texturally the stone is marked by an indefinite lamination indicated by the shreds and flakes of black mica. In color the rock is a light bluish gray which in buildings gives a bright, fresh appearance at first, and then gradually becomes somewhat darker through an accumulation of the dust and dirt of the atmosphere. Such a darkening produces a mellowed tone in the buildings which gives a pleasing effect. Chemically and physically this granite is very durable. The chemical and mineralogical analyses show no constituents easily removed by the weather, while the tests on its crushing strength (over 20,000 pounds per square inch), its absorption (0.19-0.25), and freezing thoroughly establish its durability under any circumstances to which it may be subjected.

Near Frenchtown, a few miles south of Port Deposit, is another body of granite similarly situated. Here the rock is of the same general character, but the small quarry opened in it has never been very highly developed. Other masses of similar granite, less favorably situated for commercial purposes, may be found on either side of the Susquehanna in the neighborhood of Port Deposit.

ELLICOTT CITY.—The Ellicott City granite area consists of an irregular L-shaped mass, which has an extreme length of about five miles in an east and west direction and a breadth varying from one-half to two miles. The quarries of Ellicott City are located on either side of the Patapsco River in Baltimore and Howard counties, and the rock in which they occur extends on the eastern side of the Patapsco as far east as Ilchester, but on the western side only as far as Grays Siding. The material on the Baltimore County or eastern side is a fine-grained rock with a decided foliation or gneissic structure. On the opposite side of the river in Ellicott City itself it is more uniform and granitic. Here it also has a porphyritic structure in consequence of the development of large flesh-colored crystals of feldspar which are disseminated somewhat irregularly through the rock. The time of opening these quarries dates back probably into the last of the eighteenth century, but the details of their development are entirely wanting.

The opportunities for shipment and drainage are good. Those of

the Ellicott City quarry are seldom excelled, as the opening is in the side of a hill so close to the tracks of the Baltimore and Ohio Railroad (main stem) that cars may be loaded simply by turning the derrick boom.

Probably no area of granite within the State shows as great variation in the texture and character of the rock as that about Ellicott City. In the quarries on the eastern side of the river the rock appears quite schistose and homogeneous, and practically lacking in porphyritic crystals. Through it are scattered large patches or segregations of the darker minerals, which give to the rock the somewhat somber effect displayed by the Baltimore Cathedral. These patches do not weaken the rock, though they render the stone less attractive. On the other side of the river the stone has a distinctly porphyritic character, which gives to it a mottled effect. The increased amount of feldspar brightens the rock and the distribution of the crystals adds detailed variety to the structure in which it is used.

WOODSTOCK.—Perhaps the best granite in Maryland for general building purposes is that which is found in the small area in the southwestern corner of Baltimore County near the railroad station of Woodstock, Howard County. Within this area, near the quarries, is the small town of Granite, which was formerly known as Waltersville. The granite mass forms a more or less oval, isolated area extending scarcely two miles northeast and southwest and a mile northwest and southeast. Although so small, it is one of the most important economic areas within the State. The most striking feature of these quarries is the sharp demarkation of the systems of vertical and horizontal joints which are so prominent and so regular as to give the impression of cyclopean masonry.

The chemical composition and appearance of the rock are very satisfactory, and the physical tests on the crushing strength (20,000 pounds per square inch), absorption (0.23-0.25), and freezing show the rock to be all that could be desired for strength and durability.

GUILFORD.—Perhaps the most attractive granite found within the State is that which is quarried at Guilford, Howard County, about five miles northwest of Annapolis Junction, on the Little Patuxent River.

This granite early attracted attention because of the uniformity and fineness of its grain, its light color, and pleasing effect. Although the area furnishes excellent monumental and building material, it has until the recent construction of a spur been situated some miles distant from the Baltimore and Ohio Railroad, a circumstance which has delayed such a development and recognition of the rock as the material deserves.

MINOR AREAS.—Besides the five areas already described there are several other granite masses within the State, as indicated by the map, which have been worked from time to time to supply the local demands, and occasionally with the hope of bringing the stone into commercial importance. Of these smaller masses which have been quarried spasmodically may be mentioned those at Dorsey's Run, between Ellicott City and Woodstock; at Sykesville; at Garrett Park; at Cabin John, in Montgomery County; and the granites of the Middletown Valley.

Gneisses.

Certain of the more uniform and compact gneisses furnish good building material and many quarries have been opened in the areas where the demand is great and the expense of handling and transportation is fairly low. These quarries are especially noticeable in the vicinity of Baltimore, where all of these conditions are fulfilled. The gneisses of the area, represented on the map, show great constancy in their mineralogical and textural composition. They are composed of alternating bands of fibrous to micaceous hornblende, biotite and chlorite schist between lighter colored more or less feldspathic quartzschist. The dark ferruginous bands break down readily and are not used at all as structural material, but are discarded as waste. The best material comes from those portions of the lighter bands which are composed almost wholly of quartz, the prepared blocks differing but little from those made of a well-characterized quartzite. The rocks are rather strongly bedded in slabs from three inches to three feet in thickness, and are thus more easily worked than the hardness of the rock might at first suggest.

The quarries about Baltimore are grouped around two centers, Jones Falls and Gwynns Falls, on the northern and western sides of the city,

FIG. 1.—OUTCROP OF PITTSBURG SEAM, NEAR LONACONING, ALLEGANY COUNTY.

FIG. 2.—CONSOLIDATION COAL COMPANY, OCEAN NO. 7, ALLEGANY COUNTY.

VIEWS OF MARYLAND COAL MINING INDUSTRY.

the location being determined by the facilities afforded by the shape of the country for opening and working the quarries on a horizontal plane. This method of working decreases the cost of handling the stone, avoids any expense or difficulties because of water, and often furnishes a convenient and cheap dumping ground away from the rock bed which may be worked in the future.

Smaller quarries are found at different points within the Piedmont where the gneiss is worked to meet the local demand for foundations, crushed stone, etc.

The average value for the annual output of granites and gneisses in the State is about $800,000.

THE MARBLES AND LIMESTONES.

The marbles and limestones are perhaps the most uniformly distributed of all the building stones in the State, for larger or smaller areas may be found in Baltimore, Carroll, Howard, Frederick, Montgomery, Washington, Allegany, and Garrett counties. These differ widely, however, in character, mode of occurrence, and geological age. Unlike the granites, gneisses, and serpentines, they are not confined to the central portion of the State, called the Piedmont Plateau, since they are found well developed in the broad Hagerstown and Frederick valleys and in the more mountainous areas of the Alleghanies. The exposures are almost always poor on account of the relative readiness with which these rocks break down under atmospheric agencies, and from the same cause they usually occur in valleys and seldom along ridges or the crests of mountains, as the sandstones do. Moreover, whenever there occur sufficient bodies the valleys are characteristically broad, flat, and very fertile.

According to their geological age the marbles and limestones have undergone various degrees of change, since the time of their formation. There is a progressive increase in their crystalline character and freedom from fossils, from the little changed fossiliferous Greenbrier limestones of Garrett County to the crystalline, non-fossiliferous marbles of Baltimore County. This increased alteration, which they have undergone, is accompanied by a change in color from the dark limestones of

the Carboniferous and Helderberg formations through the lighter Shenandoah limestones to the variegated marbles of the western Piedmont formation and the clear white or blue marbles which are so extensively worked in Baltimore County.

According to their character, their occurrence, and the uses to which these various stones are put, they may be grouped for discussion in the following subdivisions:

Marbles, including the highly crystalline dolomites and marbles of Baltimore, Howard, and Carroll counties.

"Potomac Marble," or breccia, which is found locally in the "Red beds" of the Newark formation (Triassic) in Montgomery, Frederick, and Carroll counties.

Serpentines or "Verde Antique" of Harford, Baltimore, and Montgomery counties.

Limestones, including the crystalline blue and gray limestones, magnesian limestones, and "dolomites" of Frederick, Washington, Allegany, and Garrett counties.

Marbles.

The marbles of Maryland have been known for their great value in building and monumental work since the beginning of the last century. They are all confined to that portion of Maryland composed of the highly crystalline rocks of the Piedmont Plateau. Those which are being worked at the present time occur in Baltimore County.

MARBLES OF BALTIMORE COUNTY.—The chief quarries are located at Cockeysville and Texas, on the Northern Central Railway, about fifteen miles from Baltimore, and are separated from each other by a distance of a mile and a half. Although situated so close together and presenting but parts of a single formation in the same valley, the quarries expose rocks showing many differences in composition, purity, coarseness of grain and texture, which have developed different industries in the two places. The rock at Texas is a coarse-grained marble of nearly pure carbonate of lime suitable for use as a flux or fertilizer, while that at Cockeysville is a finer-grained dolomitic marble, rich in magnesium and well adapted for building and decorative purposes.

The *texture* of the eastern marble varies widely. The rock from Texas is a very coarsely crystalline marble or "alum stone" in which the individual grains are sometimes $\frac{1}{2}$ or $\frac{3}{4}$ of an inch in diameter. The constituents are weak in themselves and they are weakly held together. Such a texture renders the rock nearly worthless as a building stone where small blocks must be used and great weights sustained. This is emphasized by the determination of the crushing strength, which is very low. The grain of the Cockeysville or "Beaver Dam" rock, on the other hand, is excellent, the individuals seldom exceeding $\frac{1}{61}$ of an inch in diameter, the component particles forming a closely interlocking aggregate. This interlocking of the grains tends to produce a compact and hard rock whose crushing strength is high (20,000 pounds) and absorption ratio low (0.213 per cent). This difference in closeness of grain is not strictly a geographical one, since fine-grained marbles, similar to those at Cockeysville, may be found at Texas. There is at the latter point, however, little evidence of the occurrence of rock which will combine such fineness and closeness of grain, freedom from mica and pyrite, and abundance as is shown in the rock worked by the Beaver Dam Company at Cockeysville. Quarries are also being opened at Summerfield, where good deposits of marble have recently been found. Small areas of marble also occur in Howard County.

MARBLES OF CARROLL COUNTY.—Intermediate between the clear white, fine-grained saccharoidal marbles of Baltimore and Howard counties and the dark blue and gray limestones of the Hagerstown and Frederick valleys are the variegated marbles of Carroll County, which have furnished samples unsurpassed in beauty and variety by those of other states. All of these varieties occur in lenses which do not occupy any considerable extent or present large exposures, but instead are confined to valleys which are long and narrow and are the direct result of the readier removal of the calcareous rocks than of the adjacent shales and sandstones. The marbles thus occupy the bottom lands and seldom outcrop high above the level of the streams.

Up to the present time the method of extracting the stone has been very crude, since the only desire has been to obtain the rock in pieces

suitable for foundations and ordinary buildings. From a study of the small quarries it seems probable that no blocks can now be obtained in size, shape, and quantity for first-class building purposes. The jointing is not trustworthy and the rock tends to break down into thick angular blocks varying in size from eight cubic feet to small fragments. Careful work with channeling machines or diamond drills and a discontinuance of explosives might allow the quarrying of blocks which would be valuable for interior decoration in the form of mosaics and mantels.

Another serious drawback in working these rocks, which appear so beautiful in samples, is the irregular distribution of the colors. The white may be replaced by red or the red may be replaced by blue and so on. There seems, however, to be a greater amount of red and white or clear white than anything else. The variations in color are so frequent and uncertain that it seems doubtful if any quarry now opened could fill any moderately large order with material like a given sample. That there are beautiful marbles within these lenses is beyond doubt, but a suitable place for the development of a profitable industry in them has yet to be found.

Potomac Marble.

The most interesting building material in the entire State of Maryland is the "Potomac marble," "calico rock," or "Potomac breccia," which has been used occasionally for the greater portion of a century. The chief interest in this rock arises from the fact that, as stated by Merril, it is "the only true conglomerate or breccia marble that has ever been utilized to any extent in the United States."

This conglomerate is found in several places along the eastern slope of the Blue Ridge and has been quarried near Washington Junction on the Baltimore and Ohio Railroad. The quarries are small affairs, which have been operated spasmodically. The one most actively operated is located about a mile east of the Washington Junction station.

This rock was first brought into notice by Mr. B. H. Latrobe, Superintending Architect in the construction and repair of the Capitol and White House before and after the War of 1812. The columns which

were then procured are still standing in the old House of Representatives, now used as Statuary Hall. The quarries whence they were obtained have never been fully developed, although Mr. Latrobe thought that he had found in the newly discovered marble of the Potomac an inexhaustible resource of the most beautiful building materials easily accessible by water. The conglomerate consists of pebbles of limestone of varying size which sometimes reach a foot in diameter, although usually averaging about two or three inches. The fragments, which are both well rounded and angular, range in color from gray to blue and dark blue, and occasionally pebbles of quartz, chloritic schist, and white crystalline marble occur. All are imbedded in a red calcareous matrix mixed with a greater or less amount of sand.

Serpentine.

Serpentine or "Verde Antique" has been quarried in Maryland for many years, but the annual production has always remained small. As this rock enters into competition with some of the marble for interior decoration it has frequently been classed as a marble, although as far as the Maryland deposits are concerned it is in no wise related to the marble, however intimately interwoven with calcite veins it may be. The deposits are found in Cecil, Harford, Baltimore, Howard, and Montgomery counties, where they have been worked to a greater or less extent in the hope of obtaining good material for general building or interior decoration. The most thoroughly exploited are those about Baltimore, at the Bare Hills, those on the banks of Broad Creek in the eastern part of Harford County, and a small area near Cambria in the northern part of the same county. That the stone is capable of furnishing beautiful slabs for decorative purposes has been clearly proven. The deposits on Broad Creek are situated in the midst of a large serpentine area, which extends from the Susquehanna southwesterly into Baltimore County. The nearest town is the small village of Dublin some three miles to the south, which is lacking in both railroad and canal communication. In the shipping of orders it is necessary to have all of the stone hauled to Conowingo on the Perryville and Columbia Rail-

road, a distance of three or four miles. The texture of the stone does not vary widely, and the impression is left that the stone works readily. If due care is used to avoid the use of explosives and the working of the stone after it has lost the so-called quarry water, much of the waste may be avoided. The use of diamond drills or channeling machines offers the only method which will justify the expectation of profitable work.

What has been said of the Broad Creek rock may equally well be said of that in the smaller openings near Cambria, a small station on the Baltimore and Lehigh Railroad not far from Cardiff.

The average value of the annual output of marble and serpentine in the State is approximately $100,000.

Limestones.

The blue and gray limestones of Paleozoic age have with a single exception never been quarried in Maryland as building stones except for local use. The most important and in fact the only limestone which has been used in prominent buildings is the Shenandoah limestone of the Hagerstown and Frederick valleys. This rock is a magnesian limestone containing alumina and graphite which, however, shows a wide range in its composition.

This stone is usually of a deep blue color when freshly quarried but upon exposure there is slowly formed a thin white coating over the face of the rock, which brightens the color to a dove-gray, thereby greatly improving the appearance of the buildings. This change goes on uniformly and accordingly does not pass through the unsightly mottled stage.

There is no doubt that this rock might become of considerable importance commercially as a building stone. At present, however, the residual soil, with which it is covered, lends itself so readily to brick making that there is little demand for stone except in heavy structures or for foundations.

Many areas in the Hagerstown Valley offer limestones which may ultimately prove of importance as building stones. Openings in the rock are made only for lime at the present time, and the methods of quarry-

ing, which shatter the rock by heavy charges, make the exposures look less favorable for the production of building stone than is actually the case. If proper care in extraction were exercised, there is no doubt but that large blocks of limestone could be quarried in many places throughout the entire valley, which would in some instances work into a good grade of "black marble."

The most successful quarry at the present time is that situated near Eckles Mills, Washington County, operated by the Washington Marble Company. The rock, as here exposed, occurs in several well-defined beds, lying at a moderate dip, which yield excellent decorative stock. The material varies somewhat in color in the different beds but large slabs, suitable for interior decoration, have been obtained, which in their soft, pleasing tones and agreeable markings rival many of the better known foreign marbles. The product of these quarries is already on the market and the present demand forecasts the establishment of a good industry at this locality.

In the Frederick Valley little has ever been done towards quarrying the blue limestone for building purposes, as almost all of the stone which has been taken out has been burned for lime which finds a ready market. The buildings in Frederick show that there has been some quarrying for building material, since several of them are built of limestone and almost all of them have limestone foundations or sills.

West of the Hagerstown Valley in Washington, Allegany, and Garrett counties there are three Paleozoic limestones, namely the Niagara, Helderberg, and Greenbrier. Of these the second is the only one which offers reasonable grounds for expecting good building material within its limits. The upper massive beds of the Helderberg which outcrop in five or six small bodies along the Potomac from Hancock to Cumberland, and form a continuous belt from the latter point to Keyser, West Virginia, afford every indication that satisfactory building material may be obtained. Little if any work has been done in this formation because there have been no local demands.

Of the two remaining formations the Niagara is of such a nature that it cannot be used at all, and the Greenbrier is scarcely any better adapted

to building purposes. Both formations occur in valleys with very few outcrops. The latter division has a single exposure on the Potomac between Keyser and Piedmont, West Virginia, and is imperfectly shown on Jennings Run and Braddocks Run. It is also injured for structural purposes by the pyrite which occurs scattered through it.

The average value of the annual output of limestone for the State is approximately $100,000.

THE SANDSTONES.

Although there is but one sandstone within the State which has attained any considerable reputation as a building stone, there are many formations in different parts of the area which furnish suitable sandstones for local construction. As is the case with all building stones the factor of transportation facilities is so important that only those deposits can come into general use which are high class and situated adjacent to prominent lines of travel either by railroad or boat. The sandstones of the State may be considered under the following heads: the *Triassic sandstones*, the *Paleozoic sandstones* including the Cambrian or "Mountain" sandstone, the Tuscarora and Oriskany sandstones, the Pocono and Pottsville sandstones, and the *Micaceous sandstones*.

Triassic Sandstones.

The Triassic or "Seneca Red" sandstones are the only ones quarried in Maryland which possess a recognized reputation in the market, or which furnish material for more than local work. The formation in which they occur is extensively developed along the eastern edge of the United States from Connecticut southward through New York, New Jersey, Pennsylvania, and Virginia and in scattered areas into North and South Carolina. It is from rocks of the same age that the well-known building stones from Portland, Connecticut, Prallsville, New Jersey, and Hummelstown, Pennsylvania, are quarried. This formation enters Maryland from the north near Emmitsburg, and continues with varying width through Carroll, Frederick, and Montgomery counties to

the Potomac River. Between these limits there is an almost continuous belt locally known as the "red lands" which is divided into two areas by a small exposure of the underlying Shenandoah limestone a few miles west of Frederick, where the whole of the Triassic has been removed by stream erosion.

In either direction from this point the formation widens to about 16 miles at the Mason and Dixon Line and 4 miles where it crosses the Potomac. East of this belt in the southwestern corner of Montgomery County there is also a broad area of the same formation which is continued southward into Virginia. It is to this southern area that the quarrying of sandstone is almost entirely confined. The prominent quarries are situated near the mouth of Seneca Creek, Montgomery County, on the Chesapeake and Ohio Canal about 25 miles northwest of Washington.

The first use of the Seneca stone is not known, although it is evident that blocks of this material were utilized prior to the Revolution. The beds from which the building stones are now obtained lie west of Seneca Creek, on the left bank of the Potomac River, where the dip is some 15 to 20 degrees to the southwest. The sandstone beds themselves differ very much, not only in color but also in hardness and texture. Some are fine-grained and can be wrought to a sharp arris, others are coarse-grained and may assume the character of a conglomerate. Interstratified with these grits are argillaceous shaly beds, which, together with some of the conglomeritic beds, are entirely unfit for the better grades of work, and cannot compete even with local stone for rough foundation work on account of the cost of transportation. In strata showing as wide variation as these do it is natural that only a portion of the material excavated is available, and there must necessarily be a considerable waste.

The texture of the stone which is placed upon the market is exceptionally good. It is very fine-grained and uniform and is not at all shaly, and shows little or no disposition to scale when exposed to the weather. The particles of quartz are evidently distributed through a fine, scarcely perceptible cement, and over the entire face there are very minute flakes of muscovite which brighten the general appearance of the

rock. Occasionally in larger blocks there are seen small bands of coarser grain which indicate the bedding, and in a few instances this alternation in texture is emphasized by variation in the color of the cement.

One of the most valuable features of the Seneca sandstone is the extreme readiness with which the stone may be carved and chiseled when it is first quarried. It is then soft enough to be easily cut and the texture is sufficiently uniform to render the stone satisfactory for delicate carving. As is frequently the case with all building stones the rock after exposure loses the readiness with which it may be worked and becomes hard enough to turn the edge of well-tempered tools. It is this hardening on exposure which protects and preserves the delicate tracery sometimes seen in the finer examples of dressing in blocks from these quarries.

The color of the Seneca Creek sandstone as furnished varies from a homogeneous light reddish-brown or cinnamon to a chocolate or deep purple-brown. When freshly quarried the colors are even brighter than after the rock has been exposed some time, the rock presenting tones of a light reddish fawn color. The color changes with the composition. With an increase in quartz the luster of the rock becomes brighter and with an increase in feldspar the tone of the rock becomes grayer, while an increase in the amount of cement deepens the color.

Throughout the entire extent of the Triassic as exposed in Maryland there are small local quarries developed to supply the demands for foundations and occasionally for more pretentious buildings. The general demand, however, is more than overcome by the cost of transportation in all but the most favorably situated localities. There are, however, many occurrences which will prove of value as the country becomes developed and improves its facilities for distributing its resources.

Paleozoic Sandstones.

Among the various Paleozoic formations there are five well-marked sandstones. These are the Cambrian, Tuscarora, Oriskany, Pocono, and Pottsville. None of these have been worked to any considerable extent

as building stones, because of the lack of demand and of transportation facilities.

CAMBRIAN or "MOUNTAIN" sandstone extends across the State in two parallel bands of dense quartzites which form the Blue Ridge and Catoctin mountains. These quartzites were originally porous sandstones, which have subsequently been thoroughly consolidated by a dense siliceous cement. Similar rocks also occur in the small detached area of Cambrian sandstones which forms Sugar Loaf Mountain. The rock has never been brought prominently into the market, although it has been used quite extensively for railroads, canals, roads, and a few individual buildings.

Other quarries have been opened in a small way along the Western Maryland Railroad to supply the demands for good road metal and small quarries have been operated as at Emmitsburg.

TUSCARORA and ORISKANY sandstones have a considerable development in Allegany and Washington counties where the stone has been used to supply the local demands. This is especially true of the area about Cumberland. Here the Oriskany sandstone, which is of a buff-brown to yellow color, was the first to be introduced. It is the source of all the sills, foundations, and lintels for the older buildings. Although this has not proved altogether satisfactory about Cumberland there are other points in the distribution of this formation where it seems probable that good material may be obtained.

When it was found that the Oriskany sandstones were not as durable as expected and that they soon became disfigured by exposure, attention was directed to the harder white sandstones of the Tuscarora which are exposed in Wills Mountain just west of Cumberland. The ledge as here exposed has a thickness of some 300 feet, but the solid rock has not yet been quarried since the demand is more readily supplied by utilizing the many detached blocks which cover the slopes of the mountain. At the present time this stone is used for foundations and trimmings in all of the better class of buildings in Cumberland. The rock varies somewhat in texture and firmness according to the different beds, but on the whole shows unusual uniformity. It is bright gray in color and is

composed entirely of fragments of quartz, which are themselves cemented by a silicious cement, causing the rock to be in reality a quartzite rather than a sandstone. Feldspar and mica are also found in the rock. Few imperfections were noticed and for one of such silicious character the rock seems to be very free-working.

POCONO sandstone has received but little attention and has been used only occasionally as a supply for flagging. It seems quite probable that as the demand for building stones increases the flags, which are well developed in places, may come to be of some importance.

POTTSVILLE sandstones and conglomerate are interstratified with sandy shales in which thin beds of coal are locally developed. The sandstones are usually coarse-grained and conglomeritic, with marked evidences of cross-bedding which are irregular in extent and distribution. The individual pebbles, frequently very small, are held together by a silicious cement, which indicates great durability for the rock. Unfortunately such a cement renders the working of the stone both difficult and expensive. It is probable that this material will never become of economic importance except in the supply of local demands for foundations, steps, and occasional door sills.

Micaceous Sandstones.

Scattered over the northeastern portion of Maryland in Baltimore and Harford counties are several exposures of highly micaceous quartzose rocks, which were originally sandstones but which have now undergone considerable change through dynamic metamorphism. These are most characteristically developed in Setters Ridge along the Green Spring Valley, ten miles north of Baltimore where the rock is quarried near Stevenson.

The average annual output of sandstones for the State is approximately $25,000.

THE SLATES.

Slate suitable for the production of roofing-slate has been found at several points within the limits of the State and quarries have been

opened in the Peachbottom area of Harford County, at Hyattstown in Montgomery County, and at Linganore and Ijamsville in Frederick County. Slates from the latter county have proved pleasing in color and durable, but the public taste has been educated to certain characteristics for slate which these do not possess and they are of little or no commercial importance. The only area of active operations at present is that in Harford County.

The Peachbottom Slates.

The slate produced in the quarries of the Peachbottom district of Maryland and Pennsylvania is the most widely known structural material manufactured within the limits of the State. Unfortunately Maryland has received little credit for its share in the industry although almost all of the productive quarries are situated within its limits. This apparent injustice has arisen from the fact that the shipping point for most of the quarries and the residence of many of the operators is Delta, Pennsylvania, a town lying at the foot of the ridge which supplies the stock for the manufacture of slate. Delta is much larger and better known than its Maryland associate, Cardiff, which is only separated by the State boundary.

The topographic relations between the town and the quarries are particularly favorable for the shipment of slates and the establishment of a prosperous community. The town is connected with the principal cities of the Atlantic seaboard by the Maryland and Pennsylvania Railroad reaching from York, Pennsylvania, to Baltimore. There is no information at hand from which we may learn when the presence of valuable roofing slates was first recognized in this area or when the first material was taken out for roofing purposes. According to the local tradition, which is subject to some doubt, the slates were quarried as early as 1750. The building on which these slates were laid was destroyed a few years ago and the inferences concerning its age are based on a series of deeds and family papers which seem to indicate the date of construction as 1749 or 1750 and the source of the material as some point on the ridge not far to the north of the Mason and Dixon Line.

The first authentic evidence of quarrying is the slate recently removed from the roof of the old Slate Ridge Church, known to have been built in 1805, which was torn down in 1893. The slates from this old roof which had been exposed to the atmospheric agents of degeneration for nearly a hundred years show no change in color or firmness, although some of them were covered by lichens and other vegetable growths. Some of the larger slabs have been preserved by the quarry superintendents to show the great stability of their stone, even when poorly prepared and poorly laid.

Throughout all of that part of the area which has furnished good slates the bedding is not clearly defined and the ledges of first-class material do not seem to present any continuous arrangement, suggesting valuable beds separated by non-productive ones. This lack of definition in the bedding of the stone renders it impossible to compute with any degree of accuracy the thickness of beds or "veins." Some of the quarries produce good slate over a distance of at least 150 feet across the strike and their operations are limited not by the quality of the stone but by a short-sightedness during early operations which allowed the rubbish to be dumped upon the workable beds.

All of the quarries along the line show a great many series of joints which both aid and hinder the working of the quarries. The great number of joints and their intersection with each other at varying angles renders much of the material extracted unavailable for the manufacture of roofing slates or mill stock. While this is so and the amount of rubbish about the quarries is very great it is doubtful if there has been a greater portion of waste material than is common in slate quarries the world over.

The most prominent feature in the texture of the Peachbottom slates is the coarse fibrous arrangement of the particles which give to the stone an appearance somewhat suggestive of the fiber of petrified wood. This texture renders the slates much stronger in certain directions than they might otherwise be, but precludes the method of breaking the slates by sharp blows applied normal to the cleavage and makes the stock less available for milling purposes. The material prepared for market shows little

or no variation in the nature of the stone employed, but the character of the finished product seems to vary somewhat in different quarries. Not only is there a difference in the skill with which the work is done, but the quarrymen seem to differ in the amount of care which they exercise in sorting the first and second qualities.

The color of the Peachbottom slates is a deep blue-black which is absolutely unfading, as is shown by the color of slates which have been exposed since the beginning of the last century. This fact alone marks the product of the area as one of the best slates of the world. From this color there seems to be no variation in any of the well-prepared material. It should be borne in mind, however, that slates, like broadcloths, when placed side by side with their texture in different positions show differences in their sheen and that these differences may become so marked that an impression of a variation in color is often given. The unfading quality of the Peachbottom slates allies them with the products of the Maine and certain of the Vermont quarries and separates them from the less uniformly colored slates of the Lehigh and Slatington districts which are not always able to retain their color unmodified by exposure.

The average annual output of slate for Maryland is approximately $125,000.

THE CLAYS AND CLAY PRODUCTS.

The clays of Maryland that are suitable for economic purposes are widely distributed and occur at various geological horizons. They are most widely distributed throughout the eastern and southern portions of the State although some of the most important clays occur in the central and western counties. The clays of Maryland are suitable for common brick, fire-brick, enameled-brick, stove-brick, terra cotta, sewer-pipe, tile, and pottery.

COMMON BRICK CLAYS.

Clays suitable for the manufacture of common brick are widely distributed throughout the State. Brick making began in southern Maryland in colonial days, scattered references to the industry being found in

the earliest records. It is evident that practically all of the common brick employed for building purposes in colonial days was made at the local brick yards.

Maryland common brick is made from three types of deposits, viz., the Coastal Plain sedimentary clays, the residual clays of the Piedmont Plateau, and the shaly deposits of the Appalachian Region.

Clays suitable for the manufacture of common brick are found everywhere throughout the Coastal Plain. The Columbia loams of Pleistocene

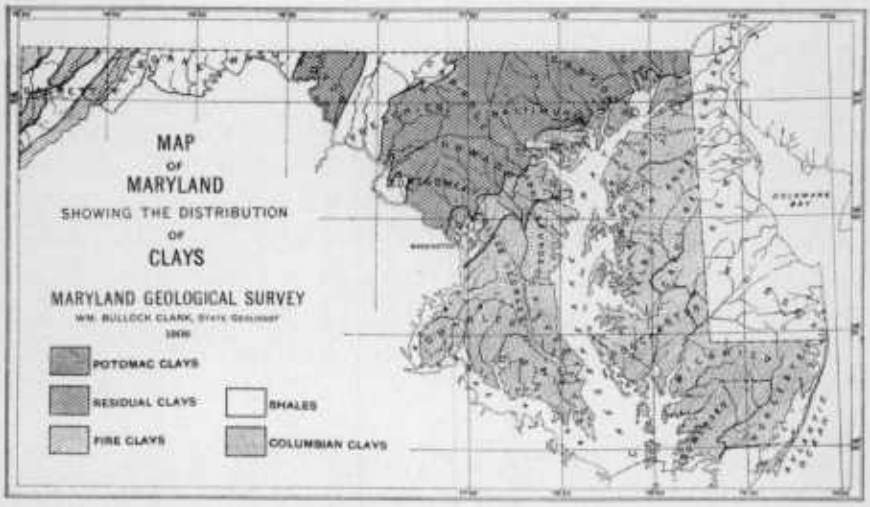


FIG. 9.—Map of Maryland showing the distribution of clays.

age form a mantle over most of the surface of the district and on account of their grittiness and ferruginous character are excellently adapted to the manufacture of common brick and are widely used in the vicinity of Baltimore. They have sufficient iron to burn to a good red color, enough fine particles to insure proper plasticity, and enough grit to prevent excessive shrinkage in burning.

The only Tertiary clay of any great importance for brick making is the Marlboro clay at the base of the Nanjemoy formation. It is common through sections of Southern Maryland and is well suited to the manufacture both of pressed and common brick.

FIG. 1.—VIEW OF MCCLENAHAN GRANITE QUARRY, PORT DEPOSIT, CECIL COUNTY.

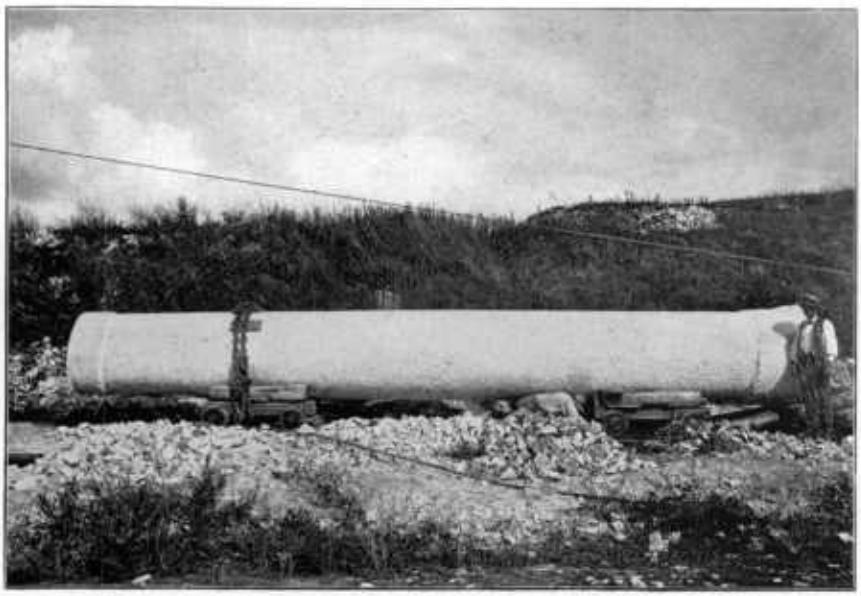


FIG. 2.—THIRTY-EIGHT-TON MONOLITH, BEAVER DAM QUARRY, BALTIMORE COUNTY.

VIEWS OF MARYLAND BUILDING-STONE INDUSTRY.

The Lower Cretaceous formations afford important brick clays, the Raritan, however, furnishing chiefly buff-burning clays, although red-burning ones occur. The clays from this formation are best developed in Anne Arundel County. The Patapsco formation which underlies the Raritan contains a large amount of highly variegated clays and extends in a broad belt across the State near the western margin of the Coastal Plain. The clays of the Patapsco formation are more plastic than the Columbia clays and as a general rule occur in beds of much greater thickness. They are particularly well adapted to the manufacture of stiff-mud brick while the Columbia clays are rather too gritty for this purpose. Next to the Columbia clays they are the most important brick clays in the eastern section of the State. They are located for the most part near the head of tide along the leading railroad lines and therefore possess great commercial importance.

In the Jurassic the Arundel formation affords large supplies of iron-ore clays which are well adapted to the making not only of common brick but also of pressed brick. They are moderately silicious, highly plastic, and have sufficient iron to burn to a good red color. At some localities the Arundel clays are comparatively free from iron so they burn buff instead of red and lend themselves well to the production of terra cotta and roofing tile.

The residual clays of the Piedmont region are derived from either gneisses, granites, limestones, or schists, as a general rule, and in almost every case are quite ferruginous so that they not only burn to a deep red product but may do so at a comparatively low temperature. Those which are derived from a basic igneous rock, such as gabbro or peridotite, usually have a very high plasticity and consequently show a high shrinkage in burning. Owing to their high plasticity, however, they generally permit of the admixture of considerable sand, although the manufacturer often has some difficulty in thoroughly incorporating the material with the clay. The residual clays are likely to be variable in their depths owing to the uneven surface of the underlying rock, and consequently they may vary anywhere from 3 or 4 to 25 or more feet in thickness.

The shales suitable for brick making are to be found either in the Devonian or Carboniferous, although up to the present time only the former have been used. With an increase in demand for bricks in the counties of the Appalachian region the Carboniferous shales will no doubt spring into prominence and be opened at a number of points. Many of these shale deposits will also probably be found available for the manufacture of vitrified brick.

TERRA COTTA CLAYS.

The terra cotta industry of Maryland has been comparatively little developed although what has been done is sufficient to show that suitable materials for the purpose are not lacking within the limits of the State. The kinds of materials which have been chiefly employed for this purpose are the buff-burning Arundel clays, the sandy Patuxent clays, and the variegated Patuxent clays. All of these clays are well developed to the south of Baltimore, especially in Anne Arundel and Prince George's counties. At times the variegated Patapsco clay is also well adapted for terra cotta work, particularly in the southern part of Baltimore City.

SEWER-PIPE CLAYS.

The only sewer-pipe clays employed at the present time come from the Arundel formation although it is probable that equally good clays could be obtained from the Pleistocene deposits and from the Patapsco formation. The small importance of the sewer-pipe industry in Maryland at the present time is due rather to trade conditions than to lack of clays for both the Arundel and Patapsco formations yield materials of considerable plasticity.

FIRE CLAYS.

The refractory clays found in Maryland are obtained either from the Coastal Plain formations or from the Carboniferous deposits of the Appalachian region. The Carboniferous fire clays of Maryland have

long been well known, the deposits having been worked since 1841. The Pottsville formation is the chief source of the clays which are worked at the present time, chiefly along the eastern flank of Savage Mountain. These Carboniferous fire clays occur in two forms, known as the plastic clay or shale, and the flint clay. Both of them are highly refractory in character.

In the Coastal Plain region fire clays are obtained from the Patapsco, Raritan, and Patuxent formations as well as in some instances from the decayed crystalline rocks beneath. The first three of these formations contain lenses or extensive beds of white to yellow-white clays which frequently show a high resistance to fire and can be heated up to the fusing point of cone 27 without in many cases becoming vitrified.

The refractory-ware industry of Maryland is one of the most important branches of the clay-working industry found in the State. Among the more important products are fire-brick, enameled-brick, retorts, stove-brick, and stove-linings. The fire-brick are made both in western Allegany County and in Baltimore. The manufacture of enameled-brick is confined, however, to the former locality. Retorts are made in Baltimore while stove-brick and stove-linings are largely manufactured in Cecil County.

POTTERY CLAYS.

The pottery clays include materials showing a wide range of composition. The clays suitable for the manufacture of stoneware are to be found at many points in the Patapsco formation, especially in Cecil County. At the base of the Patapsco formation in the same county there is often a bed of bluish-gray, very plastic stoneware clay. Aside from these Cecil County stoneware clays the most important are those outcropping along the shore of the Chesapeake from Bodkin Point southward.

Clays suitable for the manufacture of yellow-ware are to be found at a number of points in the Arundel formation and also in the Columbia, both of these formations being extensively drawn upon by the yellow and Rockingham ware manufacturers of Baltimore.

Clays for the manufacture of the common red earthenware are abundant and are obtained from the Columbia, Arundel, and Patapsco formations of the Coastal Plain and from the residual clays of the Piedmont Plateau northeast of Catonsville, and also from the residual clays of the Appalachian region around Hagerstown. The Potomac clays near Baltimore also afford the basis for the manufacture of the higher grades of pottery.

The clay industry is already an important one in Maryland, the average value of the output in recent years being $1,435,000.

THE PORCELAIN MATERIALS.

Maryland, as a State, is well provided with porcelain materials such as flint, vein quartz, feldspar, and kaolin. These are chiefly developed in central Maryland and mined in this region only. They are abundantly present over wide areas but only occasionally are they sufficiently free from colored minerals and coloring matter to meet the requirements of porcelain manufacture.

FLINT.

The flint or quartz is derived from unsually large and pure masses of vein quartz or from portions of the gneiss and granite along their contact where the original rocks have been reduced to white pulverulent quartz. Flint has been sought most successfully in Cecil, Harford, and Baltimore counties. Most of the material occurs as veins intersecting the country rock, generally gabbro, serpentine, or granite, as in the vicinity of Castleton and along Deer Creek in Harford County. Here and elsewhere where the vein quartz is utilized it is necessary to grind the material to a flour and to facilitate this grinding it is customary to roast the blocks of quartz and then cool them suddenly by pouring on water, as is done at the flint works at Conowingo, Cecil County. The flint from the granite-gneiss contacts require no roasting but need to be ground to a flour to meet requirements. The flint flour is shipped in bags to different points within and without the State, chiefly Trenton, New Jersey, where it is employed in the manufacture of porcelain,

crockeryware, wall and sandpaper, scouring soap, tiles, and paints. The annual output for the State varies greatly but does not average over $85,000.

FELDSPAR.

The feldspar, or spar, occurs in pegmatite veins which are found abundantly developed throughout the southeastern portion of the Piedmont in Cecil, Harford, Baltimore, Carroll, and Howard counties. The material mined is either microcline or orthoclase furnishing the so-called "potash spar," or a plagioclase furnishing the "soda spar." The presence of pegmatite dikes in which these minerals occur may be easily recognized by the numerous coarse-grained boulders scattered over the surface or by the chalky white streaks in the road-cuts. They are very frequently found near the borders of the serpentine, gabbro, or granite, and occasionally in the marbles. The valuable dikes are those in which the "spar" is free from colored minerals and relatively free from quartz. Pegmatites of this character are being worked in Cecil County along the Mason and Dixon Line and in the valley of the Patapsco in Baltimore and Howard counties. All of the material has to be hand-culled to free it from ferruginous matter which would stain the pottery ware during burning and the output is shipped in a crude state chiefly to Trenton, New Jersey, Baltimore, and East Liverpool, Ohio, where it is ground and used in the extensive pottery works. The supply of valuable spar is chiefly limited to the Piedmont portions of Pennsylvania, Delaware, and Maryland. The annual output in this State varies but averages over $10,000.

KAOLIN.

The kaolin, which is generally a residual white clay derived from feldspathic gneisses comparatively free from minerals containing iron, is best developed in Cecil County. The deposits of this region are closely related to those of adjoining portions of Delaware, although in the latter State part of the kaolin is derived from the decomposed pegmatites. The crude kaolin is washed and deposited in settling tanks, the greater part of the fine quartz and staining constituents being removed, and sub-

sequently dried under pressure. The Maryland material is used for fire-clay and sagger-clay but chiefly in the manufacture of paper. The annual value of the output is about $10,000.

THE LIME AND CEMENT PRODUCTS.

The limestone and marble deposits of Maryland have been extensively burned for building and agricultural purposes. In the earlier days the burning of lime was carried on largely over the State, but in later times, since the introduction of phosphates and the improvement of transportation facilities, the old quarries and kilns scattered so widely over the country have been for the most part abandoned. There are still several large industries in the marble belt of the Piedmont area and in the blue limestones of the Frederick and Hagerstown valleys, supplying lime for agricultural purposes, especially in the Frederick valley. Many of the largest companies now located in Maryland are deriving their supply from more favorably situated deposits outside the State.

The limestone and marble are also used as flux for blast furnaces. The coarse-grained marbles of Texas have furnished a large amount for this purpose, and also the limestone quarries at Cavetown on the Western Maryland Railroad. Hydraulic cement has been extensively manufactured from the limestone of the Cayuga formation of Silurian age at Cumberland and Hancock, as well as from the older Shenandoah limestone of the Hagerstown Valley near Sharpsburg. The products from these industries have an excellent reputation and have been largely employed both within and without the State.

Another use to which the limestones of the State has been applied in recent years has been in the manufacture of asphalt blocks for street paving. These blocks are constructed of crushed and pulverized limestone, Trinidad asphalt, and a residuum of petroleum heated separately and thoroughly mixed and then combined under heavy pressure. These blocks have been used extensively in Washington and Baltimore in recent years.

The total value of the lime and cement products of Maryland averages annually about $500,000.

THE SANDS.

The sand deposits of the State are widely extended both in the eastern and western sections, but have been but little developed hitherto. The sandy sediment which has been deposited upon the bottom of the Potomac River has been dredged in recent years and used extensively for building purposes in Washington.

The most important sand deposits in the eastern portion of the State are found in the Magothy and Raritan formations in Anne Arundel County, and extensive openings have been made near the head of the Severn River, where a very pure grade of glass sand is taken out. The output of these diggings is transported on small schooners which are able at high tide to reach the head of the river.

The Tuscarora and the Oriskany formations of the western portion of the State also afford very pure deposits of quartz which have been ground up and employed to some extent in glass-making. The Oriskany strata in adjacent portions of West Virginia and Pennsylvania have been extensively worked for many years and afford the chief sources of high-grade glass sands in this country.

The sandstones, both in the eastern and western portions of the State, are capable of much fuller development. The average output yearly is about $15,000.

THE MARLS.

The Eocene and Miocene formations of eastern and southern Maryland are rich in marl deposits, which have never been developed except for local uses. Their importance to the agricultural communities where they occur has not been up to the present time very generally recognized, although they have been worked to some extent since the early portion of the last century.

The Eocene marls are glauconitic and are like the famous greensand marls of New Jersey, which have been so extensively employed as fertilizers throughout the eastern and southern portions of that State. The Eocene marls of Maryland are found in Kent, Anne Arundel, Prince George's, and Charles counties and increase in thickness south-

ward. The greensand marls contain commonly a small percentage of phosphoric acid and some potash, while in some areas they are also highly calcareous. When properly used they prove of much value for certain crops. They are spread over the surface of the land, or are applied in the form of a compost with barnyard manure.

The Miocene marls are mainly shell accumulations and are never glauconitic. The proportion of shells is often very great, so that the Miocene marls are commonly known under the term of "shell marls." They occur abundantly in Queen Anne's, Talbot, Calvert, and St. Mary's counties, but have never been used so largely as the greensand marls which lie to the north of them. The average value of the marls dug each year probably does not exceed $3000.

THE IRON ORES.

The iron industry in Maryland was developed early in colonial days and continued until a recent date to be one of the most important factors in the prosperity of the State. Numerous references are found in the earlier records to the iron ores, and early in the eighteenth century we find considerable activity in the manufacture of iron. The Principio Company, one of the most important commercial enterprises in the early days of Maryland, was organized in 1722 and began the erection of a furnace in Cecil County near the mouth of Principio Creek. In 1761 the Governor and Council of Maryland reported to the Commission of the Board of Trade and Plantations in England that there were eighteen furnaces and ten forges in the State which made 2500 tons of pig iron per year. During the Revolutionary War the furnaces and forges of the Principio Company supplied bar iron and cannon balls to the Continental Army. The Principio Company during the War of 1812 produced cannon balls and hardware, and guns as large as 32-pounders were made for the government. Many furnaces were built in other sections of the State during the eighteenth and early portion of the nineteenth centuries, but nearly all of them have been abandoned. Among the most important of these furnaces is the Catoctin furnace in Frederick County, which

was built in 1774 and furnished guns and projectiles to the Continental Army during the Revolutionary War. In more recent years several modern furnaces have been constructed near Baltimore, of which by far the largest is that at Sparrow's Point, built by the Maryland Steel Company, which, however, only employs ore obtained from sources outside of the State.

The only furnace now manufacturing Maryland iron to any extent is the Muirkirk furnace in Prince George's County. It employs very largely the carbonate iron ores which are obtained from the Arundel formation, mainly from Anne Arundel and Prince George's counties. These great lenses of carbonate ore have been worked since early colonial days, but an ample supply still remains. Two types of ore are found in these ore lenses known as the "white ore" or carbonate ore and the "brown ore" or hydrous oxide ore.

Ores of iron are found widely distributed in Maryland from the older crystalline rocks down to the more recent deposits, but the most extensive accumulations thus far discovered are the brown and the red hematites of Frederick County, the carbonate ore of Prince George's County, and the iron ores belonging to the coal measures of western Maryland. Under the present conditions of the iron industry the Maryland ores have not the value which they once had, although the excellent quality of the carbonate ores still makes it possible for them to compete with the cheaper materials of the west and south. This carbonate iron has been largely used by the U. S. Government, it being guaranteed to stand 30,000 pounds to the square inch in the pig, many tests giving 40,000 pounds.

The great Maryland iron industries depend now to a very inconsiderable extent upon local iron ores. The discovery of extensive deposits in other sections of our country, particularly in Michigan, Minnesota, and Alabama, coupled with the wonderful extension and cheapening of transportation, have resulted in the past few years in driving out the charcoal furnaces and thus leaving no place for the lean ores of Maryland.

The average value of the yearly output is about $50,000.

THE GOLD.

The crystalline rocks of the Piedmont Plateau have been found to carry gold in Maryland, Virginia, North Carolina, and Georgia. The gold occurs in quartz veins which occupy the old lines of fracture in the accompanying rocks. The gold occurs either pure in quartz, or in association with pyrite, or in the pyrite itself, and is also sometimes accompanied by lead (galena), silver, and telluride of bismuth (tetradymite).

The first gold ever found in Maryland was discovered in 1849 near Sandy Springs, Montgomery County, a specimen being exhibited to the American Philosophical Society in that year. Most of the Maryland mines are located along the southern edge of Montgomery County, near the Great Falls of the Potomac. The oldest mine in this region was opened in 1867. Some wonderfully rich specimens have been obtained from this area, but the gold is so unevenly distributed that it has not yet been worked with profit. Reports are frequent of the discovery of gold in other portions of Maryland, but these finds are generally without foundation and none have as yet been proved to be of any value. The annual output of gold from the small mines in Montgomery County probably does not exceed $2500 annually.

THE MINERAL PAINTS.

Mineral paint has been produced at several points in Maryland and in widely different geological horizons. Large quantities have been obtained in the past from the brown iron-ore deposits in Frederick County, but nothing is being done at the present time in that region. Ochre mines have also been operated in Carroll and Howard counties, and something is being done in these regions at the present time.

Important deposits of paint ore have also been obtained from the Patapsco formation in Anne Arundel and Prince George's counties. This ore occurs in a fine and highly ferruginous clay and can be worked readily. There are several industries at the present time established in this belt and the opportunities for its further development are exceedingly good.

The average value of the mineral paints produced in the State is about $15,000 annually.

THE TRIPOLI.

Tripoli, also known in the trade as infusorial earth or silica is a diatomaceous earth composed of the shells or tests of microscopic plant forms known as diatoms. It is produced in larger quantities in Maryland than anywhere else in the United States. It is found at the base of the Calvert formation and comprises beds which in Anne Arundel, Calvert, and Charles counties attain a thickness of 30 to 40 feet. The most extensively worked localities are situated near the mouth of Lyons Creek on the Patuxent River and at Popes Creek on the Potomac.

Tripoli is used for polishing powder and likewise as an excellent non-conducting cover for steam pipes; also from its extremely porous character it is used in the manufacture of dynamite cartridges. This material was first worked on the Patuxent River in 1882. The average value of the product is about $5000 annually.

THE MINERAL WATERS.

The mineral waters of Maryland in the past have not attracted much attention, but there are several kinds which are being placed on the market at the present time with greater or less success, and two at least which are being exported in considerable quantities. A few are represented as having medicinal properties, but the majority are sold principally for table waters, mostly in the city of Baltimore. Nearly all of the well-known waters come from the crystalline rocks of the Piedmont Plateau, only a few being reported up to the present time from the Appalachian Region and the Coastal Plain. According to the Eleventh Census Report, based upon information obtained in 1890, Maryland ranked thirteenth among the states in the number of springs reported and twenty-first in the volume of product. The amount utilized in that year is stated to have had a market value of $12,057. Since then several new springs have been placed on the market, so that the

importance of Maryland as a producer of mineral waters is gradually increasing. The average value of the output is about $50,000.

Around many of the springs in the Piedmont region summer resorts have sprung up, in part as the result of the pure quality of the water and in part on account of the proximity of the localities to Baltimore and Washington. Among the more important may be mentioned the Chattolanee, Strontia, Lystra, Bentley, Takoma, and Carroll springs. Many other springs are found scattered over the Piedmont Region, but little beyond local use has been made of them up to the present time.

The springs of the Appalachian Region are not as well known, although a thermal spring of saline mineral water at Flintstone, Allegany County, has for a long time been highly regarded. There are numerous cold chalybeate springs scattered throughout western Maryland, but there has been as yet no attempt to introduce the waters or develop the properties upon which they are situated.

Very few springs of mineral water of more than local reputation are reported from the Coastal Plain. The Mardella of Wicomico County is very well known and the waters have been placed upon the market. Several other springs, which have only a local value, are reported from the eastern and southern counties, among them a sulphur spring situated at St. Michael's in Talbot County.

THE ROAD MATERIALS.

The State of Maryland is well provided with road-building materials, although their character varies widely, some being far better adapted for the purpose than others. The question of transportation is, however, so important that the stone of greatest value cannot always be employed, yet there is no section of the State where there are not some materials sufficiently close at hand to render them available.

The best road-building materials in Maryland are the basic igneous rocks, which are found well developed throughout the area of the Piedmont Plateau. Of these there are several types, viz., the gabbro, the peridotite, and pyroxenite, and the diabase. The gabbro or "niggerhead" rock, as it is locally called, is most widely distributed and occu-

pies an extensive area throughout the eastern portion of the Piedmont belt in Cecil, Harford, Baltimore, Howard, and Montgomery counties, the largest regions being found in central Harford and southern Baltimore counties. This rock is rather tough and difficult to work, but affords a valuable and permanent road metal. The peridotite and pyroxenite are not as extensively developed, but occupy very much the same area as the gabbro. These magnesian rocks are somewhat more easily worked than the gabbro, but do not have its wearing qualities. The most valuable of all these rocks is the diabase, which is so extensively used for road-building purposes in New England and New Jersey and which occurs in several long and narrow outcrops in Baltimore and Howard counties, but is far better developed in Frederick County, where it occupies a considerable area near the northern border of the State in the vicinity of Emmitsburg. The chief cementing material in all of the igneous rocks is the hydrous oxide of iron.

The next group of road-building materials includes the marble, the limestone, and the calcareous sandstones and shales. The carbonate of lime contained in these deposits acts as a valuable cement, but the materials have far less durability than the igneous rocks above described. They are found covering widely separated areas throughout the Piedmont Plateau and Appalachian Region, the most extensive and available deposits being found in the long, narrow valleys to the north of Baltimore City and in the Frederick and Hagerstown valleys farther west. These materials have already been considerably employed for road-building purposes.

The third group of road-building materials includes the gravels of the eastern and southern portions of the State, which belong to the late Mesozoic and Cenozoic formations. They cover extensive areas in Cecil, Kent, Queen Anne's, Talbot, Anne Arundel, Calvert, Prince George's, and Charles counties, and with lessening importance extend into the more southern portions of the State. These gravels are rich in iron, which acts as the cementing material. They probably afford less permanent road metal than the igneous rocks which were first described, but when properly used are of great value in road construction.

Several of the other rocks, both in the Piedmont Plateau and the Appalachian Region, have been locally employed for road-building purposes, some of the schists and shales as well as some of the more quartzose rocks proving useful though lacking the cementing qualities of the three groups of rocks above described. The average yearly production of these materials amounts to about $175,000.

MISCELLANEOUS PRODUCTS.

There are several other mineral substances of greater or less economic importance, which are either being worked to-day to some extent in Maryland or which have been earlier worked within the State, in some instances with great success. None of these products will probably give rise in the future to industries of great magnitude, either on account of the insufficient supply of the material or on account of the very limited use of the products themselves.

COPPER.—The copper ores of Maryland are found in the eastern and western divisions of the Piedmont and in the Blue Ridge. In every instance they appear to be associated more or less directly with igneous rocks though sometimes the ore may be best developed in rocks of some other character. The copper deposits lie in a series of zones which follow the general structural lines of the region. Three of these zones, or "veins" as they were called, prior to the opening of the Lake Superior copper region about 1844, and later of the Montana and Arizona mines, were considered of no mean importance, and did actually make Maryland for a time a copper-producing State. The first of these zones extends along the Linganore Hills in Frederick County from New London northward, through Liberty to Union Bridge, the ore occurring in limestones and slates or meta-rhyolites. The second zone runs northeast from Sykesville, through Carroll County, to and beyond Finksburg, the ore being found in the slates and schists. The third deposit, in the Bare Hills of Baltimore County, occurs in an altered gneiss or schist near the contact with the serpentines.

CHROME.—The chrome industry in Maryland originated in the discovery in 1827 of chrome ore in the serpentine of the Bare Hills in Balti-

more County. Subsequently to that, other deposits were found associated with the serpentine in Harford and Cecil counties, as well as at other points in Baltimore County. Between 1828 and 1850 Baltimore supplied most of the chrome ore consumed by the world, the remainder coming from the serpentine and platinum washings of the Ural Mountains. After 1850 the foreign demand for Baltimore ore declined gradually until 1860, since which time almost none has been shipped abroad. The reason for this was the discovery in 1848 of great deposits of chromite in Asia Minor. This region now supplies largely the world's demand. Since 1886 practically nothing has been done with the chrome deposits of Maryland, although Baltimore is still one of the most prominent centers for chromium salts.

LEAD AND ZINC.—Traces of galena and zincblende were early noted near the quarries at Jones Falls in Baltimore County, but much more decided indications of these minerals occur in connection with the crystalline limestone in the western part of Carroll and the eastern part of Frederick counties, where attempts have been made to mine them in the region to the southwest of Union Bridge. In spite, however, of the frequent traces of both these minerals throughout central Maryland, it may be confidently asserted that neither will probably be found to occur in amounts that will repay mining.

IRON PYRITES.—Small deposits of iron pyrites occur in the Magothy formation on the Magothy River, Anne Arundel County, and works were built at Cape Sable several generations ago for the manufacture of sulphuric acid but these have long since been abandoned. The discovery of much larger deposits at other points was the cause for the decline of the industry.

MANGANESE, ANTIMONY, MOLYBDENUM.—The traces of these metals which have been detected in Maryland are even more insignificant than those of lead and zinc. Manganese was once mined a short distance west of Brookville in Montgomery County, but the deposit was not sufficiently extensive to be profitable. More recently manganese has been reported from Allegany County. Specimens of the sulphide of antimony have been obtained in the Middletown Valley but nothing is known of its

occurrence or extent. The earliest discovery of molybdenite mentioned on this continent was made at the Jones Falls gneiss quarries in 1811, but the deposit was not sufficient to be of economic value.

SOAPSTONE.—Soapstone is a compact variety of talc and in composition is a hydrous silicate of magnesium. It has been worked to some extent in Carroll, Harford, and Montgomery counties, the most extensive deposits being found a short distance to the northwest of Marriottsville in Carroll County, where for a time the stone was sawed into slabs for the manufacture of bath tubs. In later years the product has been ground and sold to manufacturers of fire-proof and acid-proof paints, although some slabs are sawed out occasionally for fire-brick and hearthstones.

ASBESTOS.—The crystalline rocks of Maryland contain several deposits of asbestos, most of which, however, is not true asbestos, although it passes under that name, but is the fibrous variety of serpentine known as chrysotile. These deposits are in both quality and quantity of production inferior and unimportant. In 1880 one mine in Harford County and three in Baltimore County produced a total of 40 tons valued at $1000, but the discovery of extensive deposits in other regions has now entirely stopped any operations for this mineral in Maryland.

MICA.—The coarse pegmatites which abound in many parts of the eastern Piedmont region afford good-sized plates of light-colored mica (muscovite), and attempts have been made to secure commercial quantities of this in both Harford and Howard counties, but they have not been successful.

GRAPHITE.—Traces of graphite have been found near Pylesville in Harford County at the edge of the Peachbottom slate belt. Several deposits occur farther northward in Pennsylvania where they have been mined to some extent.

FIG. 1.—SHALE BANK OF QUEEN CITY BRICK AND TILE COMPANY, CUMBERLAND, ALLEGANY COUNTY.

FIG. 2.—PIT OF WASHINGTON HYDRAULIC-PRESS BRICK COMPANY, HARMAN, ANNE ARUNDEL COUNTY.

VIEWS OF MARYLAND CLAY INDUSTRY.

AGRICULTURAL SOILS.

Introductory.

The soils of any region constitute the surface exposures of the various geological formations which occur at that place. The study of considerable areas of soils, located in many different states and derived from many different geological formations, has developed several facts concerning the relationships which exist between the soils and the geology. Without entering into details, it may be stated that the classifications employed in geological science and in soil science are not identical, although in the study of the soils the geological relationships must always be taken into consideration. In making a geological classification of the rock-forming material of any region it is important to study the geological history of the region. On this account the time element enters largely into the identification of geological formations and the construction of maps which shall represent them. Similarly, when geological maps are drawn it is not always most necessary to represent the actual occurrence of the material which lies exposed to the air. In a region where ore deposits, coal, oil, or other economic geological products occur it is frequently of prime importance to show the location of the materials with which they are associated. Thus a geological map frequently shows the underlying rock formations and gives very little space to the delineation of a few feet of sand, loam, or clay which may occur at the surface. It is with this latter class of materials that the soil map is chiefly concerned, since the surface deposits, even though no more than 2 or 3 feet in thickness, are the ones which interest the farmer and the ones upon which vegetation, either wild or cultivated, flourishes.

The classification of the soils does not consider to any great extent the geological age of the material from which the soils are derived, since it is highly immaterial to a crop of sweet potatoes whether the soil upon which it is growing is of rather recent date, as in the case of soils derived from

Pleistocene formation, or whether it is comparatively ancient, as would be the case if it were derived from Cretaceous deposits. So far as the farmer and his crop are concerned, sand is sand, and a sweet potato crop will thrive as well upon a sand of one age as upon sand of another age, provided the physical texture, chemical composition, drainage, aeration, and the other factors which affect plant growth are equal or nearly so. Thus the soil map of any region does not coincide exactly with the geological map of the same area. Still it is possible, in the great majority of cases, to state with considerable accuracy that a given geological formation which has once been studied and its soil type or types determined, will be found in other areas not yet studied to give rise to the same class of soils. There are two general rules which must be taken into consideration whenever an attempt is made to show the relationships between the soils of a region and its geological formations.

The first of these general propositions is that a single geological formation may give rise to two or more different soil types. It matters little whether the geological formation is an unconsolidated marine sediment, such as occurs in the Coastal Plain region of Maryland and elsewhere, or a solid granitic rock, such as occurs in the Piedmont section of the United States, or even a limestone such as occurs in the Hagerstown and Frederick valleys. In the Coastal Plain region the soils are laid down as marine sediments from suspension in ocean water. Because of this method of formation, there may be deposited at one and the same time, stiff, plastic clays in deep, quiet water, medium or coarse sands near the shore-line, and gravel and boulder beds where some large stream is rolling rock fragments seaward. All of these materials might well be classified as a single geological horizon, since their formation has taken place at approximately the same time, but when these materials are elevated above sea-level and become soils, the clay, the sand, and the gravel have totally different relationships to crops, and will constitute at least three different types of soil. In the Piedmont Region, where there are extensive areas of granitic rocks, the frost, the rain, burrowing animals, and the growth of plants all tend to break the solid rock into finely divided earth material which ultimately constitutes a soil. While the original

rock over a considerable area may remain identical, the character of the geological forces at work in producing soils may vary considerably within small limits. This is especially true where not only weathering or soil preparation is being carried on, but also erosion, or the removal of completed soils is taking place, and the character of the soil which is formed depends to a considerable degree upon a nice adjustment of the two sets of forces embraced in the words "weathering" and "erosion." Thus the same granite rock may give rise in one place to a sandy loam soil, in another place to a loam, and in still another place to a clay. These remarks apply in the same way to soils derived from limestones, sandstones, shales, slates, and a variety of other solid rocks.

The second of these general propositions is that a soil type agriculturally uniform throughout may be derived from more than one geological horizon. A single example will serve to illustrate this point. Suppose that at any one time a bank of sand of Cretaceous age is subject to wash from the falling rain and the flowing streams and that a part of this sand is removed, transported a few miles, and laid down as a bank or bar of sand within some tidal estuary or along a shore-line. The character of the sand itself will change very little during this operation, but if the work is being carried on at the present time the sand in its old original locality will be Cretaceous in age, while in its new, derived locality it will be Recent in age. Thus there will be a wide discrepancy in geological age between the sand in the two localities, but this will be either the chief or the only difference between the two deposits. As soon as the Recent sand is elevated sufficiently above water-level to be well drained, it will become the home of plants, and is very likely to be as well suited to the production of watermelons, sweet potatoes, or some other crop, as the same sand in its old home locality. Thus the character of the material dominates the crop adaptation, while the age of the material very frequently has little effect upon its agricultural value.

Holding in mind the differences in climate due to variations in altitude and topography, the consideration of the variations in the soils themselves will show that the agricultural resources of the State of Maryland are extremely varied, and that few areas of the same size present so

admirable an opportunity for the selection of climatic and soil conditions suitable for the production of a wide range of crops, for the employment of intensive methods of cultivation, and for sharp discriminations in the specialization of crop production.

THE SOILS OF THE EASTERN SHORE.

In southern Cecil County, in Kent, Queen Anne's, and Dorchester counties the higher lying areas are occupied by a type of soil called the *Sassafras loam* in the State Geological Survey and the United States Bureau of Soils reports. Both on the Eastern Shore, and in the majority of instances in Southern Maryland, this soil is derived almost solely from materials which are known to belong to the Wicomico formation of Pleistocene age. The surface soil of this type consists of about 10 inches of mealy brown loam which is underlain by a heavy, reddish-yellow loam subsoil to a depth of from 3 to 6 feet. This in turn rests upon gravelly and sandy sub-strata, which aid greatly in the natural underdrainage of the soil. There are to be found, also, in Wicomico, Somerset, and Worcester counties other areas of this type occupying the level terraces and river necks.

In Cecil, Kent, and Harford counties, where the Sassafras loam is in the best state of cultivation, it produces from 20 to 25 bushels of wheat per acre, from 40 to 60 bushels of corn, and about one ton of hay. It is used extensively for the production of sugar-corn for canning, and it also produces 7 or 8 tons of tomatoes per acre. This type has been long occupied by the famous peach orchards of Maryland and Delaware, while more recently the culture of pears has been engaged in profitably. This type is the best adapted of any in the entire Coastal Plain to the purposes of general farming. Its present value ranges from $65 per acre in the northern counties to $10 or $15 per acre farther south.

South of the Chester River there are large areas of orange or brown sand of medium coarseness, known as the *Norfolk sand*. This soil type illustrates the occurrence of materials which are agriculturally of the same character in two or more geological formations, the Norfolk sand of the

Eastern Shore occurring in both the Wicomico and Talbot formations of the Pleistocene age. This soil also occurs along the river necks of Cecil and Kent counties, but it is a more prevalent type farther south. The surface soil consists of a coarse to medium brown sand having little coherence. It is frequently more loamy than the sub-soil, due to a small admixture of humus. The depth of this surface soil is usually about 8 inches. The sub-soil consists of friable orange or yellow sand extending to a depth of several feet. The type maintains a moisture supply of from 5 to 10 per cent of water, and is easily warmed and well suited to the production of all early truck crops. It occupies the broad, flat river-necks and low divides of the southern portion of the Eastern Peninsula. It is a typical early truck soil, widely utilized for such purposes from Long Island to Cape Hatteras. Wherever shipping facilities are adequate, as on the Eastern Shore, or where the population understands the production and marketing of truck crops, this soil is held in high esteem. Many acres of Norfolk sand are still awaiting development in the southern counties of this region. The experience of all the better farmed localities proves the adaptation of this type to the production of sweet potatoes, watermelons, and cantaloups of fine quality, and also to early peas, sugar-corn, tomatoes, rhubarb, and root crops. In the near vicinity of large markets the Norfolk sand attains to almost fabulous values. On the Eastern Shore its value ranges from $50 down to $3 or $4 per acre. This soil offers excellent opportunities to those desiring to secure land in locations suitable for trucking and market-gradening. It is not a general-purpose soil.

The *Portsmouth sand* is another type suited to the trucking industry. It is found on both the Wicomico and Talbot formations. The surface soil is a fine-grained, black or brown loamy sand which owes its color to a high humus content. It is underlain at a depth of about 10 inches by a fine-grained gray or yellowish sandy subsoil. The Portsmouth sand occupies low-lying, poorly-drained hollows and bowl-shaped depressions in the southern part of the Eastern Shore. At present it is chiefly timbered or cultivated to general farm crops. It should be cleared, drained, and cultivated to celery, onions, cabbage, late strawberries, and similar

late truck crops. In the vicinity of Portsmouth, Virginia, whence its name is derived, it is utilized as a general truck soil.

The *Elkton clay* is a poorly-drained counterpart of the Sassafras loam, occurring chiefly in the Talbot formation. It is probable that a large part of it could be converted into the better type by proper underdrainage. In its present condition, the surface soil is a brown loam having a depth of about 9 inches. The subsoil is a stiff, mottled yellow and gray clay loam. It is a fair grass and wheat land, but to attain its highest value it should be drained and used as a general farming soil. The Elkton clay occupies low river necks and poorly-drained divides throughout the region.

Other types of importance on the Eastern Shore are *Sassafras sandy loam, Sassafras gravelly loam,* and *Meadow.* The first two occur in the Wicomico formation in the northern portion, and largely in the Talbot formation in the southern portion of the Eastern Shore. Meadow represents poorly-drained land not suitable for agricultural crops at the present time. It may occur in materials of any geological age. In the northern part there are large areas of *Susquehanna clay* and *Susquehanna gravel,* both of which are nearly worthless for agricultural purposes. These soils are derived from the formations of the Potomac Group. Unfortunately, they are crossed by the main railroad system and present to the traveller a picture of desolation which is very far from representing the scenes to be enjoyed only a few miles away on either hand.

Along the Atlantic coast line the marshes are underlain by *Galveston clay,* and the barrier beaches consist of *Galveston sand,* neither type possessing any agricultural value at present. These are both of Talbot age.[1]

THE SOILS OF SOUTHERN MARYLAND.

The *Sassafras loam,* as already described along the Eastern Shore, occupies small areas along the river terraces of Southern Maryland. Here, also, it is a product of the Wicomico formation. It is usually not

[1] For more extended descriptions of these soil types, see Reports and maps of Maryland Geological Survey and U. S. Bureau of Soils.

so well tilled as on the Eastern Shore and produces smaller crop yields. The *Norfolk sand,* also previously described, occupies considerable areas on the low, flat river-necks of Southern Maryland, and it is also extensively developed, with a more hilly topography, along the streams and in the upland regions. Its prevalence in the northern part of Anne Arundel County has rendered that region pre-eminent in Maryland as a producer of truck crops, its cantaloupes and early peas receiving especially favorable notice. In the more southern counties the Norfolk sand is utilized in the production of peaches, tobacco and corn. In the Southern Maryland counties this soil is not only derived from materials occurring in all of the Pleistocene formations, but it is also found where sandy members of the older underlying formations reach the surface.

The *Sassafras sandy loam,* which is well adapted to the production of all canning crops, is quite extensively developed in the form of river terraces in Southern Maryland, and *Elkton clay* is occasionally encountered in Prince George's County. Both of these types have the same geological relationships as on the Eastern Shore.

The chief upland or plateau type in St. Mary's, Charles, and Prince George's counties is the *Leonardtown loam.* This soil type is derived from materials of Sunderland age, and also from the older Pliocene deposits found upon the highland in all the Southern Maryland counties. The surface soil to a depth of about 9 inches is a yellow or gray silt loam. It is underlain by a mottled red and gray clay loam subsoil, which is in turn underlain at a depth of from 5 to 8 feet by gravel beds or gravel and sand. A large part of this type is occupied by white oak and pitch pine (*P. rigida*) forests. When so occupied its value is about $2 or $3 an acre. The value of the cleared lands varies from $5 to $12 per acre. While this land is little esteemed by the majority of farmers of this region, its capabilities have been abundantly demonstrated upon a few farms where improved methods of tillage, fertilization, and crop rotation are practiced. In St. Mary's County, near Park Hill, certain farms on this type are producing from 20 to 25 bushels of wheat and 35 bushels of corn per acre. Near New Market one farmer is securing 1½ tons of hay per acre. Similarly, in Prince George's County, a few farms under

good cultivation show the capabilities of the type and display the opportunities awaiting farmers who will and can use stable manure and green crops as sources of humus, will apply lime, and will increase the depth of surface loam by gradually increasing the depth of plowing. This type should be farmed to general grass and grain crops, with the breeding of cattle as an adjunct to permanent soil improvement. The omission of tobacco from the rotation is imperative.

The *Norfolk loam* has a fine-grained, sandy-surface soil, underlain by a reddish-yellow, fine sandy loam subsoil. The soil and subsoil mass rests upon yellow or orange sand of medium grade. The type occupies ridges and crests along both the Patuxent River and Chesapeake Bay. This type is probably a product of the Sunderland formation. Its surface is usually slightly rolling or nearly level. The Norfolk loam produces small yields of Maryland pipe-smoking tobacco of excellent quality. It is peculiarly well adapted to the production of small fruits and the later truck crops. With better transportation facilities this type would afford an excellent soil for producing strawberries, dewberries, raspberries, and blackberries for the Washington and Baltimore markets.

The *Collington sandy loam* has a loose, loamy brown sandy surface soil, usually about a foot thick. It rests upon a sticky, yellow or greenish-yellow clayey and sandy subsoil. Both soil and subsoil are derived from the decomposition and chemical alteration of beds of greensand (glauconite), a material rich in potash. Indeed, the subsoil of the type frequently contains as high as 2½ per cent of potash salts. The type occupies considerable areas in central Prince George's and Anne Arundel counties. It produces larger yields of corn, tobacco, and grass than the average of the region. It is also well adapted to the production of peaches, pears, and plums, and to the cultivation of white potatoes and peas. It is underlain in all cases by greensand (glauconite) marls such as are used extensively in New Jersey for purposes of fertilization. The Maryland marls are not as rich in phosphoric acid and lime as those of New Jersey. The Collington sandy loam is notable among the agricultural soils of Southern Maryland on account of its being a single type derived chiefly from a single geological formation. It has been formed by

the weathering out of the greensands of Eocene age where they are exposed at the surface.

Large areas in northern Prince George's and Anne Arundel counties are occupied by *Susquehanna clay* and *Susquehanna gravel,* two soils which are nearly worthless for agricultural purposes. The *Susquehanna clay loam* consists of a surface covering of sand or sandy loam over a Susquehanna clay subsoil. It is fairly productive for general farm crops. The *Windsor sand* is a coarse, sandy, and somewhat gravelly soil found in southern Prince George's and in Calvert counties. It bears some excellent peach orchards, but is usually of little value for agricultural purposes and is occupied by pitch-pine forests and thickets. Of these soils, the Susquehanna types are derived from the various deposit of Potomac age, as on the Eastern Shore. The Windsor sand may be derived from several formations, but the larger portion of the material from which it is derived falls within the Sunderland formation of the Pleistocene.

THE SOILS OF NORTHERN CENTRAL MARYLAND.

The *Cecil loam,* derived from the decay of granite and other similar rocks, constitutes the principal soil type of this entire region. It occupies large areas in the western part of Cecil County, in Harford, Baltimore, Howard, and Montgomery counties, and a smaller area in Carroll County. The surface soil is a loam or heavy sandy loam of a brown or yellow color, having a depth of about 10 inches. It is underlain by a heavy loam or silt loam of a reddish-yellow color. Both soil and subsoil frequently contain fragments of quartz and of the partially decomposed parent rock. The Cecil loam is very generally recognized as well adapted to general farming under careful management. It produces about 15 bushels of wheat per acre, from 30 to 50 bushels of corn, good yields of grass, and 7 or 8 tons of tomatoes. In Harford County a large amount of sugar corn for canning purposes is produced on the Cecil loam, and the corn fodder is fed to extensive dairies which supply milk, cream, and butter to Baltimore. The type is well watered and is valued at from $35 to $80 per acre as farm land. Much higher prices are paid for locations suited for suburban or country residences.

The *Cecil mica loam* closely resembles the Cecil loam, except that both soil and subsoil contain large percentages of flakes of white (Muscovite) mica. It is formed from the decomposition of the highly crystalline Wissahickon schists and constitutes a fair general farming soil somewhat less productive and durable than the Cecil loam. It is locally known as the "gray lands."

The *Cecil clay* occupies broad belts and scattered, irregularly shaped areas which extend from northern Cecil County across Harford and Baltimore counties into Howard County. The surface soil, which has a depth of about 6 inches, is a dark red or reddish-brown clay. It is underlain by a stiff, tenacious red clay subsoil which grades into the undecomposed gabbro from which the soil is chiefly derived. Locally some areas are heavily strewn with boulders which have resisted the processes of decomposition. These are usually forested. The type is spoken of as the "red lands" from its color. It constitutes a strong, durable general-purpose soil, producing good crops of corn, wheat, and grass, and fair yields of tomatoes. Its surface is rolling to hilly and numerous streams have their headwaters within its areas.

Throughout the northern central region, especially in Baltimore and Carroll counties, are found small limestone valleys marked by fertile loam and clay loam soils. These resemble the limestone valleys further west in Maryland, in their crop adaptations and yields. There are also considerable areas of loamy soils in western Montgomery, Howard, and Carroll counties derived from the slaty rocks of the region. Though none of these types has been mapped, they are known to be fairly fertile general-purpose soils.

THE SOILS OF FREDERICK VALLEY.

The Frederick Valley, at the eastern base of the Catoctin range, has two main series of soil types. The shales and sandstones of the Triassic (Newark) series give rise to the *Penn* series of soils, investigated and mapped in the Trenton, New Jersey, and the Lebanon-Dauphin, Pennsylvania, areas. The Newark brownstone gives rise to a red sandy loam soil and subsoil, known as the *Penn sandy loam*. Sandstone fragments

are common in both soil and subsoil. The subsoil approaches a clay loam in many cases. The type is easily tilled, but the crop yields are rather small. The *Penn loam* consists of a dark red loam surface soil underlain by a heavier red clay loam subsoil. The surface is gently rolling and fairly well drained. The soil is esteemed as almost equal in fertility to the much better known limestone soils of the region. The *Penn clay* is very similar, except that both soil and subsoil are a stiffer clay. Wheat, corn, and grass are the principal crops.

The limestone soils which cover the southern part of the Frederick Valley are the *Hagerstown loam* and *Hagerstown clay*. Their full description is given in the account of the Hagerstown Valley.

THE SOILS OF CATOCTIN MOUNTAIN AND BLUE RIDGE.

The region comprised in the Catoctin and Blue Ridge mountains and the included Middletown Valley has not been mapped with respect to its soils, but it is known to contain among others the *Porters series* of soils mapped in similar areas in Virginia and North Carolina. The famous mountain peaches of Maryland are produced on the *Porters black loam* of the mountain coves and valleys of the region. The soil is a brown sandy and stony loam having a rich dark-brown or black color, due to large amounts of organic matter. The soil is fertile, but is difficult of cultivation for ordinary crops on account of its stony character and steep slopes. It is only partially utilized for peach orchards, and the industry may be more extensively developed. The Newton (Albemarle) pippin can also be raised with profit in this region and in the Middletown Valley. The Valley lands are formed of loams and clays derived from the weathering of volcanic rocks. They are well adapted to wheat, corn, oats, and grass, and constitute good soils for apple culture.

THE SOILS OF HAGERSTOWN VALLEY.

The Hagerstown Valley and the southern portion of the Frederick Valley are occupied by a very characteristic series of soils derived from the weathering of the Shenandoah limestones. The *Hagerstown loam* has a surface soil which consists of a brown or yellow loam about 12 inches deep.

It grades downward into a yellow clay loam which extends to a depth of 2 feet or more, which in turn is underlain by a stiff, tenacious red clay. The surface of the type is rolling to gently undulating, and the area is well watered by numerous streams. Of these Antietam Creek drains the Hagerstown Valley and the Monocacy River is the chief stream in the Frederick Valley. The Hagerstown loam is one of the strongest, most durable, and most fertile soils occurring east of the Alleghany Mountains. It frequently produces 30 bushels of wheat, 60 bushels of corn, and 2 tons of hay per acre. It is also adapted to apple orcharding and serves as a basis for extensive dairy operations. The land is high-priced but not expensive. The majority of farms on this type are improved with good houses and barns and little land in the area can be purchased for less than $60 per acre.

The *Hagerstown clay* differs from the Hagerstown loam chiefly in lacking the more loamy surface soil. The subsoil material of the loam is closely the equivalent of the surface of the clay. The Hagerstown clay is a little more difficult to work than the loam type, but it constitutes a strong and fertile wheat and grass soil. Small ridges and knolls occur throughout both of these types. They are occupied by a sandy loam soil of the same Hagerstown series. Such areas produce fair grass and grain crops and also bear good apple orchards. All of these types have originated from the decay and solution of limestone rock. The soils are not especially rich in lime, as this material has largely been dissolved during the processes by which the soil was formed. The physical texture of these types is improved and good tilth secured by generous applications of lime. This causes a granulation of the soil and aids all the processes which constantly prepare plant food from the soil mass.[1]

THE SOILS OF THE APPALACHIANS.

The soils of the more mountainous region of the Appalachians in Western Maryland follow in their variations the geological formations

[1] For complete description and maps of these regions, see U. S. Bureau of Soils. The types of the Hagerstown Valley are described in the reports on Lancaster County, 1900, and Lebanon County, 1901, of the Pennsylvania areas lying in the northward extension of the same valley.

from which they are derived. In the majority of cases the types occur in long, narrow areas along the crests and flanks of the mountains. They consist of clay, loam, and sandy loam soils which are occupied extensively by hardwood forests or are cultivated in small areas to grass, oats, rye, and buckwheat. The most important type of the region is derived from the surface decomposition of the Helderberg limestone. The surface soil here is usually a heavy red or yellow loam and the subsoil a clay loam of the same color. This soil is adapted to the production of corn and wheat, and it also constitutes a naturally blue-grass soil. Where the soil is stony from the presence of undecayed limestone and chert, rye and potatoes are raised, and on favoring slopes peaches, grapes, and small fruits are successfully cultivated.

The Romney-Jennings formation gives rise to yellow and gray shale loams upon which rye and oats do fairly well and early corn is a profitable crop. It also constitutes the mountain pasture land of the region. The Hampshire soils will be described in discussing Garrett County.[1]

The Alleghany Plateau, which constitutes the larger part of Garrett County, Maryland, is marked by comparatively few soil types. The Romney-Jennings soils were described in the previous section. Agriculturally the soils derived from the Hampshire formation are the most important. They occupy large areas in the central portion of the county. The surface is rolling to hilly and occupies altitudes of 1500 to 3000 feet or more above sea-level. The surface soils are red or reddish-brown loams and sandy loams, varying with the sandy or shaly nature of the rocks of which they form the decomposition products. The soil depth is usually 7 or 8 inches. The subsoils are heavier red loams and red clays, varying in texture with rock variations, as in the case of the surface soils. The soils are not generally strong, but are easily cultivated on all except the steepest slopes. These are forested or form pasture lands.

The *Hampshire loam* and *sandy loam* produce from 20 to 35 bushels of wheat in a favorable year, and about 50 bushels of oats per acre.

[1] See Md. Geol. Survey, Report on Allegany County.

Potatoes, rye, and buckwheat are also raised and excellent crops of hay are secured. Large areas of these types are found in the vicinity of Oakland, Accident, and Cove.

The only other soils of considerable extent are those derived from the Allegheny formation. The soils are shallow, and sandy loams predominate. Oats, buckwheat, and grass are the principal crops, and a large part of the formation is forested. On the Conemaugh formation, especially near Grantsville, there are considerable areas of loams and sandy loams which produce good yields of potatoes and fair yields of hay, oats, and buckwheat. Certain mountain swamp soils known as the "Glades" are very productive when artificially drained. The surface soil is a black, mucky mass which is usually underlain at a depth of about a foot by a saturated yellow clay loam. Near the larger towns this soil is used for market-gardening, and cabbage, celery, and onions could also be raised to advantage.[1]

CONCLUSIONS.

Stretching as it does from tide-water to mountain crest and including the full range of geological formations, from the most ancient to the most recent, the State of Maryland presents an exceptional diversity of climate and of soils. Its agricultural possibilities have not been developed to their full capacity. Consequently the State presents favorable opportunities to the well-trained, hard-working farmer of either small or large capital. He may locate in a selected region and devote his energies to the production of certain special crops with which he is especially familiar, or he may locate elsewhere and follow general farming, stock-raising, or dairying. If the raising of fruit constitutes his specialty, the northern and western regions present advantages for apple culture or for peach raising. Some of the best opportunities existing at present in the United States for specialized intensive agriculture are to be found in Maryland within easy reach of the great markets of Baltimore and Washington. For the home-seeker no more pleasant

[1] See Md. Geol. Survey, Report on Garrett County.

surroundings can be found than on the old plantations of the tide-water region, where the products of the water are almost as accessible as those of the land; or in the rolling plateau region of northern central Maryland, where well-tilled fields and hoarded groves of timber checker the landscape and the topography is relieved by low, rounded hills and shallow valleys. The limestone valleys can only be equalled in fertility by other limestone valleys or by the broad prairies of the Corn Belt. The western mountain and plateau region is in some part still awaiting development, although its pioneers have demonstrated its agricultural capabilities.

CLIMATE.

The climate of Maryland is controlled not only by the general meteorological conditions that affect the whole eastern seaboard but by the physical features of the State itself, the Chesapeake Bay and its tributaries in the east, and the Appalachian mountains in the west, producing a marked influence upon the distribution of temperature and rainfall in the several counties.

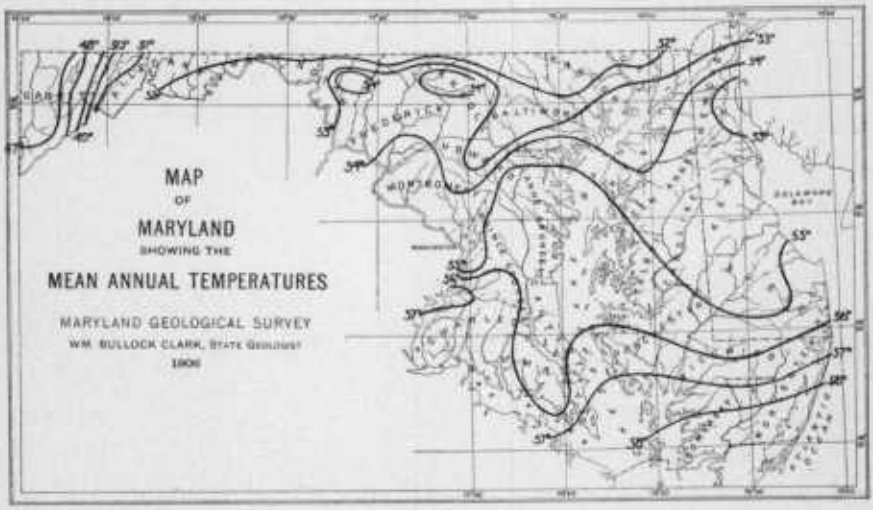


FIG. 10.—Map of Maryland showing the mean annual temperatures.

TEMPERATURE.

The normal annual temperature for Maryland is between 53° and 54°. The principal modifying influences that determine the departures from this normal, in the various climatic divisions of the State, are latitude, water areas, and elevation. The highest normal annual temperatures are found over the extreme southern counties of the Eastern and Western shores. The influence of the Bay causes an appreciable, but not very

FIG. 1.—VALLEY FARM-LANDS OF THE PIEDMONT PLATEAU, WITH MONOCACY AQUEDUCT, FREDERICK COUNTY.

FIG. 2.—LEVEL FARM-LANDS OF THE COASTAL PLAIN, TALBOT COUNTY.

VIEWS OF MARYLAND FARMING LANDS.

decided, increase in annual temperatures along either side as compared with the level land areas closely adjoining. Over these latter areas the temperatures are very much the same, and differ but slightly from the normal for the entire State. The lowest normal annual temperatures

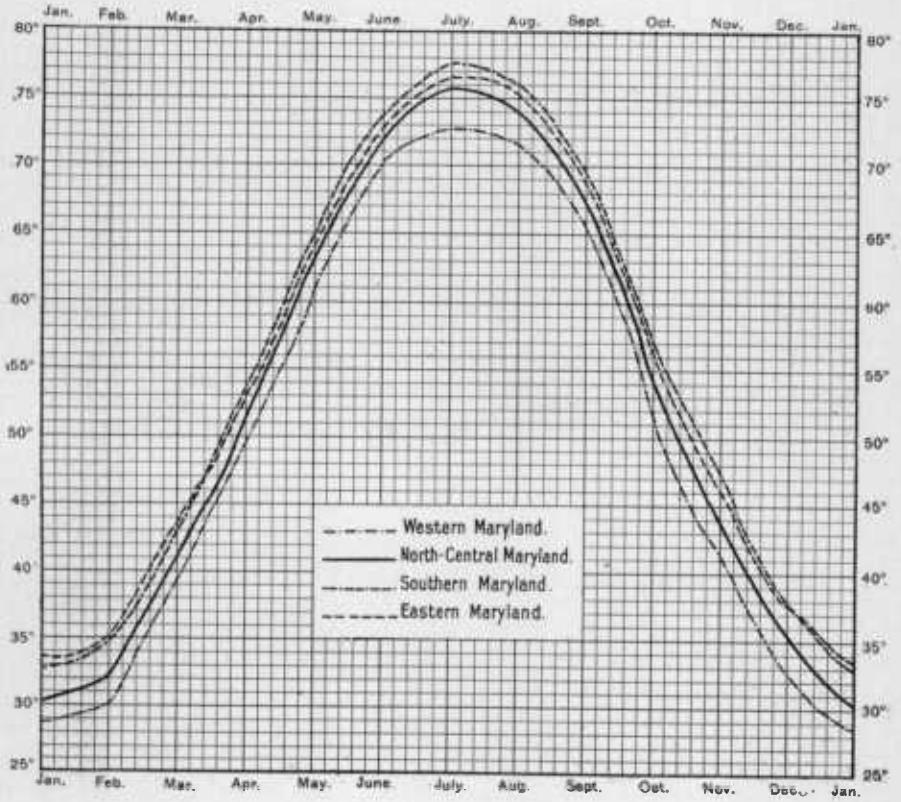


FIG. 11.—Mean temperatures in the four climatic divisions of Maryland.

occur in the western part of Garrett County, where they range from 46° at stations on the higher mountain ridges, to 48° in the plateau region lying to the north. Eastward from these higher elevations the increase in temperature is very rapid with the descent towards sea-level; a normal annual of 52° is reached in the western part of Allegany County, and an approach very nearly to the State normal is found in some of the

valley depressions. Annual temperatures of 52° or below prevail over the northern portions of the Piedmont Plateau, and thence increase gradually towards the normal conditions found southward over the interior. In the extreme southern and eastern sections of the State the annual temperature rises to about 59°.

There is considerable variability in the normal annual temperature, the normal annual maximum temperature for the State being about 63°, while the normal annual minimum temperature is 45°, a difference of 9° on either side of the normal annual temperature of 54°.

The diagram on the preceding page shows the mean temperatures in the four climatic divisions of the State for each month of the year.

KILLING FROSTS.

A factor of the highest importance, especially to the agricultural and trucking interests of a community, is the average date of occurrence of the first "killing" or "black" frost in autumn, and the last in spring, and their variations in time of occurrence from year to year. Frosts are usually designated as "light," "heavy," or "killing." The term "light" is applied to frosts which are destructive only to tender plants; "heavy" to copious deposits of frost, but which do not destroy the staple products; "killing" to such as are blighting to the staple products of the locality in which the frost occurs. First and last killing frosts are tabulated below for each year from 1871 to 1904 for the vicinity of Baltimore. The data given for Baltimore represent fairly well the mean values for the entire State. In the absence of a killing frost before a minimum temperature of 32° was observed, the date of the first record of a freezing temperature was entered in the table. The interval in days between the last frost in spring and the first in autumn is likewise given in order to show the length of the period of safe plant growth.

The average date of occurrence of the last killing frost in spring, based on observations of 34 years, is according to the above table, April 4. It has occurred as early as February 26, namely in 1903, and as late as May 3, as in 1882. The first killing frost in autumn has oc-

KILLING FROSTS IN THE VICINITY OF BALTIMORE.

	Last in Spring.	Min.	First in Autumn.	Min.	Interval in days.
1871	*Feb. 23	30°	*Nov. 28	31°	....
1872	*Mar. 25	32	* " 16	30	....
1873	" 31	29	Oct. 29	31	212
1874	Apr. 13	29	Nov. 10	31	211
1875	" 22	32	" 3	32	195
1876	" 2	30	Oct. 15	33	196
1877	" 3	32	Nov. 4	37	215
1878	Mar. 26	21	Dec. 6	32	255
1879	Apr. 5	32	Oct. 26	30	204
1880	" 12	30	Nov. 8	35	210
1881	" 21	39	" 27	34	220
1882	May 3	38	" 19	30	200
1883	Apr. 25	34	" 13	32	202
1884	Mar. 30	31	" 7	30	222
1885	" 16	31	" 1	36	230
1886	" 24	29	Oct. 17	36	207
1887	Apr. 6	30	" 31	32	208
1888	Mar. 19	30	" 22	36	217
1889	* " 30	28	Nov. 6	35	....
1890	*Apr. 2	31	Oct. 31	36	....
1891	" 9	36	" 29	33	203
1892	" 15	34	" 6	36	174
1893	" 16	36	" 17	36	184
1894	" 11	32	Nov. 12	27	215
1895	" 11	34	Oct. 29	34	201
1896	" 8	32	Nov. 14	32	220
1897	*Mar. 29	34	Oct. 31	39	....
1898	Apr. 6	26	" 28	34	205
1899	Mar. 25	30	Nov. 4	36	224
1900	" 22	26	" 16	28	239
1901	* " 17	30	" 11	31	....
1902	" 7	31	Oct. 30	34	237
1903	Feb. 26	29	Nov. 7	28	254
1904	Apr. 17	31	....	..	..	....
Average date 1871-1903	Apr. 4	....	Nov. 3	....	213 Average period.
Earliest date	Feb. 26, 1903		Oct. 6, 1892		255 Longest period.
Latest date	May 3, 1882		Dec. 6, 1878		174 Shortest period.

* No frost recorded; first day in Autumn and last day in Spring with a minimum temperature of 32° or below.

curred, on the average, on November 3. The earliest appearance is that of October 6, 1892, and the latest that of December 6, 1878. In the ordinary course of events, accordingly, the period of safe plant growth in the central part of the State, based upon the occurrence of killing frosts, is from April 4 to November 3, or approximately seven months. While this is the most probable length of the period, the interval may be considerably extended by a late autumn frost in conjunction with an early spring frost, or the period may be shortened by a late spring frost followed by an early autumn frost. The extent to which this important interval has varied in the past 34 years is shown in the above table. The shortest interval, namely 5 months and 24 days, was that of 1892, extending from April 15 to October 6; the longest was that of 1878, extending from March 26 to December 6, or 8 months and 15 days. Calculating on the basis of a 34-year record, we find that the last killing frost in spring is likely to occur sometime within the first decade of April once in 4 years; in the second decade once in 5 years; in the third decade once in 11 years; the latest occurrence, as stated above, was May 3, 1882. In the autumn the first killing frost has occurred but once in 33 years in the first decade of October, three times in the second decade, and ten times in the third decade. It fell within the first decade of November 9 times, within the second decade 7 times, and within the third decade twice. The latest in 33 years occurred on December 6, 1878.

ADVENT OF SPRING.

Botanists state that the protoplasmic contents of the vegetable cells find the limits of their activity at about 43°. When the temperature falls below this point the protoplasm becomes inactive; when the temperature rises and reaches this point the protoplasm awakens, and as it passes above 43° the cell begins to grow and multiply. The advent of spring may properly be considered as taking place at the advent of an isotherm one degree higher, or 44°.

The average date has been obtained on which a daily mean temperature

of 44° becomes permanent, and the result is shown in Figure 12, on page 231, which is intended to represent the average date of the advent of spring in Maryland.

It will be seen that spring first appears in the extreme southeastern counties, usually about the 7th of March. It advances northward in the next two weeks to an east and west line touching southern Delaware. Within the next four days the line moves northward, east and west, through Prince George's County. Five days later it reaches northern central Maryland, and by the first of April includes most of the State except Garrett County, which does not experience permanent spring conditions until about the middle of April.

HIGHEST RECORDED TEMPERATURES.

MAINLY FROM RECORDS FOR FIVE YEARS OR OVER.

STATIONS.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Annapolis	61	63	68	87	94	95	07	94	08	85	60	64	98
Baltimore	73	78	82	04	96	98	104	98	101	90	78	73	104
Charlotte Hall	66	70	83	97	95	100	102	99	100	88	78	70	102
Chestertown	63	61	79	87	92	94	97	93	90	83	75	65	97
College Park	62	68	82	92	04	100	105	08	101	88	78	69	105
Cumberland	70	66	84	94	08	101	103	101	07	87	86	68	103
Darlington	65	62	78	94	94	06	98	97	04	85	74	69	98
Deer Park	61	61	75	84	93	99	04	91	90	80	70	65	99
Denton	62	70	82	97	98	101	102	97	08	82	80	72	102
Easton	65	64	82	93	03	96	101	98	96	87	77	66	101
Frederick	64	63	75	92	95	99	104	09	96	86	75	66	104
Hagerstown	62	62	82	92	08	98	08	100	95	88	77	66	100
Jewell	64	66	80	94	95	99	99	97	95	83	78	68	99
Laurel	64	61	80	94	94	09	104	98	100	90	77	67	104
Mardela Springs	70	67	80	92	93	96	08	100	95	88	77	67	100
Mt. St. Mary's	61	62	78	93	90	06	102	96	95	88	74	65	102
Newark, Del.	56	61	73	92	92	96	98	98	07	86	75	63	98
New Market	62	61	70	03	93	99	105	08	96	85	83	65	105
Pocomoke City	69	70	81	93	96	99	101	100	96	91	81	74	101
Princess Anne	68	66	76	03	93	06	95	98	96	84	78	68	98
Seaford, Del	65	66	82	95	94	98	100	97	95	84	75	68	100
Solomon's	66	67	82	88	100	99	99	98	98	89	77	65	100
Sunnyside	61	64	75	87	90	92	03	90	91	82	73	65	92
Van Bibber	63	62	72	91	96	95	98	96	95	87	71	68	98
Westernport	65	66	81	92	96	102	107	99	08	88	78	65	107
Westminster	60	62	82	94	99	99	103	102	98	90	74	66	103
Washington	76	78	83	93	06	102	103	101	104	92	80	73	104
Extremes for each month	76	78	84	97	100	102	107	102	104	92	86	74	107

LOWEST RECORDED TEMPERATURES.

MAINLY FROM RECORDS FOR FIVE YEARS OR OVER.

STATIONS.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Annapolis	5	— 6	....	24	40	..	58	52	40	33	25	....	— 6
Baltimore	— 6	— 7	5	24	34	47	55	51	39	30	15	— 3	— 7
Charlotte Hall	— 1	...	0	25	37	41	49	52	40	23	18	5	— 1
Chestertown	5	— 9	16	25	37	43	54	51	41	30	22	9	— 9
College Park	— 2	—16	10	24	35	38	48	44	34	26	16	4	—16
Cumberland	— 7	—12	6	25	33	45	52	50	35	22	14	2	—12
Darlington	— 8	—12	8	20	38	42	51	50	40	26	18	3	—12
Deer Park	—23	—25	—13	6	20	30	32	31	22	4	— 6	—20	—25
Denton	—17	—14	15	25	37	43	50	50	43	27	21	9	—17
Easton	— 1	—15	15	26	38	40	52	50	38	28	21	12	—15
Frederick	— 7	—10	0	25	33	39	50	45	37	25	19	0	—10
Hagerstown	— 8	—14	1	20	34	42	49	48	38	26	24	1	—14
Jewell	1	—14	11	23	38	45	53	50	41	28	21	8	—14
Laurel	— 4	—18	7	23	34	45	49	46	35	21	22	6	—18
Mardela Springs	—10	....	15	24	37	42	51	50	39	26	18	11	—10
Mt. St. Mary's	—14	—15	11	21	37	42	51	50	40	22	13	6	—15
New Market	— 4	—14	5	21	33	45	52	49	38	25	16	3	—14
Pocomoke City	8	— 4	18	27	40	46	55	55	42	33	21	11	— 4
Princess Anne	1	—10	16	22	31	40	51	46	33	23	21	9	—10
Solomon's	4	— 5	18	28	41	49	57	59	46	35	23	11	— 5
Sunnyside	—24	—26	— 2	8	24	29	33	36	24	10	— 4	—17	—26
Van Bibber	— 1	—11	9	23	38	43	53	50	41	31	19	10	—11
Washington	—14	—15	4	22	34	43	52	49	38	26	12	—13	—15
Westernport	— 8	—13	— 3	19	30	36	41	42	28	16	15	— 6	—13
Westminster	— 7	—16	12	22	34	..	..	..	..	30	19	7	—16
Lowest	—24	—20	—13	6	20	29	32	31	22	4	— 6	—20	—2

PRECIPITATION.

The normal amount of precipitation for the entire State of Maryland, whether falling as rain, hail, sleet, or snow, is about 43 inches.

The greatest normal annual amounts occur over the western part of the Alleghany Plateau, where conditions favor both *frequency* and *intensity* of rainfall and snowfall. At Sunnyside, in Garrett County, the average annual precipitation for the past six years was 53.5 inches, or over ten inches greater than the normal annual fall for the State. This station has an elevation of 2500 feet above sea-level, and is situated on the western slope of the Backbone Mountain—a ridge running southwest and northeast, with elevation of 3000 feet.

Just east of the Alleghany Plateau the annual rainfall decreases rapidly

over an area including eastern Allegany County and the greater part of Washington County, or, more strictly, the Greater Appalachian Valley. A second area of diminished precipitation is found over upper St. Mary's County and the southern part of Charles County, and a third over narrow portions of Maryland and southern Delaware, bordering on the Atlantic. These three have a normal annual rainfall of 31 to 35 inches, and are the driest regions of the two states.

The normal annual precipitation increases east of the Blue Ridge, over the Piedmont Plateau. Parr's Ridge divides the plateau into two rain-

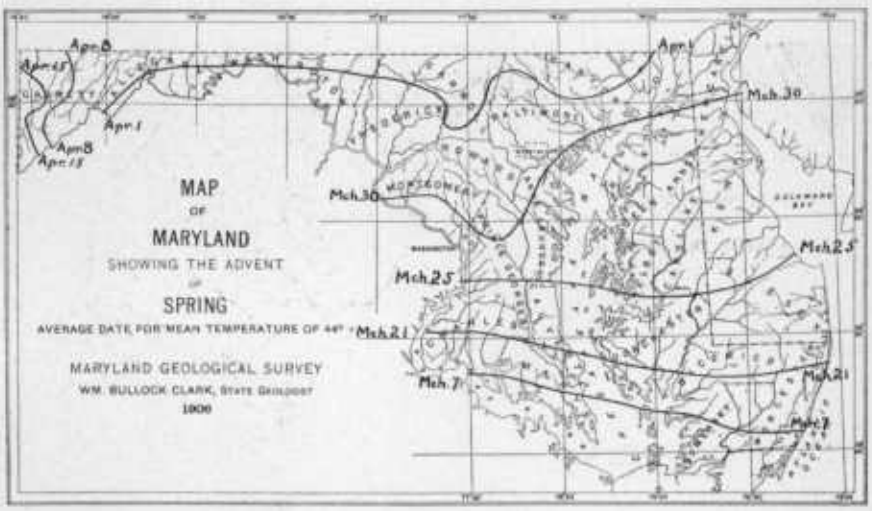


FIG. 12.—Map of Maryland showing the Advent of Spring.

fall divisions; west of the ridge the annual amounts are about 40 inches, while east of the ridge there is a general increase to 45 inches.

A narrow area over which the normal annual fall is less than 40 inches lies just west of the Atlantic coast area already mentioned as one of the dry divisions, and a second limited area of this kind is found to embrace portions of Caroline, Talbot, Prince George's, Howard, and Baltimore counties. With these exceptions, and that already noticed in portions of Charles and northern St. Mary's counties, the normal annual precipitation for the Coastal Plain is from 42 to 48 inches. The bands of greatest

precipitation in this latter area include southern Anne Arundel County, and from southern St. Mary's County northeastward over portions of Dorchester and Wicomico counties.

The normal annual precipitation is divided throughout the seasons as follows: spring and summer will have 11.5 to 12 inches, and fall and winter 9.5 to 10 inches.

The normal monthly, seasonal, and annual precipitation for the several districts of the State is shown in the tables on pages 233 and 235.

Snowfall never fails completely in Maryland even in the warmest

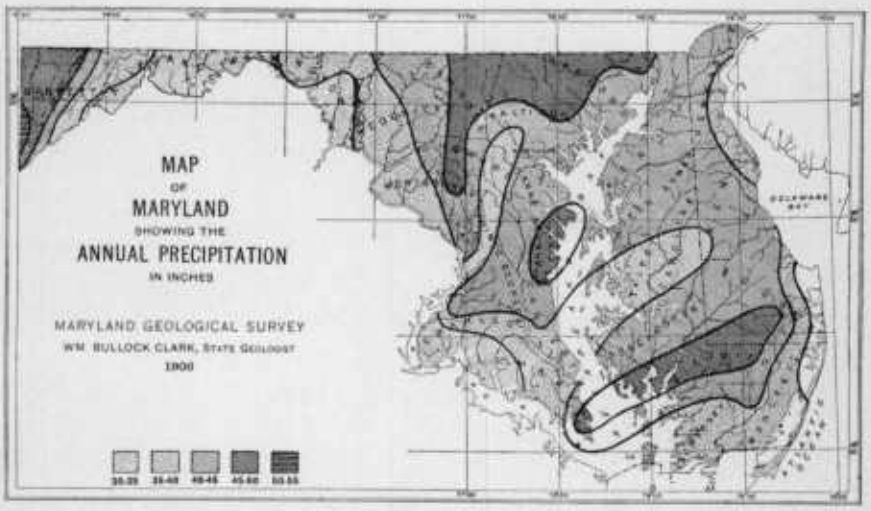


FIG. 13.—Map of Maryland showing the Annual Precipitation in inches.

winters, although it may be reduced to insignificant proportions except in the mountains. The average monthly amounts for the various climatic divisions of the State are shown in the table below:

AVERAGE DEPTH OF SNOW IN INCHES.

	Jan.	Feb.	Mar.	Apr.	May.	Nov.	Dec.
Western section	12.0	8.9	9.2	3.1	1.8	3.2	5.2
N. Central section	5.1	5.1	6.6	2.0	....	5.6	2.4
Southern section	5.4	4.0	1.0	1.4	....	2.5	2.3
Eastern section	4.6	4.1	....	1.5	....	2.5	1.9
Entire state	6.6	5.7	5.0	1.4	0.4	3.7	2.6

NORMAL PRECIPITATION FOR THE SEVERAL DISTRICTS.

STATIONS.	No. Years Record.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.	Spring.	Summer.	Autumn.	Winter.
Annapolis	18-22	3.2	3.6	4.3	3.9	4.7	4.0	4.8	4.6	3.7	3.8	4.3	3.4	48.2	12.9	13.3	11.9	10.2
Baltimore	47-51	3.0	3.5	4.0	3.3	4.0	3.7	4.7	4.1	3.6	3.1	3.3	3.2	43.3	11.3	12.4	10.0	9.6
Charlotte Hall	4-6	2.8	3.2	3.1	3.5	3.9	2.5	4.0	2.5	1.3	3.7	2.1	2.0	34.4	10.5	9.0	7.1	8.0
Cherryfields	5-6	1.9	3.5	3.3	3.0	4.3	2.7	6.0	3.4	2.2	3.8	3.2	2.5	39.9	10.6	12.1	9.3	7.9
Chestertown	6-13	2.9	2.6	3.3	4.0	4.7	3.9	3.5	5.4	3.4	3.0	3.3	2.7	42.6	12.0	12.7	9.7	8.2
Cumberland	26-28	2.3	2.7	3.0	2.3	3.5	3.6	3.4	3.1	2.7	2.5	2.4	2.2	33.7	8.8	10.0	7.5	7.2
Easton	7-8	2.7	3.7	3.3	3.1	4.2	2.7	4.2	3.3	2.2	3.0	2.9	2.6	37.8	10.6	10.2	8.1	9.0
Emmitsburg (Mt. St. Mary's)	20-29	3.1	3.2	4.1	3.1	4.7	3.9	3.5	3.5	3.6	3.8	3.9	3.0	43.2	11.8	10.9	11.3	9.3
Fallston	26-29	3.7	4.1	4.3	3.4	4.3	4.0	4.5	4.9	4.3	3.6	3.8	3.4	48.3	12.0	13.4	11.7	11.2
Frederick	20-24	3.2	3.0	3.0	3.5	3.9	4.2	3.7	2.8	3.4	2.5	2.9	2.9	38.9	10.4	10.6	8.9	9.0
Green Spring Furnace	5-6	2.4	2.9	2.6	2.1	3.7	2.8	3.8	4.3	2.8	2.9	2.9	2.3	35.4	8.4	10.9	8.6	7.5
Jewell	8-10	2.8	3.6	4.8	4.0	5.1	3.7	7.0	3.4	3.7	3.7	3.3	2.9	47.9	13.9	14.1	10.7	9.3
Mardela Springs	10-11	2.9	4.0	4.4	4.3	4.2	2.1	6.6	3.6	3.4	4.6	3.3	2.3	45.7	12.9	12.3	11.4	9.2
New Market	9-13	2.6	3.3	3.7	3.4	3.8	3.4	4.1	4.3	3.8	2.8	4.5	2.5	42.2	11.0	12.0	11.1	8.4
Sandy Spring	7-8	3.5	3.4	4.1	2.7	3.1	5.0	5.1	4.9	3.3	3.7	3.1	3.4	45.2	10.0	15.0	10.1	10.3
Solomon's	7	2.6	4.0	3.2	3.5	3.9	3.3	4.2	3.2	2.0	3.2	3.0	2.6	38.6	10.6	10.7	8.1	9.2
Sunnyside	5-6	4.3	5.0	5.0	4.7	5.2	4.7	6.2	3.6	3.1	3.4	4.3	4.0	53.3	14.8	14.5	10.7	13.3
Washington	25	3.5	3.4	4.2	3.3	3.9	4.0	4.6	4.0	3.7	3.1	2.8	3.0	43.5	11.4	12.6	9.6	9.9

FREQUENCY OF PRECIPITATION.

The amount and frequency of precipitation have been carefully tabulated for the vicinity of Baltimore and as Baltimore is centrally located the results may be accepted as fairly well representing the average conditions throughout the State.

Considering only days with an appreciable amount of rainfall or snowfall (one-hundredth of an inch or more) there are on the average 131 per year. The limits of variability in 33 years were 164 and 104. Such

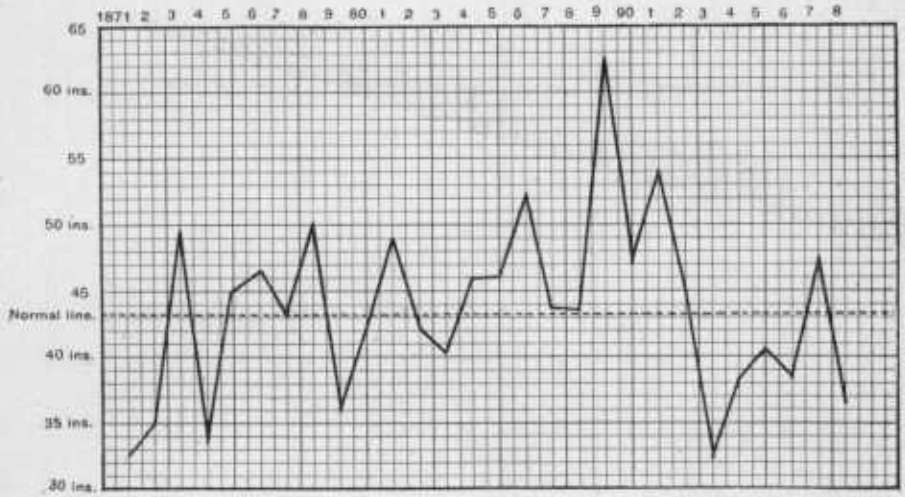


FIG. 14.—Fluctuations in Annual Precipitation at Baltimore, 1871-1898.

days are least frequent in September and October and most frequent in March. With normal conditions, the rainfall is ample at all periods of the year. Disastrous droughts are of rare occurrence. The variations in the total annual frequency of rainy days from year to year are confined within quite narrow limits. The successive ten-year averages from 1871 to 1900 were 130, 142, 127, respectively.

In addition to the days with an appreciable quantity of rainfall or snowfall, there are nearly 40 per year on the average, during which light sprinkling rains, or mists, are recorded. Their distribution throughout the year closely follows that of the days with appreciable

quantities of precipitation. While the individual effect of these light rains is small their aggregate annual value to vegetation cannot be neglected.

The most frequent quantity of rain or snow, and hence the most probable quantity to be expected upon any day, is some amount between one-hundredth of an inch and one-tenth of an inch. The average monthly and annual frequency of stated amounts, based upon a record of 32 years at Baltimore is shown in the following table:

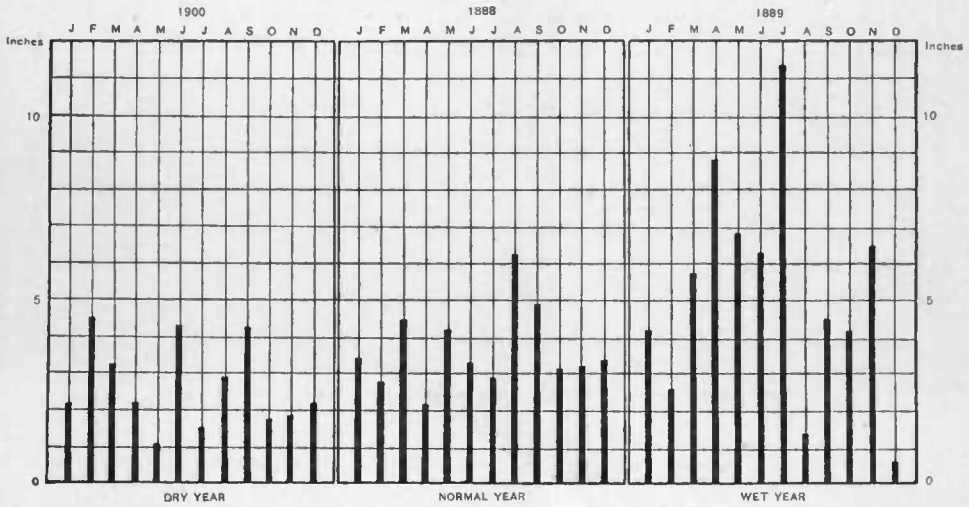


FIG. 15.—Total monthly precipitation during Dry, Normal, and Wet years.

FREQUENCY OF PRECIPITATION OF STATED AMOUNTS IN DAYS.
(Average for 33 years.)

Precipitation in hundredths of an inch.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Trace*.....	3.4	2.5	3.6	2.9	4.6	3.0	4.0	3.6	2.2	2.8	2.9	2.8	38.3
0.01 to 0.10.....	5.4	4.8	5.0	4.7	4.8	4.1	5.0	4.7	3.8	4.7	4.1	5.3	56.3
0.11 to 0.25.....	2.4	2.0	3.5	2.7	2.5	1.7	2.2	1.9	1.4	1.3	2.1	1.8	25.4
0.26 to 0.50.....	2.1	2.1	1.9	1.8	2.2	2.0	1.5	1.8	1.5	1.5	1.8	1.9	22.1
0.51 to 1.00.....	1.5	1.6	1.7	1.3	1.6	1.7	1.4	1.5	1.4	1.2	1.5	1.0	17.4
Over 1.00..... ..	0.5	0.8	0.9	0.6	0.8	0.8	1.4	1.2	1.2	0.7	0.7	0.9	10.4
.01 and over.....	11.9	11.3	13.3	11.0	11.8	10.5	11.5	11.1	9.1	9.3	10.0	10.9	131.4

*Average for 20 years.

WINDS.

The prevailing winds in Maryland are northwesterly in winter and during the summer months blow from a southerly direction, more gen-

erally from the southwest. The following table shows the prevailing wind direction for the several divisions for the past seven years:

PREVAILING WINDS.

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July	Aug.	Sep.	Oct.	Nov.	Dec.
Western section.....	N W.	N W.	S W	Var	S W.	Var.	Var.	S W.	Var.	Var.	Var.	S W.
N. Central section.....	N W.	N W.	N W.	N W.	Var.	Var.	S W.	S W.	Var.	N W.	N W.	N W.
Southern section.....	N W.	N W.	N W.	Var.	Var.	Var.	S W.	S W.	Var.	N W.	N W.	N W.
Eastern section	N W.	N W.	N W.	Var.	Var.	S W.	S W.	Var.	Var.	N W.	N W.	N W
Entire state.....	N W.	N W	N W.	N W.	Var.	Var.	S W.	S W.	Var.	N W.	N W.	N W.

The direction of the wind depends upon the relative positions of the pressure areas with respect to each other and to Maryland. The velocity of the wind is determined by the intensity of the atmospheric disturbances. The only satisfactory records of the wind velocities for the State are those that have been made at Baltimore and Washington. The average monthly, daily and hourly, velocities of the wind, in miles, for Baltimore during twenty-eight years are given in the table below:

AVERAGE MONTHLY, DAILY AND HOURLY WIND MOVEMENT AT BALTIMORE.

AVERAGE.	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly	4609	4506	5499	5038	4636	4284	4147	3787	3931	4376	4413	4492
Daily	149	161	177	168	150	143	134	122	131	141	147	145
Hourly	6.2	6.7	7.4	7.0	6.2	6.0	5.6	5.1	5.5	5.9	6.1	6.0

SUNSHINE AND CLOUDINESS.

There is in all seasons of the year an abundance of sunshine. The amount varies considerably in different months but in all months the average is above 50 per cent of the possible amount. January and December have the smallest amount in actual number of hours as well as in the percentage of the possible amount. At Baltimore the amount increases from 4.8 hours in December to a maximum of 9.2 hours in June per day. September, with but 8.1 hours of sunshine has a higher percentage than June, the values being respectively 65 per cent and 62 per cent.

The average monthly amounts of sunshine at Baltimore are shown by the following figures:

AVERAGE DAILY SUNSHINE AT BALTIMORE.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Average in Hours.....	4.9	6.4	6.8	7.9	7.7	9.2	9.1	8.6	8.1	6.8	5.5	4.8	7.2
Percentage of possible amount..	50	59	57	60	54	62	62	63	65	60	51	50	58

Grouping all days of the year into clear days during which less than four-tenths of the sky is covered with clouds, cloudy days, with more

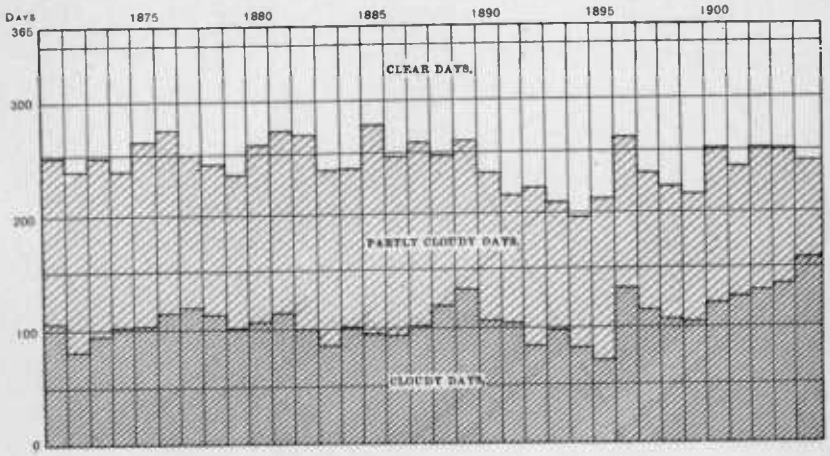


FIG. 16.—Relative Frequency of Clear, Partly Cloudy, and Cloudy days.

than seven-tenths cloudiness, and partly cloudy days with four to seven-tenths cloudiness, we have the following annual distribution at Baltimore:

CLOUDINESS AT BALTIMORE.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Clear days.....	8.3	8.4	8.8	9.2	9.5	9.0	10.0	10.7	11.9	12.4	10.2	9.7	118.1
Partly cloudy days.....	12.1	10.9	11.5	11.8	11.6	14.0	13.3	12.9	10.5	10.2	10.2	11.5	140.5
Cloudy days.....	10.6	8.9	10.7	9.1	9.9	7.3	7.4	7.4	7.5	8.7	9.6	9.4	106.6

Fig. 16 shows the variation in the distribution of clear, partly cloudy, and cloudy days at Baltimore during the period of 34 years from 1871 to 1904.

HYDROGRAPHY.

The greater part of the State of Maryland lies in the Atlantic drainage, but a small area in the western part of the State is drained by the Youghiogheny River whose waters find their way into the Gulf of Mexico by way of the Ohio River. The most important drainage areas within the State are as follows: (1) the Youghiogheny River drainage, which includes the greater part of Garrett County, (2) the Potomac River drainage, which includes Allegany, Washington, and Frederick counties, and portions of Garrett, Carroll, Montgomery, Prince George's, Charles, and St. Mary's counties, (3) the western Chesapeake Bay drainage, which includes Harford, Baltimore, Anne Arundel, Calvert, and Howard counties, and portions of Cecil, Carroll, Montgomery, Prince George's, Charles, and St. Mary's counties, (4) Eastern Chesapeake Bay drainage, which includes Kent, Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, and Somerset counties, and portions of Cecil and Worcester counties, (5) the direct Atlantic Ocean drainage, a small area in Worcester County in which the streams flow directly into the Atlantic Ocean or its tributaries. On the accompanying map the outlines of the several basins are shown.

Most of the streams of the State belong to one of two types, although there are some streams which exhibit the characteristics of both types in different portions of their courses. One type is found west of a northeast-southwest line, known as the "fall line," extending across the State through Elkton, Baltimore, and Washington. Here the streams have fairly steep slopes and flow over rocky beds. Their courses lie through a rolling country in which hard rocks prevail. Rapids and gorges are of frequent occurrence and there are many opportunities for water-power development. Some of these have been utilized, but there are still many available power sites that are capable of yielding a large amount of horsepower. Much study has been given to this region, the

Hydrographic Division of the U. S. Geological Survey materially aiding the local organizations in the study of the district. Particular attention has been given to the drainage basins of the Potomac and Susquehanna rivers and their tributaries as well as to the Gunpowder, Patapsco, and Patuxent rivers. Stream measurements have been made in many instances over a term of years so that the variations in the stream flow are fairly well known. This is important for future developments on these streams and the data secured are frequently called for by those seeking information for water-power sites and for municipal supply.

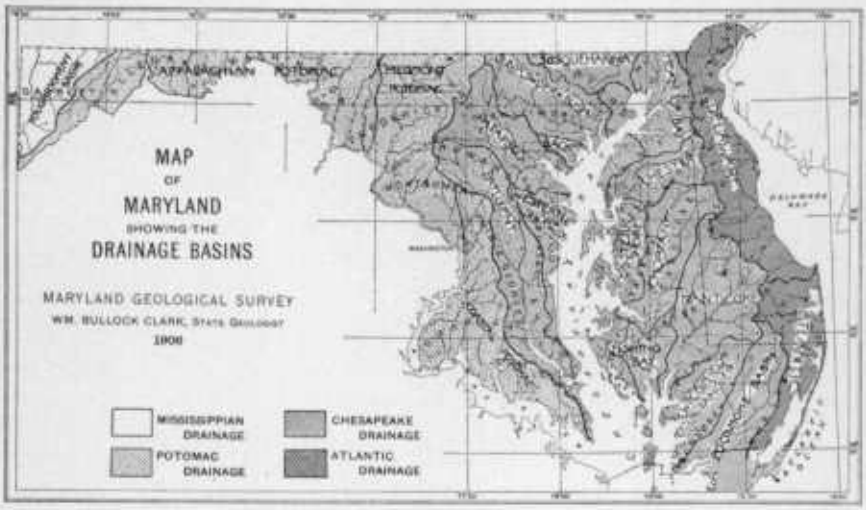


FIG. 17.—Map of Maryland showing Drainage Basins.

East of the "fall line" the streams and the topography and geology have a different character. Here the country is less rolling and the surface formations are unconsolidated sands and clays. The streams flow sluggishly in winding courses and in the lower counties open out and become estuaries of the Chesapeake Bay. Here also the streams are navigable in their lower courses, but owing to the slight velocity they split up rapidly in places, and on many streams the head of navigation is several miles farther down stream than it was a half century ago. As a result of the general flatness of the country there are no water-power

sites in this section. In this area also a smaller proportion of the rainfall finds its way into the streams, as the loose porous soil, most of which is cultivated, absorbs the water very quickly.

As there are no natural lakes of importance in the State there is no regularity in the stream flow such as would exist if there were storage reservoirs on the headwaters of the streams. The flow of the streams varies according to the rainfall. In areas that are highly cultivated the rainwater runs off quickly and the streams rise rapidly at times of large precipitation. In wooded areas the water is held back and reaches the streams more gradually. The highest water generally occurs in the spring months when the snow and ice melts, the ice carried by the large streams, especially the Potomac and Susquehanna, frequently gorging and causing extensive floods.

FIG. 1.—THE YOUGHIOGHENY NEAR OAKLAND, GARRETT COUNTY.

FIG. 2.—THE POTOMAC AT WILLIAMSPORT, WASHINGTON COUNTY.

VIEWS OF MARYLAND HYDROGRAPHY.

TERRESTRIAL MAGNETISM.

The wide-spread interest being taken at present in the investigations of the various phenomena manifested by the earth's magnetism and the important bearings such researches have both from a practical as well as a scientific standpoint on many of the questions confronting the Maryland Geological Survey induced that organization to conduct a magnetic survey on a scale not hitherto attempted in this country and exceeded by but one country abroad, viz., Holland.

The practical need of an accurate magnetic survey is at once recognized when it is recalled that a compass not only does not point to the true north but makes an angle varying from place to place, this angle at any one place furthermore being subject to fluctuations of various kinds of sufficient importance to be taken into account by the surveyor in the determination of land boundaries.

In order to contribute the necessary data for the successful determination of the causes producing the changes in the compass direction and to furnish the means of obtaining the extent, distribution, and depth of rocks which cause the so-called "local magnetic disturbances," the magnetic survey of Maryland included also in its operations the determination of the angle of dip of a magnetic needle and the strength of the earth's magnetic force.

Furthermore, true north and south lines were established and defined by well-placed monuments at all of the County Seats in fulfillment of the statute laws of Maryland. The highly useful purpose of such lines, enabling surveyors to readily test, compare, and correct their compasses, has been generally conceded and appreciated.

To make the magnetic data obtained still more useful, a compilation of previous observations was undertaken in co-operation with the United State Coast and Geodetic Survey, so that it is possible at short notice to supply to those interested the amount of change in the compass direction since the year 1700 for all parts of Maryland with sufficient precision

for all ordinary needs. Extensive use has been made by surveyors and lawyers of this valuable fund of information.

Two tables are annexed, the first giving the compass direction at Baltimore for every tenth year since 1700, from which it is possible to calculate the amount of change between any two given dates. This table shows that from 1700 to about 1800 the north end of the compass needle steadily moved toward the east, so that instead of pointing nearly 6° to the west of north as it did in 1700 it diverged only about 40′ to the

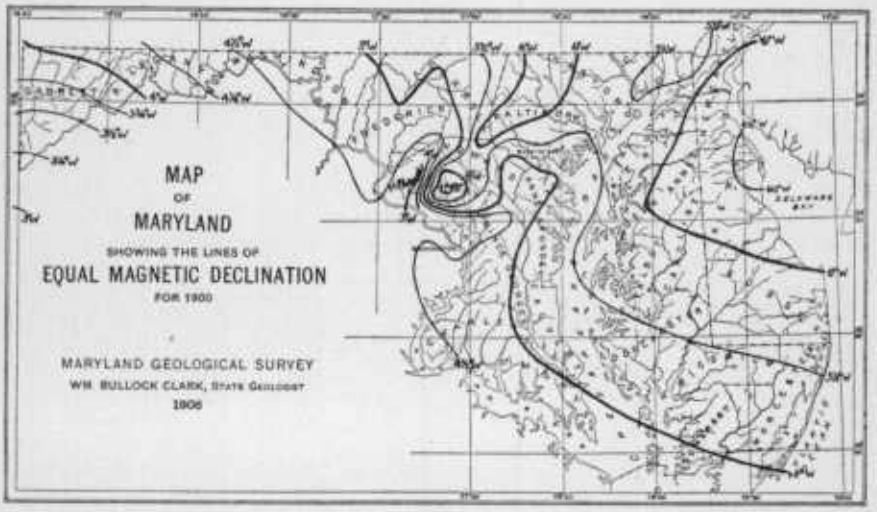


FIG. 18.—Map of Maryland showing lines of Equal Magnetic Declination.

west at the close of the eighteenth century. It will be noticed that beginning with the nineteenth century the north end of the compass began to move towards the west by an ever-increasing amount until at the present it points in the same direction as it did about 200 years ago.

What mysterious cause produces a change in the compass direction large enough to seriously affect land surveys if not taken into account? If a street a mile long has been laid out in Baltimore in 1800 so as to run in the direction indicated by the compass at that time, its northern terminus would have been found nearly one-tenth of a mile too far east as judged by the compass direction in 1905. Furthermore, over how

long a period do these progressive changes extend? Neither of these questions can as yet be answered, nor is there any chance that they will ever be solved unless every state and every country make an energetic and systematic attempt to accumulate the necessary data. The example set by Maryland has already been followed to a greater or less extent by the states of North Carolina and Louisiana. Previous to the work of the Maryland Geological Survey, Professor Francis E. Nipher of St. Louis made a most commendable attempt during the years 1877-81 at a carefully executed magnetic survey of Missouri, but for lack of support from the state was prevented from completing the work. Since then the U. S. Coast and Geodetic Survey has made magnetic observations at a number of stations in Missouri, but there still remains much to be done if the completeness with which the Maryland work was undertaken be striven for.

TABLE I. SHOWING HOW THE COMPASS NEEDLE CHANGED ITS DIRECTION EACH DECADE BETWEEN 1700 AND 1905 IN BALTIMORE.

Year (Jan. 1)	North end of compass pointed west of north.	Year (Jan. 1)	North end of compass pointed west of north.	Year (Jan. 1)	North end of compass pointed west of north.	Year (Jan. 1)	North end of compass pointed west of north.
1700	5° 49′	1750	2° 52′	1800	0° 40′	1850	2° 25′
1710	5 27	1760	2 13	1810	0 41	1860	3 05
1720	4 54	1770	1 38	1820	0 52	1870	3 45
1730	4 14	1780	1 08	1830	1 15	1880	4 26
1740	3 34	1790	0 48	1840	1 50	1890	5 01
1750	2 52	1800	0 40	1850	2 25	1900	5 36
						1905	5 51

The second table shows how the compass direction changes in Maryland in the course of the day, both for a winter month and a summer month. The tabular figures give the correction to be applied to the direction of the compass for every hour between 6 a. m. and 6 p. m. in order to correspond with the average direction which the compass would assume in the course of 24 hours, from midnight to midnight. For example, at Baltimore the north end of the compass pointed on the average during the summer of 1905, 5° 53′ west of north. About 8 o'clock in the morning it pointed 5′ less, hence 5° 48′, and between 1 and 2 p. m. about 5′ more or 5° 58′. The angular change of 10′ in the compass

direction between morning and afternoon corresponds to a linear change of 15 feet at the distance of a mile. It will be seen that in winter the change between morning and afternoon is only about one-half of that in the summer.

In addition to the regular and progressive changes shown by these two tables, the compass is subject to a number of other fluctuations of a more or less periodic character which, however, are subordinate in amount to those taking place during the day. At times and especially during periods of increased sun-spot activity, as is the case at present, the compass needle may be suddenly deflected by as much as one to three degrees and continue for some time in such violent agitation as to be useless for the time being. Such fluctuations are being photographically registered at the various magnetic observatories maintained by the U. S. Coast and Geodetic Survey, one of these being at Cheltenham, Maryland, and another at Baldwin, Kansas.

TABLE II. SHOWING HOW THE COMPASS NEEDLE CHANGES ITS DIRECTION DURING THE DAY IN MARYLAND.

Month	A. M.						Noon	P. M.					
	6	7	8	9	10	11		1	2	3	4	5	6
	′	′	′	′	′		′	′	′	′	′	′	′
January	−0.1	+0.2	+1 0	+2.1	+2 4	+1.2	−1.1	−2.5	−2.6	−2.1	−1.3	−0.2	+0.2
July	+3.1	+4.6	+4.9	+3.9	+1.8	−1.2	−3.4	−4.4	−4.7	−4.2	−2.8	−1.3	−0.3

With the knowledge of such facts as here related, there is a noticeable tendency in Maryland towards the employment of more accurate methods and instruments than were previously used in land surveys.

The map included in this article enables one to tell at a glance what angle the compass makes with a true north and south line in any part of Maryland. Similar maps published in the Survey volumes show the dip of the magnetic needle and the strength of the magnetic force throughout the State. The three maps bear common testimony to the very irregular distribution of the earth's magnetism over central Maryland. The local disturbances in these regions have been definitely referred to certain magnetic rocks and it has been shown that the information thus obtained by means of the magnetic needle can usefully

supplement the data acquired from a purely geological survey. On the average there is one magnetic station in the State to every 100 square miles. The latest magnetic survey of England embraced one station on the average to every 139 square miles, while that of Holland had one station to every 40 square miles.

In addition to the magnetic work described above the services of the Maryland Geological Survey were twice called into requisition in this connection in the accurate determination of two important boundary lines. First in 1897 when by order of the Supreme Court of the United States the State of Maryland was requested to make a survey of the line which it claims as its western boundary and next in 1898 to trace a difficult boundary line between the two counties, Allegany and Garrett. This work, as well as that of the Magnetic Survey, was entrusted to a special "Division of Terrestrial Magnetism" and placed in charge of Dr. L. A. Bauer, who is now directing the extensive magnetic survey work being done under the auspices of the U. S. Coast and Geodetic Survey and the Carnegie Institution of Washington.

FORESTRY.

The total area of woodland in Maryland comprises about two and one-half million acres, constituting approximately forty per cent of the total land area of the State. Something less than one per cent of the wooded area is virgin forest. The forests of the State are mostly second growth and under 150 years in age. In the western part of the State there is much recently culled and cut-over virgin forests with little second growth as yet, or covered with a very small brush growth under 25 feet in height.

The general forest conditions which prevail in Maryland can best be described separately for each of the three physiographic divisions which compose the area of the State: (1) the Appalachian Region; (2) the Piedmont Plateau; (3) the Coastal Plain.

The Appalachian Region.

The Appalachian Region is the most heavily wooded region of the State and the lumber industry is here of first importance. The region supplies much lumber for the general market besides the large quantity consumed locally in mines, pulp mills, and for building purposes. About 60 per cent of the area of this division, or some 750,000 acres, is woodland.

The elevation of this region is 500 to 3400 feet above the sea, forming a mountainous country of deep valleys and high ridges. The upper slopes and ridges are unsuited for agriculture and it is not probable that, to any extent, additional areas of forest will be cleared for farming purposes as the best lands are already cleared and many acres once cultivated are being abandoned on account of their poor soil.

The forests of this region consist mostly of recently culled and cut-over virgin forest and sufficient time has not yet elapsed for second growth of any size to develop. What little virgin forest there is in

Maryland is located in inaccessible parts of this region. The prevailing growth is deciduous, but this is conspicuously mingled with patches, and often large areas of conifers. The peculiar position of western Maryland, intermediate between North and South, gives the region a forest flora rich in species, there being in all upwards of seventy distinct tree species. Conifers and hardwoods of the middle South and North mingle here almost on the same ground. The important timber trees occurring in the region include among the conifers, white pine, hemlock, spruce, pitch, and shortleaf pines, and among the hardwoods, red, white, and chestnut oaks, chestnut, tulip, poplar, basswood, birch, beech, and maple.

Nearly all the merchantable coniferous trees have already been culled from the forests of this region and the hardwoods are now rapidly being cleaned out under the highly intensive system of lumbering which has lately been inaugurated in the region. Trees of nearly all species down to very small sizes are used for mine props and lagging. The prevailing forest condition is that of cut-over virgin forest, covered with a scattering growth of large, defective trees not suitable for lumber, interspersed with reproduction of hardwood sprouts and seedlings, and occasional patches of coniferous reproduction. The prevalence of fires, following the severe lumbering, has greatly deteriorated the quality of the reproduction and second growth, so that the outlook for a valuable future crop is, at present, not bright.

The outlook for private forest management in this region is not promising, due to the intensive form of lumbering, the prevalence of fires damaging young growth, and the general slowness of tree growth in this mountainous country requiring a very long time for trees to reach maturity. No owners of large timber tracts in this part of the State have as yet taken up the idea of conservative treatment of their woodlands. Forest management in this region could best be carried on by the State rather than by private owners, as the long rotation required in this section to mature timber would not be as objectionable to the former as to the latter. There is an increasing amount of cut-over land in this section, non-agricultural, and suitable only for growing trees,

which will not have a second valuable crop of timber for fifty to seventy-five years, and then only if properly managed. There is no very great inducement to the individual to properly care for such forest land with the harvest so far off, while if managed by the State the welfare of the next generation would be considered and the forest carefully handled accordingly.

There are some wood-lots in this region, adjacent to farms, and for such small tracts, private forest management will be advisable. At present, however, not such intensive forestry will be practicable for these wood-lots, as for those in the Piedmont section where the land is more valuable and timber much more scarce. But the farmers here should always try to keep out fire and improve their lots by thinning out worthless and hindering material as far as it can be done without financial outlay.

THE PIEDMONT PLATEAU.

The Piedmont Plateau is a fertile region of rolling hills with a general variation in altitude from 100 to 1000 feet above the sea and extends from the Appalachian Region to the Coastal Plain. It is the most lightly-wooded part of Maryland, and the lumber industry here is of very slight importance. It is estimated that about twenty-five per cent of the region is woodland, or some 700,000 acres.

There are no large timber tracts in this region and the forest area is almost exclusively made up of farmer's wood-lots, or small tracts, for the most part under 100 acres in area. The forest is second-growth hardwoods with oak, chestnut, hickory, tulip, poplar, and maple the prevailing trees. It is mostly of sprout origin under 100 years in age. There is also some old-field growth scrub pine in this region. These wood-lot forests are in fairly good condition as compared with the heavily-culled and burned-over forests of the Appalachian Region. As the forest areas are usually small and much broken up by fields, pastures, and roads, extensive forest fires do not occur. However, all the wood-lots now produce much less timber than they are capable of producing if properly

managed. The forest is usually under-stocked, due to frequent random culling out of timber as needed instead of systematic cutting.

The wood-lot is an indispensable adjunct to a well-equipped farm, to furnish the necessary supply of cordwood consumed, fence posts, and rails, and for a hundred and one other purposes, all requiring that there be a wood-lot convenient. The farmer's wood-lot furnishes one of the best possible opportunities for economical forest management. The farmer has the best chance to bring his wood-lot up to the highest possible productive state by utilizing his leisure time during the winter to work in his wood-lot and improve it. He can usually find use for inferior and defective trees, which should be removed for the benefit of the trees remaining; it will, in short, pay him to make improvement cuttings. The more valuable the land occupied by wood-lot is for agriculture, the more intensive should be the forest management in order to realize a reasonable rate of interest on the capital represented by the land. Where the reproduction and second growth following clear cutting is insufficient, the natural reproduction should be supplemented by artificial planting or sowing, in order that the future stand be fully stocked and produce a high yield of timber. The farmer will, in the end, be abundantly repaid if he thus uses his spare time in the improvement of his wood-lot.

Timber brings a good price in this section because of its scarcity, especially such species as chestnut, oak, walnut, and hickory. The growing of chestnut for poles and ties is an especially good proposition as shown by the bulletin of the U. S. Forest Service on the subject.

THE COASTAL PLAIN.

The Coastal Plain is fairly heavily wooded and the lumber industry is here of considerable importance but almost exclusively in the manufacture of lumber for local consumption and not, to any extent, for the general market. It varies in elevation from sea level to somewhat over 250 feet, although much of the area, especially on the Eastern Shore, is less than 20 feet above tide. It is estimated that forty per cent of the

region is wooded, or over 1,000,000 acres, practically all of which is second growth under 150 years in age. Before the Civil War a much larger per cent was cleared and worked as farm land than at present, but since that time much of it has been abandoned and has grown up, for the most part, to a thick growth of scrub or loblolly pine.

The forests of this region occur in much larger bodies than in the Piedmont Plateau, but there are no such immense continuous tracts as are found in the Appalachian Region. The lumbering here is characterized by an abundance of small sawmills, many portable, in contradistinction from the lumbering in the Appalachian Region which is carried on mostly by a few large operators. The lumbering is mostly of second-growth yellow pine, 40 to 100 years old, which has not had time to attain the large dimensions of virgin timber.

The forests of this region are over half yellow pine, which occurs sometimes in mixture with hardwood but more frequently pure. The species of yellow pine which occur, in order of their importance, are: loblolly, scrub, shortleaf, and pitch. The pine on land over 40 feet in elevation above the sea is prevailingly scrub, and below 40 feet is mostly loblolly.

The rapid growing loblolly and scrub pines in this region which attain merchantable size in thirty to sixty years are good propositions for private forest management, especially the loblolly. Most of the land on which this pine occurs is of little value for agriculture and will often bring better returns from growing timber on short rotations than from crops. In thirty years the scrub pine is valuable for pulpwood; also for charcoal. It is best to cut out the loblolly for lumber as it is sufficiently large in thirty-five to forty-five years.

The outlook of forestry for wood-lots in this section is nearly as good as for the Piedmont region, though timber prices are not usually as high.

In the U. S. Census for 1900 the following figures are given on the lumber industry in Maryland for that year:

Cut of conifers	109,651,000	board feet
Hardwoods	78,306,000	" "
Total	187,957,000	
Value of product	$2,650,082.	

Probably about one-half of this production was from the mountain region and one-half from the Coastal Plain with none to speak of from the Piedmont section.

PLATE XVI.

ORDOVICIAN.

Fig. 1. ISOTELUS MAXIMUS Locke (greatly reduced).
Fig. 2. TRINUCLEUS CONCENTRICUS Eaton.
Figs. 3, 4. DINORTHIS PECTINELLA (Emmons) Hall & Clarke.
Fig. 5. RAFINESQUINA ALTERNATA (Emmons) Hall & Clarke.
Fig. 6. DIPLOGRAPTUS FOLIACEUS (Murchison).
Fig. 7. MACLUREA MAGNA LeSueur.
Fig. 8. PLECTAMBONITES SERICEUS (Sowerby) Hall & Clarke.

CAMBRIAN.

Figs. 9, 12. HYOLITHES COMMUNIS Billings.
Figs. 10, 11. HYOLITHES COMMUNIS Billings (transverse sections).
Figs. 13, 14. OBOLELLA MINOR Walcott.
Fig. 15. MICROMETRA BELLA (Billings) Walcott
Fig. 16. OLENELLUS THOMPSONI Hall.
Fig. 17. SCOLITHUS LINEARIS Halde.

CAMBRIAN-ORDOVICIAN.

CHARACTERISTIC FOSSILS OF MARYLAND FORMATIONS.

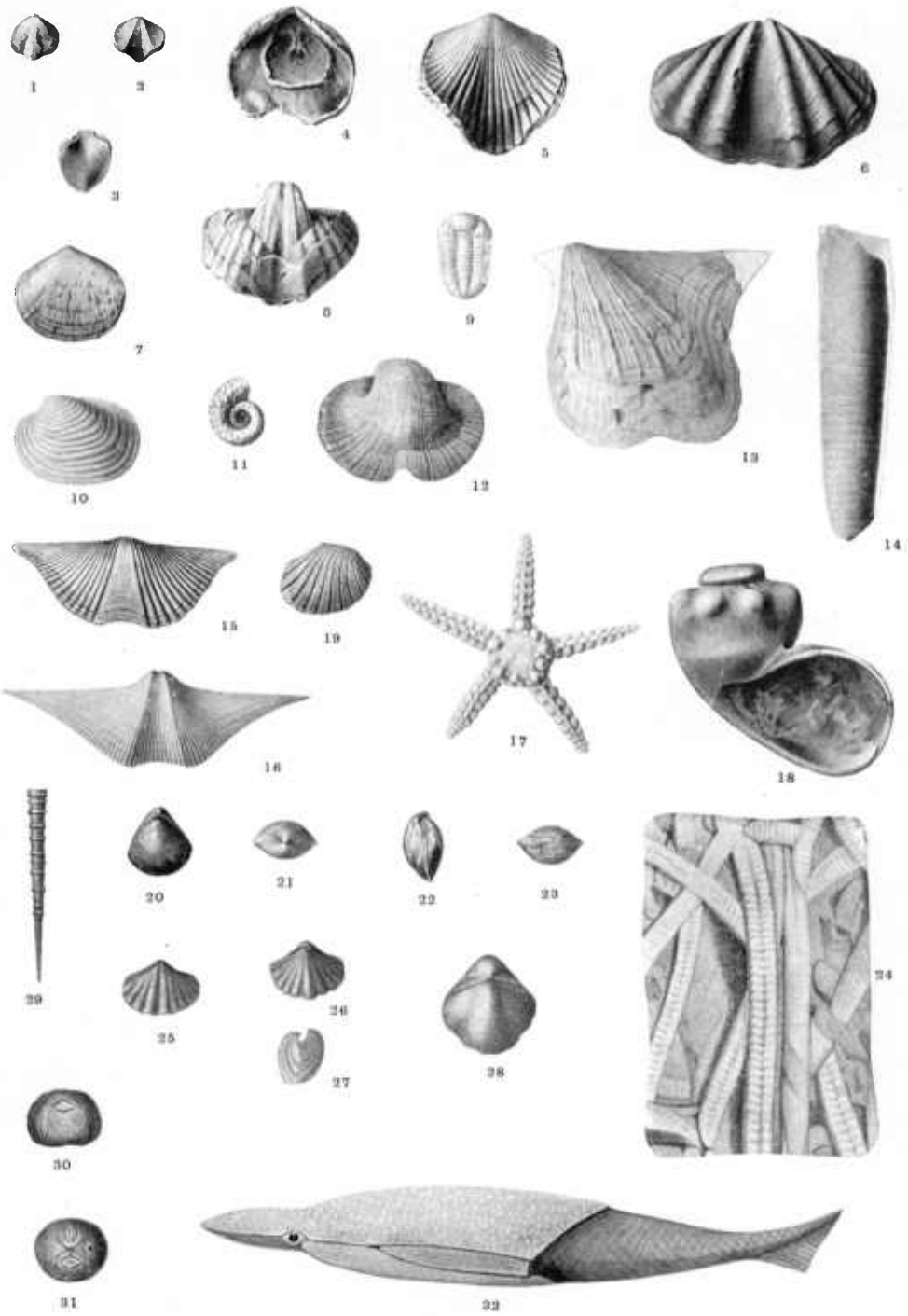
PLATE XVII.

DEVONIAN.

Figs. 1, 2. EATONIA SINGULARIS (Vanuxem).
Fig. 3. EATONIA PECULIARIS (Conrad).
Figs. 4, 5. EATONIA SINUATA Hall.
Fig. 6. SPIRIFER MACROPLEURA (Conrad).
Fig. 7. RHIPIDOMELLA ASSIMILIS (Hall).
Fig. 8. SPIRIFER MURCHISONI Castelnau.
Fig. 9. PHACOPS RANA (Green).
Fig. 10. GRAMMYSIA ARCUATA (Conrad).
Fig. 11. SPIRORBIS GYRUS Clarke.
Fig. 12. BELLEROPHON (Bucanopsis) leda Hall.
Fig. 13. PTERINEA NODOCOSTA Clarke.
Fig. 14. ORTHOCERAS CONSTRICTUM Vanuxem.
Fig. 15. SPIRIFER MESASTRIALIS Hall.
Fig. 16. SPIRIFER DISJUNCTUS Sowerby.
Fig. 17. PALAEASTER CLARKI Clarke.
Fig. 18. TURBO CORONULA Clarke.
Fig. 19. BUCHIOLA RETROSTRIATA v. Buch.

SILURIAN.

Figs. 20-23. WHITFIELDELLA INTERMEDIA Hall.
Fig. 24. ARTHROPHYCUS HARLANI Conrad (greatly reduced).
Figs. 25-27. SPIRIFER OCTOCOSTATUS Hall.
Fig. 28. HYATELLA CONGESTA Conrad.
Fig. 29. TENTACULITES NIAGARENSIS VAR CUMBERLANDIAE Hall.
Figs. 30, 31. SPHAEROCYSTITES MULTIFASCIATUS Hall.
Fig. 32. PALAEASPIS AMERICANA Claypole (restored).



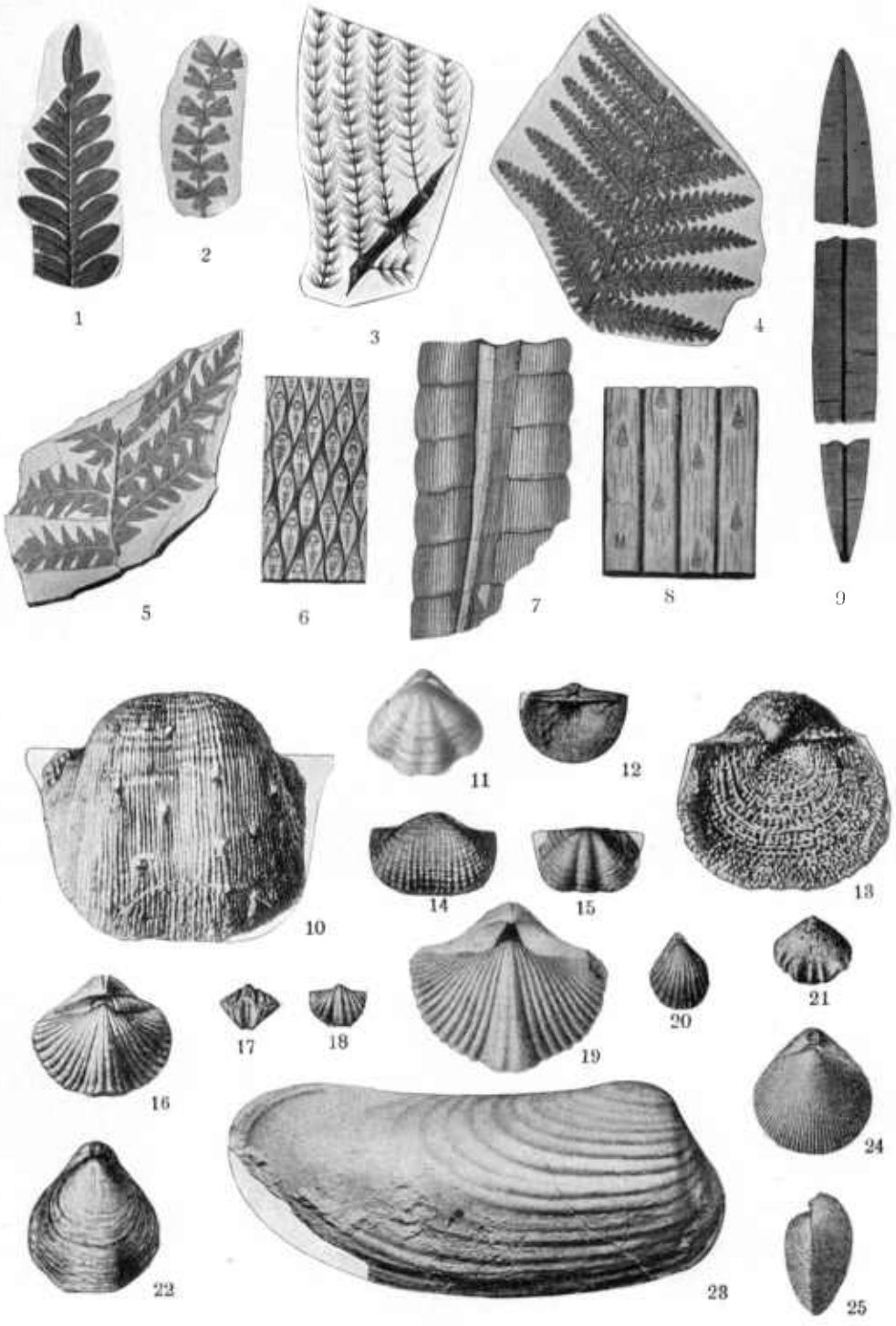
SILURIAN-DEVONIAN.

CHARACTERISTIC FOSSILS OF MARYLAND FORMATIONS.

PLATE XVIII.

CARBONIFEROUS-PERMIAN.

Fig. 1. ALETHOPTERIS SERLII Brongniart.
Fig. 2. SPHENOPHYLLUM FILICULME Lesquereux.
Fig. 3. ASTEROPHYLLITES EQUISETIFORMIS Brongniart.
Fig. 4. SPHENOPTERIS LESCURIANA Fontaine.
Fig. 5. MARIOPTERIS NERVOSA (Brongniart).
Fig. 6. LEPIDODENDRON ACULEATUM Sternberg.
Fig. 7. CALAMITES APPROXIMATUS Schlotheim.
Fig. 8. SIGILLARIA LEPTODERMA Lesquereux.
Fig. 9. TAENIOPTERIS NEWBERRIANA Fontaine.
Fig. 10. PRODUCTUS SEMIRETICULATUS Martin.
Fig. 11. SEMINULA TRINUCLEA Hall.
Fig. 12. CHONETES FLEMINGI Norwood & Pratten.
Fig. 13. PRODUCTUS NEBRASKENSIS Owen.
Fig. 14. MARGINIFERA MURICATA Norwood & Pratten.
Fig. 15. CHONETES MESOLOBUS Norwood & Pratten.
Fig. 16. SPIRIFER ROCKYMONTANUS Marcou.
Fig. 17. SPIRIFERINA KENTUCKYENSIS Shumard, (front view).
Fig. 18. SPIRIFERINA KENTUCKYENSIS Shumard, (dorsal view).
Fig. 19. SPIRIFER KEOKUK Hall.
Fig. 20. HUSTEDIA MORMONI Marcou.
Fig. 21. PUGNAX UTAH Marcou.
Fig. 22. SEMINULA SUBTILITA Hall.
Fig. 23. ALLORISMA TERMINALE Hall.
Figs. 24, 25. EUMETRIA VERNEUILIANA Hall.



CARBONIFEROUS-PERMIAN.

CHARACTERISTIC FOSSILS OF MARYLAND FORMATIONS.

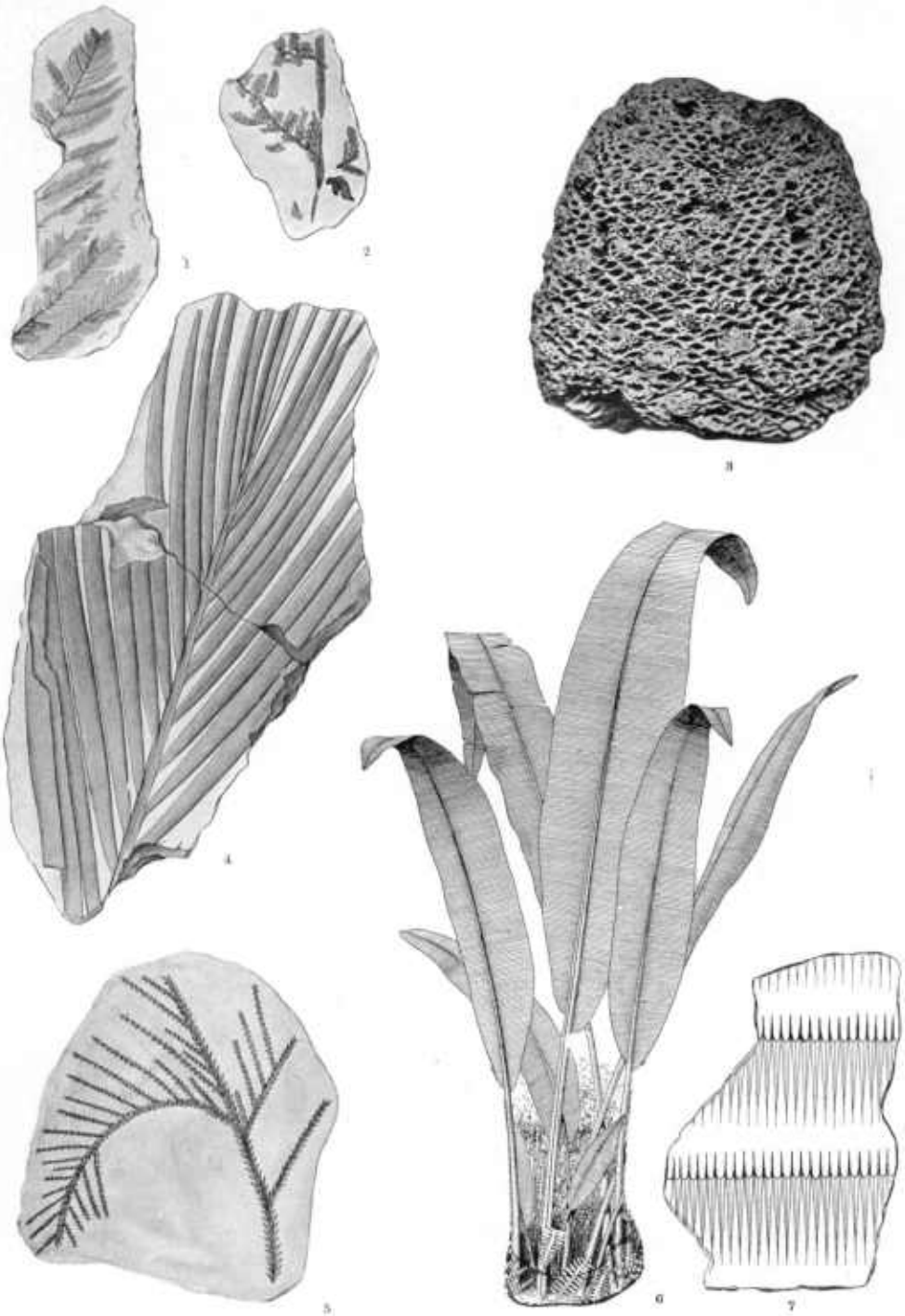
PLATE XIX.

JURASSIC (?).

Figs. 1, 2. DRYOPTERIS HETEROPHYLLA (Fontaine) Knowlton.
Fig. 3. CYCADEOIDEA MARYLANDICA (Fontaine) Cap. & Solms. (greatly reduced).
Fig. 4. DIOONITES BUCHIANUS (Ettings.) Bornemann.

TRIASSIC.

Fig. 5. CHEIROLEPIS MÜNSTERI Schimper.
Fig. 6. MACROTAENIOPTERIS MAGNIFOLIA Rogers (restored).
Fig. 7. EQUISETUM ROGERSII (Bunbury) Schimper.



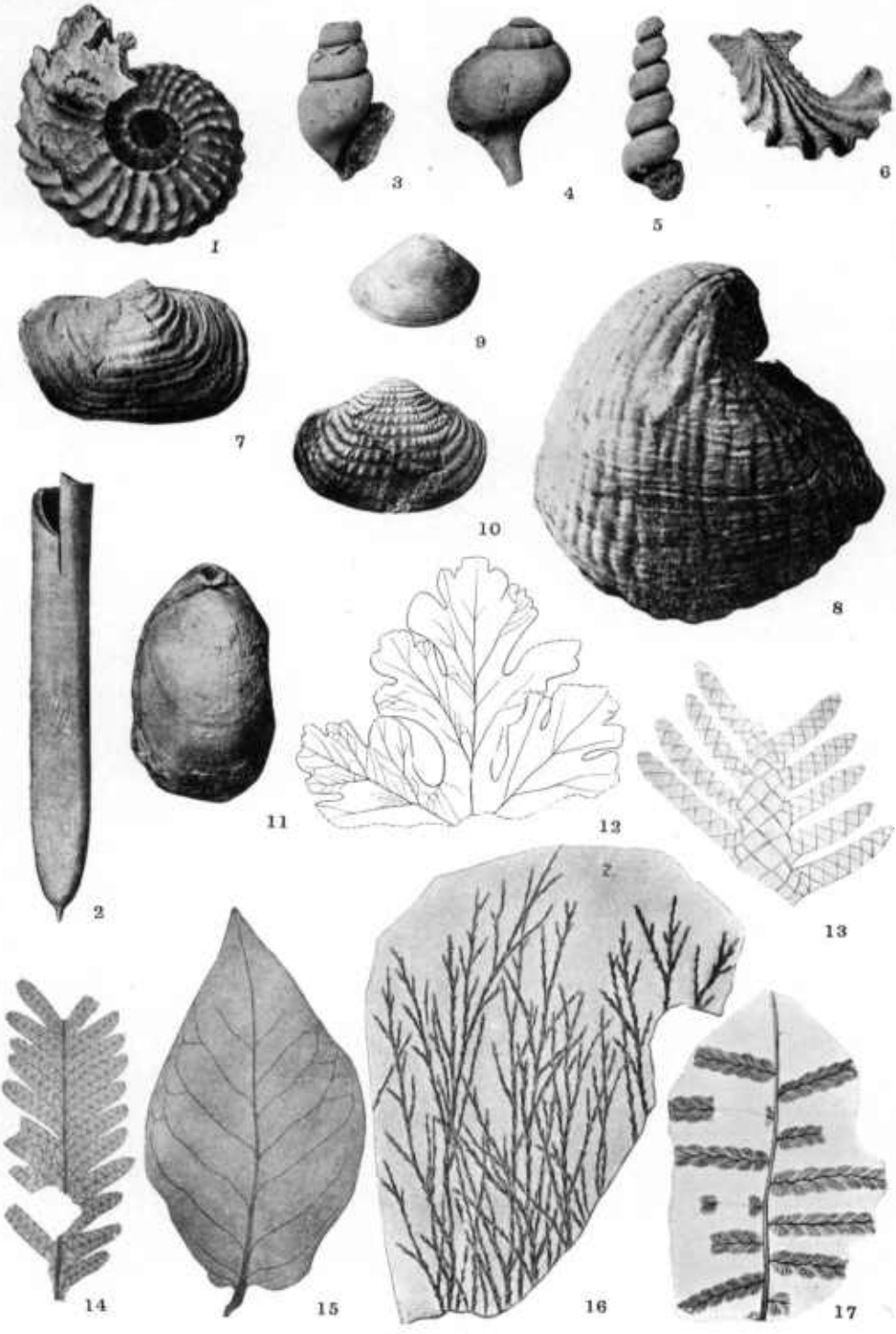
TRIASSIC-JURASSIC (?).

CHARACTERISTIC FOSSILS OF MARYLAND FORMATIONS.

PLATE XX.

CRETACEOUS.

Fig. 1. AMMONITES (Mortoniceras) VANUXEMI Morton.
Fig. 2. BELEMNITELLA AMERICANA (Morton).
Fig. 3. ANCHURA PENNATA (Morton).
Fig. 4. TURBINELLA ALABAMENSIS (Gabb).
Fig. 5. TURRITELLA VERTEBROIDES Morton.
Fig. 6. OSTREA FALCATA Morton.
Fig. 7. PANOPEA DECISA Conrad.
Fig. 8. EXOGYRA COSTATA Say.
Fig. 9. NUCULA PERCRASSA Conrad.
Fig. 10. CYMELLA BELLA Conrad.
Fig. 11. TEREBRATULA HARLANI Morton.
Fig. 12. VITIPHYLLUM MULTIFIDUM Fontaine.
Fig. 13. BRACHYPHYLLUM MACROCARPUM Newberry.
Fig. 14. MORICONIA CYCLOTOXON Deb. & Ettings.
Fig. 15. MAGNOLIA AURICULATA Newberry.
Fig. 16. WIDDRINGTONITES REICHII (Ettings.) Heer.
Fig. 17. OSMUNDA DELAWARENSIS Berry.



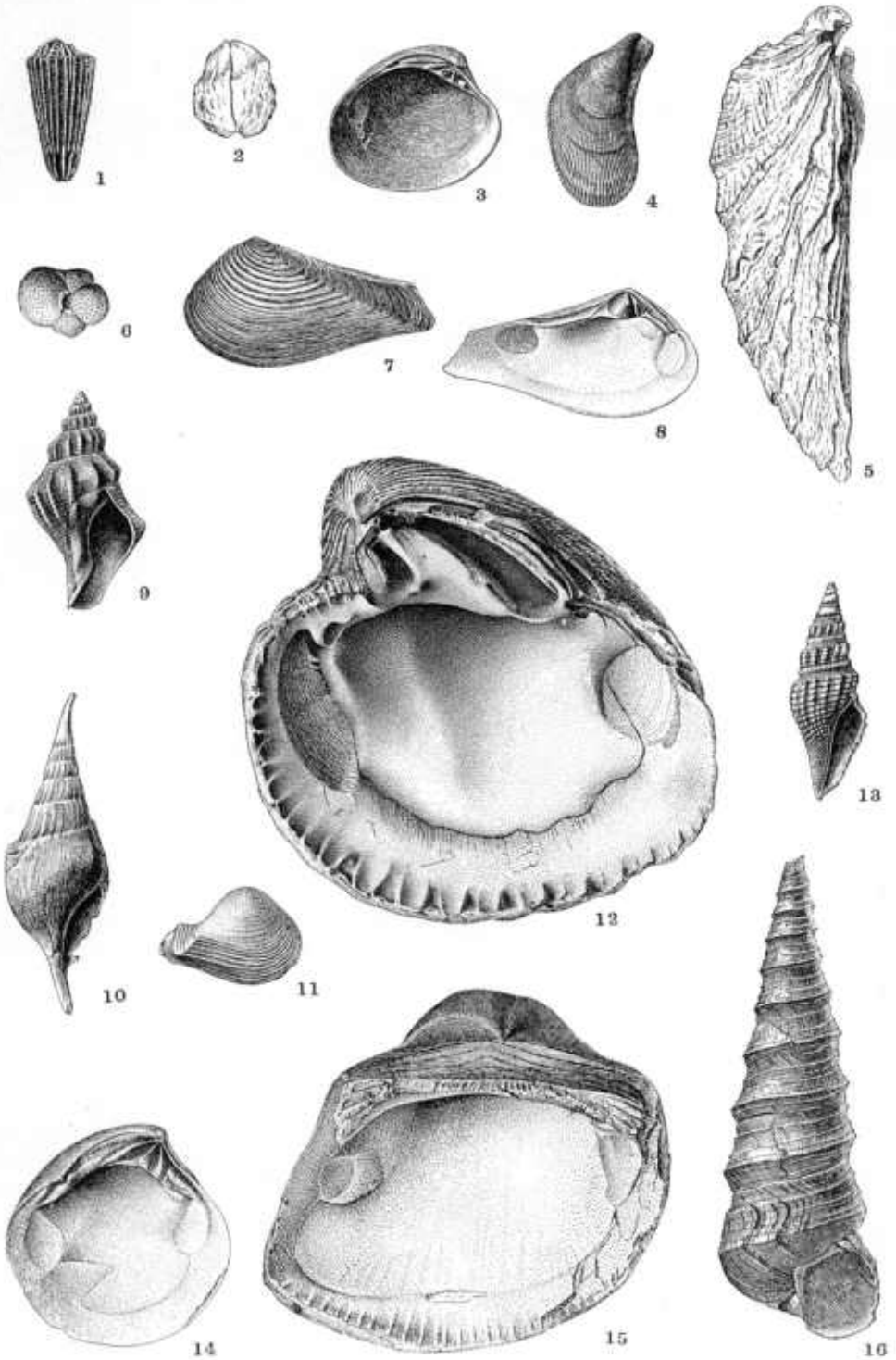
CRETACEOUS.

CHARACTERISTIC FOSSILS OF MARYLAND FORMATIONS.

PLATE XXI.

EOCENE.

Fig. 1. TURBINOLIA ACUTICOSTATA Vaughan.
Fig. 2. CARPOLITHUS MARYLANDICUS Hollick.
Fig. 3. MERETRIX OVATA VAR PYGA Conrad.
Fig. 4. MODIOLUS ALABAMENSIS Aldrich.
Fig. 5. OSTREA COMPRESSIROSTRA Say.
Fig. 6. GLOBIGERINA BULLOIDES d'Orb. (greatly enlarged).
Figs. 7, 8. CRASSATELLITES ALAEFORMIS (Conrad).
Fig. 9. STREPSIDURA SUBSCALARINA Heilprin.
Fig. 10. CALYPTRAPHORUS TRINODIFERUS Conrad var.
Fig. 11. CORBULA ALDRICHI Meyer.
Fig. 12. VENERICARDIA PLANICOSTA VAR REGIA Conrad.
Fig. 13. PLEUROTOMA TYSONI Clark & Martin.
Fig. 14. DOSINIOPSIS LENTICULARIS (Rogers).
Fig. 15. CUCULLAEA GIGANTEA Conrad.
Fig. 16. TURRITELLA MORTONI Conrad.



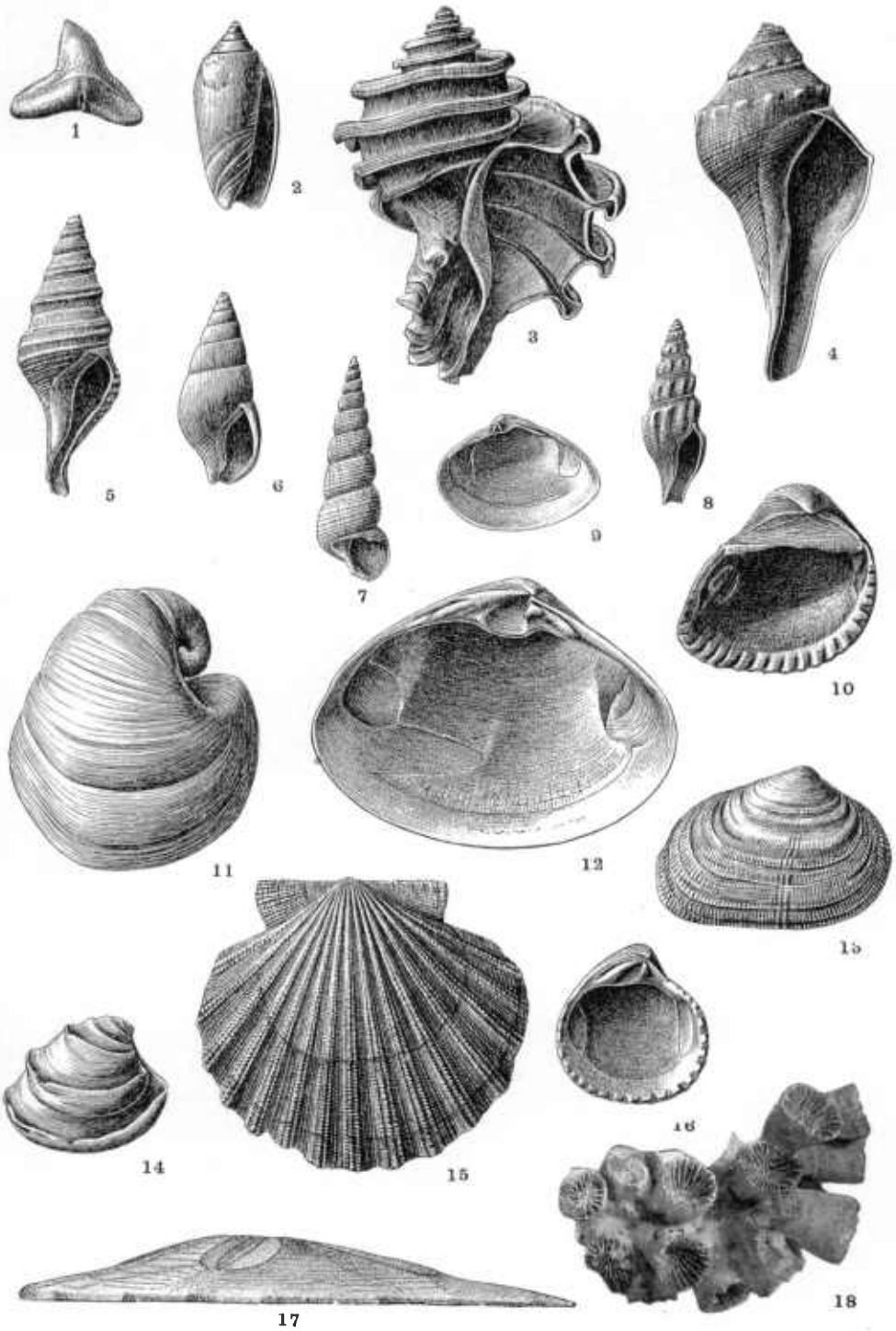
EOCENE.

CHARACTERISTIC FOSSILS OF MARYLAND FORMATIONS.

PLATE XXII.

MIOCENE.

Fig. 1. CARCHARIAS (Prionodon) egertoni (Agassiz).
Fig. 2. OLIVA LITTERATA Lamarck.
Fig. 3. ECPHORA QUADRICOSTATA (Say).
Fig. 4. FULGUR FUSIFORME Conrad.
Fig. 5. SURCULA BISCATENARIA Conrad.
Fig. 6. COLUMBELLA (Astyris) communis (Conrad).
Fig. 7. TURRITELLA PLEBEIA Say.
Fig. 8. MANGILIA PARVA (Conrad).
Fig. 9. MACTRA CLATHRODON Lea.
Fig. 10. ARCA (Scapharca) staminea Say.
Fig. 11. ISOCARDIA MARKOËI Conrad.
Fig. 12. SPISULA (Hemimactra) subponderosa (d'Orb.).
Fig. 13. ASAPHIS CENTENARIA (Conrad).
Fig. 14. CHIONE ALVEATA (Conrad).
Fig. 15. PECTEN (Chlamys) madisonius Say.
Fig. 16. VENERICARDIA GRANULATA Say.
Fig. 17. SCUTELLA ABERTI Conrad (lateral view).
Fig. 18. ASTRANGIA LINEATA (Conrad).



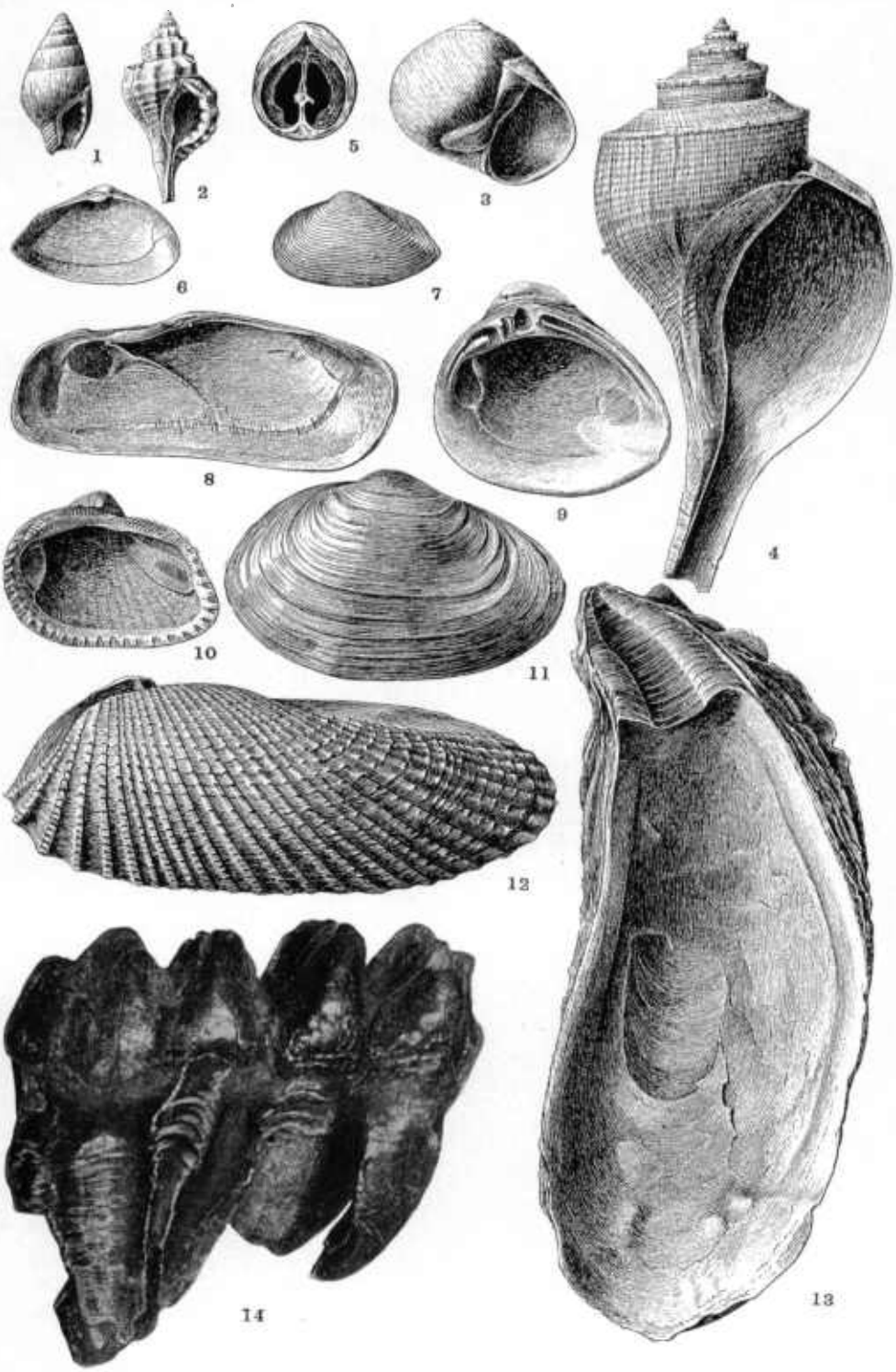
MIOCENE.

CHARACTERISTIC FOSSILS OF MARYLAND FORMATIONS.

PLATE XXIII.

PLEISTOCENE.

Fig. 1. ILYANASSA OBSOLETA (Say) Dall.
Fig. 2. EUPLEURA CAUDATA (Say) Holmes.
Fig. 3. POLYNICES (Neverita) duplicatus (Say) Dall.
Fig. 4. FULGUR CANALICULATUM (Linné).
Fig. 5. HICORIA GLABRA (Mill) Britton.
Figs. 6, 7. CORBULA CONTRACTA Say.
Fig. 8. TAGELUS GIBBUS (Spengler) Dall.
Fig. 9. RANGIA CUNEATA (Gray) Dall.
Fig. 10. ARCA (Noëtia) ponderosa Say.
Fig. 11. MYA ARENARIA Linné.
Fig. 12. BARNEA (Scobina) costata (Linné) Dall.
Fig. 13. OSTREA VIRGINICA Gmelin.
Fig. 14. TOOTH OF MASTODON, MAMMUT AMERICANUM (Kerr) (greatly reduced).



PLEISTOCENE.

CHARACTERISTIC FOSSILS OF MARYLAND FORMATIONS.

PART II

EXHIBITS OF MARYLAND MINERAL RESOURCES

MADE BY THE

MARYLAND GEOLOGICAL SURVEY

AT

BUFFALO, CHARLESTON, ST. LOUIS, AND ANNAPOLIS

1901, 1902, 1904, 1906

BY

WM. BULLOCK CLARK

EXHIBITS OF MARYLAND MINERAL RESOURCES MADE BY THE MARYLAND GEOLOGICAL SURVEY AT BUFFALO, CHARLESTON, ST. LOUIS, AND ANNAPOLIS, 1901, 1902, 1904, 1906

BY

WM. BULLOCK CLARK

The commissioners of the State of Maryland to the Buffalo, Charleston, and St. Louis expositions, in 1901, 1902, and 1904 respectively, requested the Maryland Geological Survey to prepare for them exhibits of Maryland's mineral products. Much valuable material had already been collected by the Survey subsequent to its organization in 1896, but only a small amount was in suitable form for exposition purposes. It became necessary, therefore, for the State Geologist and his associates with the funds placed at their disposal by the Commissioners to greatly elaborate the existing collections by arranging for a systematic display of all the more important natural minerals together with their manufactured products. The cooperation of the various operators throughout the State was sought, the aim being to present the several materials in a way that would make the exhibits not only of educational but of commercial value.

The Maryland Commissioners to Buffalo and Charleston were the same and the appropriations made by the State for those expositions were administered as a common fund, the sum of $5000 being allotted to the mineral exhibits. The Commissioners to St. Louis further allotted $7,500 for the same purpose. The collection and preparation of the exhibits involved but a small part of the outlay, the chief cost being for installation which under the unfavorable conditions of an exposition required several months of time and large expenditures for labor and materials.

The exhibit prepared for the Charleston exposition was much more complete than that displayed at Buffalo, and the St. Louis exhibit again

represented a marked advance over that at Charleston. Much labor and time are involved in securing adequate collections of this character, and many permanent materials have been gradually added to the original display, and these will always be of service to the State for exposition purposes.

The collections made by the Maryland Geological Survey for these several expositions are now installed in the Old Hall of Delegates in the State House at Annapolis where they form a comprehensive exhibit of Maryland's mineral wealth.

PAN-AMERICAN EXPOSITION.

EXHIBIT IN MINES BUILDING AT BUFFALO, NEW YORK, 1901.

The Maryland mineral exhibit at Buffalo occupied about 150 square feet of floor space and 1500 square feet of wall and window space in the Mines Building. The materials were advantageously arranged about the main entrance to the building. Maps and transparencies occupied the walls and windows, the whole surmounted by a striking mural decoration entitled "The Genius of Geology unveiling Maryland's Mineral Wealth," which attracted the attention of all visitors to the Maryland display. No other state was so conspicuously represented.

The exhibit consisted chiefly of the three leading mineral products of the State, viz., the coals, the clays and clay products and the building and decorative stones. To these were added smaller collections of the limestones, cement rocks and sands.

A unique feature of the section devoted to Maryland's coals was a great block of "Big Vein" Georges Creek coal three feet square at the base and over seven feet high which aroused much interest. It was the largest single block of coal in the Mines Building and was from the mines of the Consolidation Coal Company. Smaller pieces of Maryland coal were exhibited by the Black, Sheridan and Wilson Company, Georges Creek Coal and Iron Company, Maryland Coal Company, New Central Coal Company, Piedmont Mining Company, and Watson-Loy Coal Company.

FIG. 1.—GENERAL VIEW OF EXHIBIT.

FIG. 2.—NEAR VIEW OF EXHIBIT.

MARYLAND GEOLOGICAL SURVEY EXHIBIT, BUFFALO, 1901.

The exhibit of clays and clay products was considered by experts to be the most comprehensive at the Exposition, although much smaller than those made by the State at Charleston and St. Louis. It was extensively discussed in the technical journals devoted to the clay industry and the plan which was followed of showing the raw and manufactured products side by side was highly commended. Many of the better known common brick, fire brick, terra cotta and earthenware clays were shown, together with samples of the articles made from them. Exhibits were secured from the Baltimore Brick Company, Union Mining Company, Burns and Russell Company, Green Hill Fire Brick Company, Frederick Brick Works, Conococheague Brick & Earthenware Company, Queen City Brick & Tile Company, Savage Mountain Fire Brick Works and Andrew Ramsay.

The exhibit of building and decorative stones contained representatives of the most important materials quarried in the State, although the specimens displayed were far less conspicuous than those at the later expositions, the granites and marbles being chiefly represented. A beautiful collection of slabs of polished serpentine from Harford County attracted much attention. The exhibits were largely from the quarries of the Maryland Granite Company, McClenahan Granite Company, Beaver Dam Marble Company and the Guilford & Waltersville Granite Company.

The limestones came from a number of localities in Frederick, Washington, and Allegany counties and the cement rocks from Washington and Allegany counties. The latter materials were secured from the Round Top Cement Company near Hancock and the Cumberland Cement Company at Cumberland. The sands were from several points on the Severn River.

A small exhibit showing the methods pursued by the Maryland Geological Survey in its highway investigations was included among the other collections, besides samples of Maryland highway materials and the various methods of testing them.

A feature of much educational value was furnished by the collection in systematic geology in which characteristic specimens of the rocks, minerals, and fossils from the oldest to the youngest geological formations

of the State were included. The attempt was made to show the geological position of all of the State's economic materials.

The maps, illustrations, and transparencies on the wall above the exhibit added much to the effectiveness of the display. Four large maps showing the geology and agricultural soils of the State, the relative elevations, the physiographic provinces, and the distribution of temperature and rainfall stretched across the end of the building, while between them were county topographic and geological maps, framed illustrations from the Maryland Geological Survey volumes, and geological sections. Large colored transparencies showing Maryland scenery occupied the windows. The most conspicuous feature of the exhibit was the great mural painting that occupied the entire upper part of the wall over the main entrance to the building and which bore the word MARYLAND in large letters beneath it.

Awards at Buffalo.

The exhibit received a Gold Medal, the only one awarded to any State for its exhibit of mineral resources. The individual exhibits also received eight Honorable Mentions.

Gold Medal.—

Maryland Geological Survey—Exhibit of geological specimens, mineral products, maps, photographs and transparencies illustrative of the geology and mineral resources of Maryland.

Honorable Mention—

Baltimore Brick Company, Baltimore—brick.
Beaver Dam Marble Company, Baltimore—marble.
Burns and Russell Company, Baltimore—terra cotta.
Green Hill Fire Brick Company, Northeast—furnace linings.
Andrew Ramsay, Mount Savage—enameled-brick.
McClenahan Granite Company, Port Deposit—granite.
Peach Bottom Slate Producers' Association, Delta—slate.
Union Mining Company, Mount Savage—fire-brick.

SOUTH CAROLINA, INTERSTATE, AND WEST INDIAN EXPOSITION. EXHIBIT IN MINES BUILDING AT CHARLESTON, SOUTH CAROLINA, 1902.

The Mineral Exhibit made by the State at Charleston covered about 1000 square feet of floor space and 2500 square feet of wall and window space in the Mines Building. The location of the exhibit was at one of the main entrances to the building, the pyramid of building and decorative stones standing directly in front of the central doors.

The exhibit was both economic and educational. The leading minerals were displayed together with their more representative manufactured products. Many materials that had not been employed at Buffalo were added prior to the installation of the exhibit at Charleston, besides many new maps and framed illustrations.

The coal exhibit contained a large block of "Big Vein" Georges Creek coal, as at Buffalo, again furnished by the Consolidation Coal Company. There was nothing comparable to it among the exhibits from other states. In addition to this great mass of coal there were smaller pieces from the mines of the Black, Sheridan and Wilson Company, Georges Creek Coal and Iron Company, Maryland Coal Company, New Central Coal Company, and the Piedmont Mining Company.

The exhibit of clays and clay products which was made so prominent a feature at Buffalo was largely increased for the Charleston exhibit, especially by the addition of pottery displays from the leading pottery works of Baltimore—D. F. Haynes and Son and Edwin Bennett Pottery Company. Additions were also made to the common brick and fire-brick collections. An effective fireplace with mantel was furnished by the Washington Hydraulic-Press Brick Company, the beautiful brick supplied being made from clays dug at the pits of this company in Prince George's County. Among other leading exhibitors were the Baltimore Brick Company, the Union Mining Company, Andrew Ramsay, the Baltimore Retort and Fire-Brick Company, the Green Hill Fire-Brick Company, the Frederick Brick Works, the Conococheague Brick and Earthenware Company, and the Queen City Brick and Tile Company. The exhibit of terra cotta was a striking feature of the display, the Burns and

Russell Company furnishing a large number of objects, among them the seal of the State of Maryland in red terra cotta. There were also smaller exhibits of earthenware from the works of George S. Kalb and Son and M. Perine and Sons.

The exhibit of building and decorative stones afforded the most conspicuous feature of the display. The architects, Parker and Thomas, drew plans for a pyramid with columns at the four corners which would attractively display the leading types of these materials. At the four corners were turned columns of Howard County granite, Baltimore County white marble, Montgomery County red sandstone, and Harford County serpentine while the center of the pyramid was capped by a polished piece of Potomac marble. Around the base were risers of the leading types of Maryland granite. The central portion of the pyramid was composed of cubes of different types of Maryland building and decorative stones, fifty varieties being represented. There was no exhibit in the Mines Building that attracted more attention. The same pyramid with a few additions, in order to make the exhibit more representative, was subsequently installed at St. Louis. A number of additional slabs, especially of Maryland decorative stones, were exhibited on an adjacent table, as well as a collection of Peach Bottom slate from the leading firms of the Peach Bottom Slate Producers' Association.

There were several minor collections representing the limestones, cement rocks, flint, building and glass sands, and tripoli. The limestones and cements came largely from the western counties of the State, the latter being supplied by the Round Top Cement Company near Hancock and the Cumberland Cement Company at Cumberland.

The modern methods of highway construction carried on in Maryland under the direction of the State Geological Survey were illustrated by a display of photographs and materials. Samples of Maryland road metals both before and after testing in the laboratory of the Survey, as well as samples of paving materials used in Baltimore and the other municipalities of the State were exhibited.

One of the most interesting displays in the exhibit was the collection in systematic geology, mineralogy, and paleontology. The great diver-

FIG. 1.—GENERAL VIEW OF EXHIBIT.

FIG. 2.—BUILDING-STONES, GRANITE, MARBLE, SLATE, ETC.

MARYLAND GEOLOGICAL SURVEY EXHIBIT, CHARLESTON, 1902.

sity of Maryland's economic resources was prominently brought out by this collection which contained representatives from all of the different geological horizons in the State. The exhibit was installed in a series of plate-glass cases and could be readily studied by anyone interested in the geological history of the State.

The walls surrounding the exhibit were covered by maps, illustrations from the various publications of the Maryland Geological Survey and by models of Allegany and Cecil counties, transparencies showing various types of Maryland scenery and the characteristic textural features of the leading varieties of Maryland rocks were placed in the windows. A large geological map occupied the entrance wall above the Maryland exhibit.

Awards at Charleston.

The awards bestowed by the Jury at Charleston far exceeded those given to any other state for its exhibit of mineral resources. They consisted of 10 Gold Medals, 8 Silver Medals, 4 Bronze Medals and 5 Honorable Mentions, more than twice the number of Gold Medals as well as total number of awards, given to the exhibits of any state in the Mines Building.

Gold Medals—

Maryland Geological Survey, Baltimore—systematic geological collection.
Maryland Geological Survey, Baltimore—reports and maps, etc.
Baltimore Brick Company, Baltimore—common and face brick and terra cotta.
Baltimore Retort and Fire Brick Company, Baltimore—clay retorts.
Beaver Dam Marble Company, Baltimore—marble.
Guilford and Waltersville Granite Company, Baltimore—granite.
Maryland Granite Company, Baltimore—granite.
Seneca Stone Company, Baltimore—sandstone.
Andrew Ramsay, Mount Savage—enameled-brick.
Washington Hydraulic-Press Brick Company, Harmans—brick.

Silver Medals—

Burns and Russell Company, Baltimore—terra cotta.
Consolidation Coal Company, Baltimore—coal.

Green Hill Fire-Brick Company, Northeast—stove linings and fire-brick.
McClenahan Granite Company, Port Deposit—granite.
Maryland Slate Companies, Cardiff—slate.
Union Mining Company, Mt. Savage—fire-brick.
Washington Junction Stone Company, Point of Rocks—marble and sandstone.
J. H. C. Watts, Belair—serpentine.

Bronze Medals—
Schwind Quarry Company, Baltimore—gneiss.
Hugh Sisson and Sons, Baltimore—serpentine.
Albert Weber, Baltimore—granite.
W. Scott Whiteford, Whiteford—serpentine.

Honorable Mention—
Conococheague Brick and Earthenware Company, Williamsport—brick and earthenware.
Cumberland Hydraulic Cement Company, Cumberland—cement.
Queen City Brick and Tile Company, Cumberland—building brick and tile.
Baltimore Terra Cotta Works, Baltimore—sewer pipe.
Round Top Hydraulic Cement Company, Hancock—cement.

LOUISIANA PURCHASE EXPOSITION.

EXHIBIT IN MINES AND METALLURGY BUILDING AT ST. LOUIS, MISSOURI, 1904.

The exhibit of Maryland's mineral resources occupied a conspicuous position at the southern end of the Mines and Metallurgy Building. It covered an area of over 2000 square feet of floor space together with 4000 square feet of wall and window space, the combined area being surpassed by but few other states. The exhibit stood at the entrance most frequented by those passing to and fro to the United States Government Building which was situated adjacent to the Mines Building. The Maryland location was accordingly regarded as one of the best in the building.

The St. Louis exhibit comprised many of the materials which had been earlier shown at Buffalo and Charleston. Deficiencies in the earlier ex-

GENERAL VIEW OF MARYLAND GEOLOGICAL SURVEY EXHIBIT, ST. LOUIS, 1904.

hibits were filled and much larger and more comprehensive collections were secured, nearly everything of present or prospective economic value being included in the display. The exhibit of coal especially was greatly enlarged, as well as that of clays and clay products. Some of the materials were exhibited in specially constructed booths, while many new maps, models, and sections were introduced so that every aspect of Maryland's mineral products might be readily comprehended by those seeking information regarding the economic possibilities of the State.

The exhibit was divided into a number of main groups: (a) mineral products, (b) systematic geology, (c) maps, sections, reports, and models, (d) highway materials and methods.

MINERAL PRODUCTS.—The mineral products were represented by the following: coals; building and decorative stones; ores; clays and clay products, including pottery, tile, terra cotta, fancy and common brick, fire-brick, enameled-brick, retorts, and stove-linings; limestones; sands; cement rocks; flints; feldspars; marls; tripoli; barytes; soapstones; etc. The total value of Maryland's production of these materials has been gradually increasing in recent years until it now aggregates between nine and ten million dollars annually. The attempt was made to show the natural materials together with the various kinds of manufactured products derived from them. All of the leading operators and manufacturers in the State took part in the display, some of them supplying large collections of materials.

Many of the most important mineral products were arranged in the form of special exhibits. A large pyramid of blocks of coal, mainly from the Georges Creek valley, furnished by the Consolidation Coal Company, Black Sheridan and Wilson Company, Georges Creek Coal and Iron Company, American Coal Company, Piedmont Mining Company, Davis Coal and Coke Company, Garrett County Coal and Mining Company, Maryland Coal Company, New Central Coal Company, Phoenix and Georges Creek Coal Company, Monroe Coal Company, Moscow-Georges Creek Mining Company, Piedmont and Georges Creek Coal Company, and G. C. Pattison, was placed conspicuously near the center of the space.

The large block forming the center of the pyramid was from the mines of the Consolidation Coal Company. In connection with this exhibit was a collection of glass jars filled with samples of coal from all the workable seams and a large vertical section showing the position of each seam in the Maryland Coal Measures. A large model also showed the distribution of the several coal seams in the various coal basins of the State.

Columns, slabs, and cubes of building and decorative stones, from the leading quarries of the State, were arranged both in the form of a pyramid and on tables, among them being granite from the quarries of McClenahan and Brother at Port Deposit, the Maryland Granite Company at Guilford, and the Guilford and Waltersville Granite Company at Granite; marble from the quarries of the Beaver Dam Marble Company at Cockeysville, the Washington Marble Company near Eakles Mills, and the Washington Junction Stone Company near Point of Rocks; sandstone from the quarries of the Seneca Stone Company of Seneca, and serpentine from those of J. H. C. Watts at Cardiff; also specimens from the numerous quarries in the vicinity of Baltimore and from many other points throughout Maryland. Some samples represented types of stone which have not been developed commercially as yet although occurring in large amounts. A booth made of slate furnished by the well-known Peach Bottom Slate Producers' Association and other interests in Harford County was a conspicuous feature of the exhibit.

Various iron and copper ores were displayed, particularly the historic carbonate iron ores worked in Baltimore, Anne Arundel, and Prince George's counties and smelted at the Muirkirk furnace of Charles E. Coffin, illustrating which were shown armor-piercing projectiles made by the U. S. Arsenal at Watertown, Massachusetts, and metal rolls made by the Philadelphia Roll and Machine Company. The hematite and limonite ores of the central and western counties were also effectively displayed.

In the clay exhibit was a large glass case filled with decorated pottery from the manufactories of the Edwin Bennett Pottery Company and D. F. Haynes and Son of Baltimore. A wall case contained a fine ex-

FIG. 1.—VIEW LOOKING SOUTH.

FIG. 2.—VIEW LOOKING NORTH.

MARYLAND GEOLOGICAL SURVEY EXHIBIT, ST. LOUIS, 1904.

hibit of enameled-brick from the works of Andrew Ramsay of Mount Savage. A central mantel-piece made of brick from Maryland clay was put up by the Washington Hydraulic-Press Brick Company to display its products and an exhibit of terra cotta and building bricks was made by the Burns and Russell Company and the Baltimore Brick Company of Baltimore. Fire-brick was supplied by the Union Mining Company of Mount Savage, and the Baltimore Retort and Fire-Brick Company of Baltimore, and sand-brick by the Cumberland Granite Brick Company of Cumberland. A booth was covered with roofing-tile from Edwin Bennett's Roofing Tile Works of Baltimore and there was also a large exhibit of stove-linings from the Green Hill Fire Brick Company of Northeast. There were several other exhibits of clay products including brick, earthenware, and pottery. A large collection of the raw clays of the State, classified according to their various uses, was arranged in jars.

Among other materials displayed were limestone and lime from S. W. Barrick and Son of Woodsboro, Wm. C. Ditman of Texas, John W. Tabler Lime and Stone Company of Frederick, and the M. J. Grove Lime Company of Lime Kiln; cement rock and cement from the Cumberland Hydraulic Cement Company of Cumberland, the Round Top Cement Company of Hancock, and the Cumberland and Potomac Cement Company at Pinto; flint from the mines of the American Pottery Supply Company in Harford County, and feldspar from the mines of the Sparvetta Mining Company in Cecil County; also tripoli from the pits of the New York Silicate Company on the Patuxent River. There was also exhibited a collection of typical Maryland soils, explanatory of the agricultural soil maps that adorned the walls near by.

SYSTEMATIC GEOLOGY.—In addition to the exhibit of mineral products there was an extensive systematic collection representing the geology, mineralogy, and paleontology of the State displayed in a series of plate-glass cases on the walls. In this exhibit the numerous materials found at the various geological horizons of the State from the oldest (Archean) to the youngest (Pleistocene) were displayed with the object of emphasizing the great variety of geological formations represented, and the

variety and extent, both developed and undeveloped, of the mineral products of the State.

MAPS, ETC.—A large collection of maps, geological sections, photographs, and illustrations covered the upper portions of the walls. They constituted a graphic panorama of the leading physiographic, geologic, soil, hydrographic, elimatic, and economic features of the State. Colored transpareneies of local scenery, and greatly enlarged microphotographs of the leading types of Maryland rocks occupied the windows. The publications of the Maryland Geological Survey filled one of the cases. Several models were displayed, the most important of these being one showing the relief of the coal basins of Allegany and Garrett counties and another of Baltimore and vicinity with the water and land approaches to the city.

HIGHWAY MATERIALS AND METHODS.—This display was designed to illustrate some of the materials and methods employed by the Highway Division of the Maryland Geological Survey. Photographs and drawings showing the testing laboratory and character of tests made were appropriately arranged together with samples of the materials used. The highway exhibit was the most complete one at the Exposition and fully represented the up-to-date methods which the State of Maryland has recently inaugurated.

Two original "Mason and Dixon Line" stones, a "crown-stone" and a "mile-stone" were also included in the Maryland exhibit, awakening great interest among the visitors to the Mines Building.

PUBLISHED INFORMATION.—The Maryland Geological Survey issued and distributed at St. Louis a pamphlet containing "A Brief Account of Maryland Mineral Resources and Description of Exhibit of Maryland Mineral Products in Mines and Metallurgy Building, St. Louis, 1904." Several thousand copies of this publication were distributed to the public at St. Louis and from Baltimore. It has been much sought for by those desiring information regarding the mineral resources of the State.

The article on the Physical Features of Maryland prepared for the Maryland Commission and published as a part of their Report is a

FIG. 1.—BUILDING-STONES, GRANITE, MARBLE, SLATE, ETC.

FIG. 2.—DECORATIVE STONES, MARBLE, SERPENTINE, ETC.

MARYLAND GEOLOGICAL SURVEY EXHIBIT, ST. LOUIS, 1904.

more elaborate discussion of the natural wealth of the State and is intended to meet the demands for more complete information regarding the material resources of Maryland. It has seemed desirable that the results of the work of the Maryland Geological Survey should be put in such form as to be readily available to those seeking information regarding the State. A large edition of this pamphlet will be prepared for distribution to those who do not obtain the complete volume.

Surmounting the entire exhibit and visible from all parts of the building was the great seal of the State in black and gold over which in gilt letters was the word MARYLAND, which could be clearly seen from all parts of the great building.

Awards at St. Louis.

Grand Prizes—

State of Maryland—Collective Mineral Exhibit.
Consolidation Coal Company, Baltimore—coal.
Hydraulic-Press Brick Company, St. Louis and Washington—brick (part of exhibit made of brick from Maryland clay).

Gold Medals—

Maryland Geological Survey, Baltimore—publications.
Maryland Geological Survey, Baltimore—maps, sections, transparencies.
Maryland Geological Survey, Baltimore—building stones.
Maryland Geological Survey, Baltimore—clays and clay products.
Maryland Geological Survey, Highway Division, Baltimore—road materials.
Georges Creek Coal and Iron Company, Baltimore—coal.
Muirkirk Furnace, Muirkirk—Iron ores and ordnance products.
Wm. Bullock Clark, Baltimore—Director Mineral Exhibit.

Silver Medals—

Union Mining Company, Mount Savage—fire-brick.
Andrew Ramsay, Mount Savage—enameled-brick.
Queen City Brick and Tile Company, Cumberland—press brick.
D. F. Haynes and Son, Baltimore—pottery ware.
Edwin Bennett Pottery Company, Baltimore—pottery ware.
Edwin Bennett's Roofing Tile Works, Baltimore—roofing tile.
Baltimore Retort and Fire-Brick Company, Baltimore—clay retorts, etc.
Maryland Coal Company, Lonaconing—coal.

Allegany County, Maryland—iron ores.
Prince George's County, Maryland—iron ores.
Charles E. Coffin, Muirkirk—iron ores.
McClenahan Granite Company, Port Deposit—granite.
Beaver Dam Marble Company, Baltimore—marble.
Peach Bottom Slate Producers' Association, Cardiff—roofing slate.
Seneca Stone Company, Baltimore—sandstone.
H. P. Rieger and Company, Baltimore—granite.
Washington Junction Stone Company, Point of Rocks—marble and sandstone.
Albert Weber, Baltimore—granite.
J. H. C. Watts, Belair—serpentine.
M. J. Grove Lime Company, Lime Kiln—lime.
Edward B. Mathews, Baltimore—Collaborator of Mineral Exhibit.
Harry F. Reid, Baltimore—Collaborator of Mineral Exhibit.
A. N. Johnson, Baltimore—Collaborator of Mineral Exhibit.

Bronze Medals—

Maryland Granite Company, Baltimore—granite.
I. H. Peddicord and Son, Baltimore—granite.
Victor Perola, Point of Rocks—marble.
Piedmont Mining Company, Baltimore—coal.
Edward Kerr and Company, Robinson—Glass-sand.
Cumberland Granite Brick Company, Cumberland—sand-lime brick.
S. W. Barrick and Son, Woodstock—lump lime.
Round Top Cement Company, Hancock—cement.

STATE MINERAL EXHIBIT.

EXHIBIT IN OLD HALL OF DELEGATES, ANNAPOLIS, 1906.

The installation of a permanent Mineral Exhibit within the State has been a subject under consideration for some time and various efforts towards that end have been made. After the Buffalo and Charleston expositions the more important units of the Maryland exhibits, such as the building-stone pyramid, the exhibits of clays, the pottery display, etc., were brought together in a small but effective exhibit in rooms furnished by the authorities of the Johns Hopkins University at that institution.

Subsequent to the close of the exposition at St. Louis in 1904, at the suggestion of Governor Warfield, the Old Hall of Delegates was placed at the disposal of the Geological Survey Commission who decided to make a permanent Mineral Exhibit at that place. Much of the material

FIG. 1.—COALS, FLINTS, AND FELDSPARS.

FIG. 2.—IRON ORES, CEMENTS, AND LIME PRODUCTS.

MARYLAND GEOLOGICAL SURVEY EXHIBIT, ST. LOUIS, 1904.

from the preceding expositions had been brought back to the State and this served as a nucleus for the present Mineral Exhibit, which was opened during the session of the Assembly of 1906.

The floor space of the Old Hall of Delegates approximately equals that allotted at St. Louis and the wall space is likewise about the same,

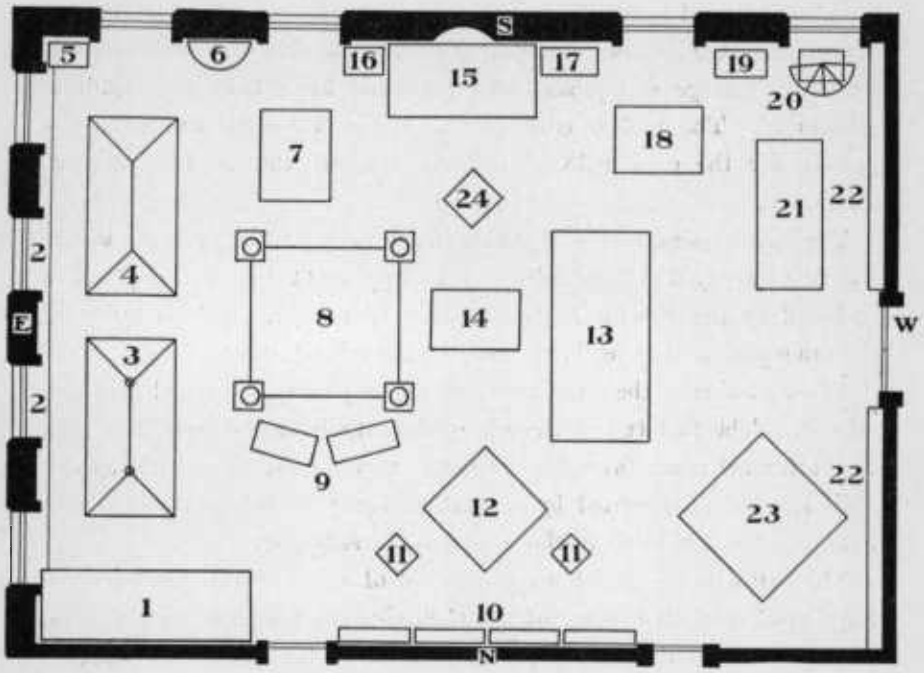


FIG. 19.—Plan of Annapolis Exhibit.

1. Clay Exhibit.
2. Fire-Clay Products.
3. Brick-Tile Pavilion.
4. Slate Pavilion.
5. Asbestos and Soapstone.
6. Earthenware.
7. Model of Baltimore.
8. Building Stone Pyramid.
9. Polished Boulders.
10. Systematic Geology.
11. Mason-Dixon Monuments.
12. Ore Exhibit.
13. Pottery and Decorative Stone.
14. Model of Coal Fields.
15. Cement, Lime, Marl, etc.
16. Feldspar.
17. Diatomaceous Earth.
18. Publications.
19. Flint.
20. Road Views.
21. Highway Table.
22. Road Sections.
23. Coal Pyramid.
24. Obelisk.

although at Annapolis it is more irregularly distributed on account of the many doors and windows.

The exhibit arranged at Annapolis has been fully described in a guide-book which has been prepared by the Geological Survey for free distribution. The arrangement of the parts is shown in the accompanying diagram.

The clays and clay products and the building stones occupy the east side of the room. To the former is devoted a table showing the wide

range of clays found within the State and the uses to which they can be put. The finished products, exclusive of pottery, are arranged along the east wall or in the attractive tile and brick pavilion. This little display structure is an open pavilion supported by three pairs of brick columns constructed of face-brick from Baltimore, lime-sand brick from Cumberland, and hydraulic-pressed brick made from material secured at Harmans, Anne Arundel County. The floor consists of enameled brick from Mt. Savage and pressed and lime-sand brick from the localities mentioned. The roof is covered with a glazed roofing tile made expressly for the exhibit by the Edwin Bennett Pottery Company of Baltimore.

The building-stone exhibit consists essentially of the pyramid which was first displayed at Charleston, but is supplemented by a slate pavilion installed by the Proctor Slate Company of Cardiff. This is built on the same plan as that for brick and tile, the columns being slated.

The west side of the hall is devoted to the pottery, coal, and highway exhibits. The first two of these are substantially in the form in which they attracted much favorable comment at St. Louis. The highway exhibit has been augmented by a notable display of road sections, illustrating old and modern methods of road construction.

The coal exhibit consists of a pyramid of cubes of coal capped by a large block from the mines of the Consolidation Coal Company. This display is one of the most important because of the large yearly output of high-grade semi-bituminous coal from the Maryland mines, coal being by far the most important mineral product of the State.

The highway exhibit at Annapolis is quite different from anything hitherto attempted. The six road sections displayed are of natural size and show in detail the various methods of road construction employed in Maryland. The modern highway built by the latest engineering methods is contrasted with the earlier roads built in the State and is an admirable object lesson to those seeking information regarding the best methods of highway construction.

The other exhibits representing the ores, cement rocks, limestones, feldspars, flints, etc., are distributed about the room as given on the diagram, and effectively show these important Maryland mineral products.

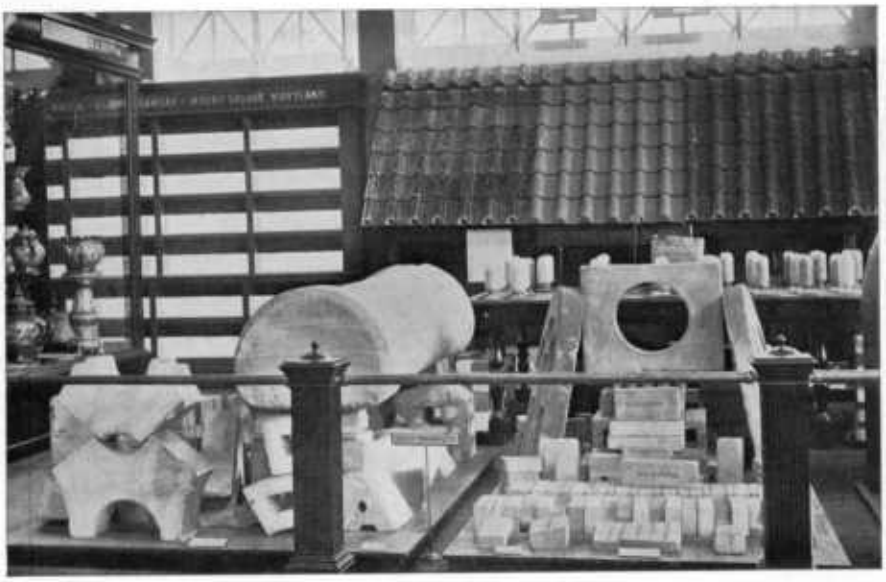


FIG. 1.—CLAY PRODUCTS, FIRE-BRICK AND TILE.

FIG. 2.—CLAY PRODUCTS, POTTERY, TERRA COTTA AND ENAMELED BRICK.

MARYLAND GEOLOGICAL SURVEY EXHIBIT, ST. LOUIS, 1904.

PART III

FOURTH REPORT ON THE HIGHWAYS OF MARYLAND

BY

A. N. JOHNSON

HIGHWAY ENGINEER

FOURTH REPORT ON THE HIGHWAYS OF MARYLAND FOR PERIOD FROM JANUARY 1, 1904, TO MAY 1, 1905

BY

A. N. JOHNSON

HIGHWAY ENGINEER

INTRODUCTORY.

A number of counties availed themselves of the assistance of the Highway Division during 1904, and this feature of the work was carried on much as in previous years. The counties or other organizations having in charge a specific road improvement would request the Highway Division to make the necessary surveys to determine the cost and to suggest the best method of spending the money available for the proposed work. If it was carried on according to the plans suggested by this office a general supervision of the actual construction was undertaken. Numerous visits were made to different localities to give advice regarding the construction of some particular section of road.

Some of the counties have become so accustomed to look to the Geological Survey for advice in these matters that no road improvement of any magnitude has been undertaken recently without consulting the officers of the Survey. This fact shows an important change of sentiment, a change looking toward the adoption of more economic methods. This cooperative work, though modest in the actual amount of road constructed, has had a gradually widening influence on public opinion. Where but a few years ago the very name of engineer in connection with road construction was scarcely considered, to-day there are four county road engineers appointed under the new county road laws and a corps of engineers engaged under the State Aid Road Law.

Other evidences of this gradual change of sentiment are the special meetings which have been held to discuss the question of better county road administration. A number of such meetings were addressed by the Highway Engineer of the Survey, who advocated the general plan for a county road law as outlined on page 49 of the Third Highway Report. Meetings of this character were held at Sandy Spring, Denton, and Annapolis.

One of the results of these discussions is the adoption of improved road laws by Caroline and Allegany counties which were passed at the last session of the General Assembly. These laws, which are a long step towards a more economical administration of county road funds, provide that the road work in each of these counties shall be entrusted to the immediate charge of a trained engineer.

Beside the road work for the counties, an entirely new field of activity was entered at the request of Governor Warfield. It was his desire to have surveys made of all the State properties and he accordingly directed that the Highway Division of the Survey should devote as much time as possible to the latter work. Surveys were accordingly made of the Government House and State Power House lots at Annapolis and of the grounds of the Second Hospital for the Insane at Springfield. This work kept a field party of three men continuously employed for about four months during the summer. This is a work which should be extended until complete records are obtained and the boundaries permanently marked for every piece of land owned by the State. But it is quite improbable that a work of such magnitude could be completed within a reasonable length of time unless an additional appropriation were made for this purpose by the Legislature.

Perhaps the preparations made for active construction under the State Aid Road Law may be considered the most important work accomplished by the Highway Division during 1904. Inasmuch as the provisions of this law, which was approved April 2, 1904, did not become effective until January 1, 1905, the intervening time was used as fully as possible in order that some actual construction could begin in the spring of 1905 without unnecessary delay. Pamphlets explaining the law, specifica-

tions, surveys, and estimates were prepared and every endeavor was made to have as many counties as possible apply for at least a part of their appropriation. A full account of this work will be found in a subsequent chapter.

Owing to the large amount of time and money necessary for more important field work only routine tests were undertaken in the laboratory.

OPERATIONS FROM JANUARY 1, 1904, TO MAY 1, 1905.

SPECIAL ROAD IMPROVEMENT.

Requests for surveys and estimates for proposed road improvements were received as follows during 1904: From Baltimore County for Park Heights avenue and for First street, Highlandtown; from Dorchester County, for Poplar street, Cambridge; from Harford County, for the Churchville-Havre de Grace road and the Forest Hill road; from Howard County, for the Church road and the Washington-Baltimore road; from Montgomery County, for the Wheaton-Kensington road. Estimates were also made of the cost of improvements at Deer Park, Garrett County, and Salisbury, Wicomico County; and plans were prepared for the construction of a brick driveway around the Government House at Annapolis.

With the exception of First street, Highlandtown, all of the above work done by contract was under specifications furnished by this office.

ANNE ARUNDEL COUNTY.

EXECUTIVE MANSION, ANNAPOLIS.

The Governor requested that this office make surveys, plans, estimates, and specifications for the construction of a brick driveway around the Government House. This was done, and after various plans were considered it was decided to build the driveway practically in the same place as the old one, but to construct a larger turning circle so that vehicles could get out without inconvenience. The plans called for a vitrified brick pavement laid on four inches of concrete, with a one-inch

sand cushion between, bordered by a cement curb 18 inches deep and 4 inches wide. The work included 380 square yards of vitrified brick paving and 386 linear feet of cement curb, and was completed under contract about September 1 for $1141 by Mr. W. E. Feltmeyer of Annapolis.

BALTIMORE COUNTY.

FIRST STREET, HIGHLANDTOWN.

In pursuance of the policy of the Highways Commission of Baltimore County to lay in Highlandtown each year a stretch of improved pavement, First street between Eastern avenue and Baltimore street was selected for improvement during 1904, and this office was requested to make the surveys and furnish the plans. The street to be improved was slightly over 2100 feet long, but, owing to the many details it was necessary to record, the survey and platting took more time than would several miles of ordinary road. This office first recommended that a grass plot of 16 feet should be left along the center of the street for about 1700 feet as there was 52 feet between curbs, thus leaving a roadway on each side of the grass plot, which would be ample for all traffic at this time. If in the future the traffic should become heavy enough to require more room, the street was so planned that the grass plots could be removed and the street paved for the full width without extra work, save that involved in paving the space previously occupied by grass. These proposed grass plots occupied about 2500 square yards of surface, and would have effected a saving of about $5000 over the plan of paving the entire street which was finally adopted by the County Highways Commission. It would in addition have added much to the attractive appearance of the street. The preliminary estimates of the alternate plans were as follows:

ESTIMATE OF BRICK PAVEMENT FOR FIRST STREET, HIGHLANDTOWN.
(*Paved Whole Width.*)

Brick pavement	11,704 sq. yds.	at $2.50	$29,260.00
New curb	2,268 feet	at 50 cents	1,134.00
Curb reset	1,600 feet	at 10 cents	160.00
Excavation	3,900 cu. yds.	at 40 cents	1,560.00
			$32,114.00

(Grass Plots in Center.)

Brick pavement	9,229 sq. yds.	at $2.50	$23,072.50
New curb	2,268 feet	at 50 cents	1,134.00
Curb reset	1,600 feet	at 10 cents	160.00
New curb around squares	2,976 feet	at 50 cents	1,488.00
Excavation	2,900 cu. yds.	at 40 cents	1,160.00
			$27,014.50

The above estimates included a 5-inch concrete foundation under the brick, which was omitted by the County Highways Commission, for which a gravel foundation 8 inches thick was substituted. The contract was let to the Baltimore Wrecking & Contract Co. for about $26,000.

The plans of this office, which were drawn up in cooperation with Mr. H. G. Shirley, county roads engineer, included, as finally submitted, several hundred square feet of iron gutter plates which were necessary to carry the water below the surface at the various street intersections, but these were considered too costly, and a system of open gutters was built instead.

This street was completed in 1904. Where the water and gas companies were forced to relay their pipes owing to changes in the grades, the back-fills over these pipes were not properly tamped and depressions in the street followed. These were remedied in the spring of 1905. Owing to the many changes in the original plans that were made by the Highways Commission of the county against the advice of both their roads engineer and this office, the pavement as laid is far from a model piece of construction.

PARK HEIGHTS AVENUE.

Park Heights avenue was surveyed by this office in 1903, as shown by the Third Annual Report. In 1904 it was decided to increase the width of the road to such an extent that it became necessary to take new cross-sections at many points. This was done and a revised estimate furnished the Baltimore County Highways Commission. This work was let in the late summer to Hook & Ford, contractors, and covers a greater number of square yards of macadam than has been built under any

single contract previously let in the State of Maryland since the days of turnpike construction. The work on this road will be finished by January 1, 1906. The length of road improved is 20,400 feet.

The road was graded to a total width of 47 feet from the outside rail of the electric railway which occupies the right side of the location. Of this total width 24 feet was resurfaced with 4 inches of trap rock and an 18-foot driveway of earth was constructed on the left side of the macadam. The remaining 5 feet was taken up by the shoulder and ties on the track side.

The following are the estimated quantities and contract prices of materials:

8500 to 9000 cu. yds. of excavation unclassified at 54¾ cents.
2500 cu. yds. of No. 1 stone in place..... " $1.50.
5400 sq. yds. of 4" macadam..... " 41 cents.
80 ft. of 18" terra cotta pipe in place..... " 80 cents.
98 ft. of 15" " " " " " ..... " 55 cents.
96 ft. of 12" " " " " " ..... " 35 cents.
188 ft. of 6" " " " " " ..... " 20 cents.
76 ft. of 10" iron pipe " " ..... " $1.20.
108 ft. of 18" " " " " ..... " $2.25.
88 ft. of 12" " " " " ..... " $1.25.
250 linear ft. of 4' cobble gutters in place..... " 10 cents.
252 linear ft. of wooden boxes " " ..... " 80 cents.
30 cu. yds. of rubble masonry " " ..... " $4.50.

CARROLL COUNTY.

SYKESVILLE-SPRINGFIELD ROAD.

The trustees of Springfield Hospital requested a profile of the road from the Baltimore and Ohio Railroad Station at Sykesville to the Men's Group in the Hospital Grounds, the object being to determine the practicability of running a freight trolley line to the latter. This survey, covering a distance of about 2 miles, was made and the profile submitted.

CECIL COUNTY.

RISING SUN-FARMINGTON ROAD.

Work on the Rising Sun-Farmington Road, which was started in the fall of 1903, was continued by the contractor, E. Ward Brown, as soon as

spring opened, and one mile of road was completed. The total width graded was 20 feet, with 12 feet of macadam in the center. Under a misapprehension, the Board of County Commissioners had cut down the length of the road from two miles to one mile in signing the contract with Mr. Brown. The prices under this contract, with the details of the work to be done, will be found in the Third Report on the Highways of Maryland. The total cost for this mile was about $4500. As the prices which were submitted for the continuance of the work were deemed too high, the work was discontinued.

Unfortunately an adjoining property owner refused to allow the contractor to open ditches in order to get a proper discharge from two of the culverts, thus making them practically useless. This caused trouble the following spring, due to water standing in a flat place, where it was possible to get only about three inches fall in 100 feet. Aside from this, the road has proved entirely satisfactory.

DORCHESTER COUNTY.

POPLAR STREET, CAMBRIDGE.

The City Council of Cambridge having bought about 150 tons of granite from Port Deposit applied to the Highway Division for advice regarding the best way of spreading it. The street selected for the improvement, though only one block in length, is the most heavily traveled street in Cambridge. This office advised 6-inch concrete curbs and 3-foot vitrified brick gutters, but those were deemed too expensive and brick curbing was placed, and the gutters were made of macadam continuous with the street. The street was first excavated to the proper sub-grade and cross-section, and then about 5 inches of oyster shells were placed and rolled. Over this course stone was placed about 3 inches deep and rolled, and then covered with stone chips or dust, and likewise rolled. Only a three-ton horse roller was available, which made it impossible to compact the stone sufficiently to stand travel, so 1½ inches of the crushed oyster shells from the old street were placed on top and rolled, and a fairly firm surface thus secured. This street is not as satisfactory as it

would be if better conditions could have been secured during construction. The stone used has such a poor cementing quality that it is difficult to construct a satisfactory road with it, even with a ten or twelve-ton roller. The addition of the shell gave much better results than would otherwise have been obtained with the light roller used. The street has worn fairly well, but in spring when all the other streets get soft, so much mud is carried from them onto this short stretch that it becomes almost as muddy as unimproved roads, and in this condition has a tendency to "pick up." Each spring if it is thoroughly cleaned of mud a fairly satisfactory street will be secured. Where the traffic is as heavy as it is here, and especially where horses stand continually, vitrified brick or some other good hard pavement would be much cheaper in the long run.

HARFORD COUNTY.

CHURCHVILLE-HAVRE DE GRACE ROAD.

The work on this road, which was described in the Third Report on the Highways of Maryland, p. 173, was started about July, 1904. As the County Commissioners had not decided whether to build the road via the Level route or the Aldino route, work was begun beyond the junction of these two and pushed toward Havre de Grace from Webster Post Office. The portion built in 1904 was about one mile in length and included the laying of about 700 feet of tile underdrain, placed 1½ feet below the surface, the trench then filled with stone up to the macadam, the latter being 12 feet wide. The construction was done by day labor by the county. The cost for 7500 feet of road was reported as about $6500 or $4600 per mile. This road will be completed in 1905 under the State Aid Law.

FOREST HILL ROAD.

The construction on the road from Rock Spring Church through Fallston to Grafton Shops, a distance of 1.8 miles, was started in the summer of 1904. The County Commissioners did the work, bringing the stone by the Maryland and Pennsylvania Railroad from the alms-

house at Watervale and crushing it at Forest Hill. Difficulty in securing cars when needed caused much delay, but about 4500 feet was completed before winter. This road was made 12 feet wide with 4-foot shoulders, macadamized uniformly to a depth of 6 inches, except a very small stretch, which was only resurfaced. It was found difficult to get the foreman in charge to keep the depth of stone down to 6 inches, and thus a greater amount of stone was used on the road than was necessary. Part of the cost of this improvement was paid from the $1500 given by the Woolsey estate, and part by contributions from the neighborhood. The unfinished part will be completed in 1905 under the State Aid Road Law.

HOWARD COUNTY.

WASHINGTON-BALTIMORE ROAD.

In 1904 the County Commissioners decided to grade another section of the Washington-Baltimore road adjoining that graded and surfaced in 1902-3, as described on page 176 in the Third Report on the Highways of Maryland. This second piece joined the old work on the west and continued about one mile toward Washington. It included 2318 yards of excavation, 14 yards of cement rubble masonry, 137 feet of 18-inch vitrified clay pipe, 75 feet of 5-inch vitrified clay pipe, and 1000 square yards of riprap.

This work which was let in a lump sum to Mr. W. S. Hinman, of Ellicott City for $975, included cutting down the grades on three hills from 8 per cent, 9 per cent, and 10 per cent respectively to 6 per cent. The road was finished late in the summer of 1904 and was surfaced with broken stone by the County Commissioners during the same year.

CHURCH ROAD.

In the spring of 1904 this office was petitioned for plans and estimates on the Church road, one of the streets in Ellicott City. The principal feature of the improvement was the elimination of a steep grade on a sharp turn from Church street into Main street. The electric railway on Main street made this a particularly dangerous turn, which was ob-

viated by straightening and continuing the stone retaining wall a distance of 52 feet and going back into a rock cliff until the full width of 20 feet and a grade of 6 per cent was obtained. The survey was made for a distance of 2450 feet, but there was only sufficient money to complete the work at the entrance, and the contract was accordingly let for a distance of 1325 feet. The grades on this road for the whole distance were very steep, being nowhere less than 5 per cent. The steepest grade as built was 9 per cent, which necessitated the removal of 2800 cubic yards of material, for the most part solid rock. The work was undertaken by Wm. Davis of Ellicott City for the sum of $1400 not to include surfacing, and was finished in 1904. In some places it was found necessary to make a small earth fill over solid rock, which it was feared would wash out during heavy rains on such steep grades; consequently, the County Commissioners were advised to surface with broken stone. This they were unable to do immediately, but it is expected that this will be done in 1905.

HOOD'S MILL ROAD.

The grading on the Hood's Mill road was started in July, 1903, by Mr. Albert Dorsey, contractor, but not finished in that year. (Third Report on the Highways of Maryland, page 178.) The cuts were purposely made as light as possible in order to save expense, but as most of them were solid rock they were difficult to make. Neither the County Commissioners nor this office were able to have an inspector constantly at hand, and as the contractor seemed unable to follow the grades shown on the plans and grade sheets, the work was finally abandoned in a half-finished condition. The contractor was afterwards ordered to smooth up the road surface as much as possible. It is to be hoped that the County Commissioners will complete this much-needed improvement.

UPPER SYKESVILLE ROAD.

Work on this road was begun in 1903 (Third Report on the Highways of Maryland, page 177) but not finished before winter, though the third hill from Sykesville was brought nearly to grade and considerable ex-

cavation had been made on the first hill. Work on the latter was resumed in 1904 and completed to the satisfaction of the County Commissioners although not exactly to grade. It is to be hoped that the plan of relocating this road around the first and second hills will be ultimately carried out as originally recommended by the Highway Engineer.

MONTGOMERY COUNTY.

WHEATON-KENSINGTON ROAD.

The County Commissioners of Montgomery County requested surveys and estimates for the improvement of the road from Wheaton to Kensington, a distance of 1.2 miles. Plans and estimates were submitted, which included cutting down one comparatively steep hill near Kensington, from a grade of 10 per cent to one of 6 per cent. This would have involved an additional expenditure of about $300, but would have made a road with extremely easy grades except for a short distance of the 6 per cent grade. The County Commissioners decided to spend all the money available on surfacing, and the work was thus done under County supervision.

SURVEYS OF STATE PROPERTIES.

TOPOGRAPHIC SURVEY AT SPRINGFIELD.

The property known as Springfield, on which is situated the Second State Hospital for the Insane, is located in Carroll County about 1½ miles from Sykesville. It contains approximately 800 acres and is irregular in shape with a maximum length of about 2 miles and a maximum width of about 1 mile. A topographic survey had already been undertaken in 1896 by H. S. Farquhar, and about 300 acres completed, when the funds at the disposal of the hospital authorities for the purpose gave out. The portion of the map completed was drawn to a scale of 100 feet to the inch and showed contours for every 5 feet of elevation. It was proposed to finish the topographic survey of the remainder of the property by additions to the existing map.

The survey as made by the Highway Division of the Geological Survey was controlled by a system of triangles starting from a carefully

measured base of 1114.75 feet, situated in a level piece of meadow ground. The various important points were located on a coördinate system of north and south lines, the origin of which was an imaginary point situated 2000 feet to the west and 2000 feet to the south of the triangulation station on Buttercup hill. The meridian line was carefully determined by observations on Polaris from this same triangulation station, the bearing of a mark about 3800 feet distant being accurately determined. After the triangulation stations were established and their elevations carefully determined from levels connecting with the U. S. Geological Survey bench mark at Sykesville, they were platted on plane table sheets and the detail drawn in the field with the plane table. The method of locating the contours was to have the rodman set the target on his rod so that the bottom would be at a certain contour elevation when the target was at the same elevation as the level instrument. The rod was carried up or down on the surface of the ground until the target was at the right elevation, when the position of the rod would be located by stadia readings by the plane table operator, a rodman with a stadia rod accompanying the level rodman.

This work was carried on during the summer of 1904 by a field party of five, three being detailed from the office of the Highway Division. Two assistants were furnished by the State Hospital authorities, who also provided board and lodging for all of the men while in the field. When about 325 acres were thus platted it was concluded to defer the completion of this survey as it was necessary to use all the force available to prepare plans for the proposed State roads.

It was intended to locate every corner by its respective coördinates. There would thus be an exact record of the boundaries with reference to prominent points on the different buildings and other fixed points whose coördinates have already been computed by triangulation. This method admits of great accuracy and provides by far the most explicit record of all corners. Stone bounds should also be set at all bends and at intermediate points on long lines, but in addition the coördinate position of each should be recorded as here described.

EXECUTIVE MANSION LOT.

Before laying out the driveway, an account of which is given elsewhere, a detailed topographic map of the Executive Mansion lot at Annapolis was made and platted on a scale of 20 feet to the inch. The contours were shown for every foot of elevation, together with the location of all trees, shrubs, flower gardens, buildings, walks, etc. This survey located with some accuracy the outlines of the lot as defined by the present stone coping by which it is surrounded, but no attempt was made to look up the deeds and establish the original lines of the lot as the purpose of this survey was purely to enable different schemes for the improvement of the grounds to be presented for the consideration of the Governor.

STATE POWER HOUSE LOT AT ANNAPOLIS.

Additional coal storage capacity was required by the State at the Power House at Annapolis. The plans included the construction of a substantial brick wall to enclose the entire lot. Before this wall could be built it was necessary that the lot lines be accurately defined. These lines had been surveyed a number of times with a different result in each case. At the suggestion of the Governor, the Highway Division was called upon to make a thorough investigation of the exact boundaries. For this purpose an examination was made of all the deeds of the various lots which are included in the block surrounded by Bladen Street, College Avenue, and St. John Street as far as the railroad property. No records could be found which aided in the definite location of any of the street lines, so that recourse was had to existing fences and curbs as the only monuments defining these lines. From the fence lines, buildings, curbs, and deed measurements, sufficient data were secured to establish beyond any reasonable doubt the precise boundaries of the State lot. Every requirement of the deed held by the State was satisfied without at the same time encroaching on what the neighboring landowners believed to belong to them.

A plat of the survey with measurements and references to fixed points was made and filed with the Superintendent of Buildings.

WATER POWER SURVEY AT SYKESVILLE.

At the present time the power plant for the State Hospital at Springfield is located near the hospital buildings, which are some two miles distant from Sykesville where all coal is delivered by the railroad. From here to the hospital is a hard up-hill haul. The advisability of establishing the power plant near Sykesville had been discussed and in this connection the question arose as to the availability of the water power in the Patapsco River at this point. At the request of Governor Warfield a preliminary survey and report was made on the amount of power that would be obtainable.

The quantity of water available was estimated from the stream measurements made continuously during 1902 by the U. S. Geological Survey at a point near Woodstock. Inasmuch as the drainage area of the river at this point is about three times the drainage area at Sykesville, it was assumed that one-third of the water would be available at the latter point. On this basis the minimum flow at Sykesville was found to be about 29 cubic feet per second, which occurred during July. The mean average for the same month was 56 cubic feet per second. It would be possible to construct a dam which would secure from 15 to 20-foot head and develop during eight months in the year about 60 horse-power and 120 horse-power during the remaining four months. Levels were run up the river to determine how far the back water would extend. If a head of 15 feet was secured the back water would extend to a point about 2400 feet upstream from the railroad station at Sykesville. Cross-sections of the river were made at different points and two locations studied for the location of a dam.

It was concluded that the water power could be used only as an auxiliary to a steam plant, which would have to be of full capacity owing to the uncertainty of the amount of flow in the river and consequent wide variation in the power available.

STATE AID ROAD LAW.

By far the most important piece of legislation affecting road construction in Maryland is the State Aid Road Law, commonly known as the Shoemaker Law, which was approved on April 2, 1904. The provisions of this law permit the State to participate in actual road construction in all the counties. As such work was thought by some to constitute "internal improvements," the constitutionality of this law was questioned, which together with the fact that the law was not operative until January 1, 1905, gave rise to a most anxious delay which it was sometimes doubtful how best to use to advantage. It was decided, however, to do everything possible in the way of preparation so that active construction might be undertaken just as soon as the constitutionality of the law should be decided.

The first step was to publish a pamphlet explaining the purpose, together with the exact wording of the new law. This pamphlet was ready for distribution July, 1904. The text, together with that of the law, is as follows:

HOW IMPROVED ROADS MAY BE SECURED UNDER ITS PROVISIONS.

Purpose of the Law.

The purpose of the new State Aid Road Law is to encourage in a practical way the gradual building up of a system of good roads in all parts of the State, and, as a means to that end, the State under the law proposes to assist the counties to build such roads by paying one-half of the cost.

Based on experience of other States.

The law here referred to was passed at the last session of the General Assembly (Acts of 1904, Chapter 225). This law is not an experimental piece of legislation, but is the embodiment of those parts of the State highway laws of other States (notably New Jersey, Massachusetts, New York, and Connecticut, where there have been successfully built under State aid thousands of miles of macadam roads) which are best adapted to meet existing conditions in Maryland.

Appropriation $200,000 annually.

In brief, the Maryland Road Law provides State aid to the extent of $200,000 annually for the construction of modern macadam roads, one-half of the cost of the roads constructed under this law, to be paid by the State.

Apportionment to counties. The amount received by each county is the direct proportion the public road mileage of the county bears to the total public road mileage of the State. These amounts have been computed by the Maryland Geological Survey as required by law, and are given in the annexed table.

Apportionment of unused balance. If, however, all the counties do not take up their full allotment as here shown, the balance is to be reapportioned among the remaining counties ready to take up a further allotment, in proportion to the public road mileage of these counties. Thus it may be possible for some counties to secure a larger sum than is given according to the first general allotment.

Method of procedure on part of county. A county may secure State aid in the following manner: The County Commissioners of a county petition the State Commission for aid to build a certain piece of road. If it is found, upon examination by the State Commission, that the road in question is one of general public convenience and a proper one to construct, an estimate of the cost of the improvement is made, together with plans, specifications, etc., for doing the work. This is undertaken by the County Commissioners either by contract or, if the prices for doing it in this manner are considered too high, then in other ways that they may deem best.

ALLOTMENT TO THE COUNTIES, ACCORDING TO THEIR PUBLIC ROAD MILEAGE, OF THE STATE APPROPRIATION FOR ROADS.

LAWS OF MARYLAND, 1904, CHAPTER 225.

County.	Mileage.	Allotment.
Allegany	693	$8,967.39
Anne Arundel	521	6,741.72
Baltimore	1,119	14,479.81
Calvert	335	4,334.89
Caroline	547	7,078.16
Carroll	770	9,963.77
Cecil	638	8,255.69
Charles	465	6,017.08
Dorchester	600	7,763.98
Frederick	1,151	14,893.89
Garrett	940	12,163.56
Harford	822	10,636.65
Howard	413	5,344.20
Kent	427	5,525.36
Montgomery	798	10,326.09
Prince George's	892	11,542.44

Queen Anne's	563	7,285.20
St. Mary's	602	7,789.85
Somerset	464	6,004.14
Talbot	397	5,137.16
Washington	695	8,993.27
Wicomico	772	9,989.65
Worcester	832	10,766.05
Total	15,456	$200,000.00

State to pay one-half of cost.

After the work is done according to the specifications, and the State Commission has so certified to the Comptroller, then one-half of the cost of constructing the road will be paid by the State to the county building the road; but in no case is the amount paid by the State to exceed one-half of the estimate of the cost of the work made by the State Commission.

Property-owners' rights.

Payment of 10 per cent not compulsory.

In the event that the County Commissioners fail to petition for State aid under this law, it is provided that the owners of two-thirds of the lands binding upon any public road or section of road, not less than a mile long, can compel the County Commissioners to petition for the construction of the piece of road, provided that the owners petitioning have paid or have pledged 10 per cent of the cost. The work then proceeds as already described, except that the County Commissioners cannot be compelled by this payment of 10 per cent by property-holders to contract for work to an amount greater than one-fourth of the road levy of the county. This 10 per cent subscription is not obligatory on any property-owner.

Land damages.

Any expense due to the payment for land that may be necessary to secure a proper location for the road or any damages that may arise through the construction of the road will not be paid by the State, but must be met by the county.

Preliminary surveys.

As this State Road Law does not become operative until January 1, 1905, there is an opportunity in the meantime for the various Boards of County Commissioners to take up the preliminary work in connection with the selection of the road to be first built. There will also be required plans of the road in order to make proper estimates of the cost. All of these preliminary arrangements take much time and if they are

delayed until the first of the year much valuable time will be lost and but little progress will be made the first season.

Importance of beginning work.

It is with a view to saving much of this time that the Highway Division of the Maryland Geological Survey proposes to make for the various Boards of County Commissioners such surveys and plans as may be necessary to draw up a correct estimate of the cost of construction, and so have everything in readiness to begin at the first available moment the actual construction of roads under the State Aid Law.

Cost of surveys.

Any county applying in season to have its surveys made during the present year will gain the advantage of having the full cost of the surveys paid by the State in the end, while one-half of the cost of the surveys made after January 1, 1905, must be borne permanently by the county as stated in sections 5 and 10 of the act.

Application blanks.

A form of request for the required surveys is attached and other blank forms can be had on application to the Highway Division of the Maryland Geological Survey, Baltimore, Md.

LAWS OF MARYLAND

ACTS OF 1904

Chapter 225

AN ACT FOR THE IMPROVEMENT OF THE PUBLIC HIGHWAYS OF THE STATE AND TO PROVIDE THE MEANS THEREFOR, AND TO REQUIRE THE COMMISSION CREATED BY AN ACT OF THE GENERAL ASSEMBLY OF 1896, CHAPTER 51, TO PERFORM CERTAIN ADDITIONAL DUTIES.

County Commissioners can petition for plans and estimates of cost of improving a road before March 1 of each year.

SECTION 1. *Be it enacted,* by the General Assembly of Maryland, That whenever any Board of County Commissioners of any county in this State shall by resolution have declared their intention to cause any particular road, or section thereof, within such county, to be built or improved under the provisions of this Act, such Board shall so notify the Commission so created by an Act of the General Assembly of 1896, Chapter 51, by written notice to the Chief Engineer of said Commission on or before the first day of March in each year, and shall request of said Commission plans and specifications and an estimate of the cost of the proper performance of said work according to said plans and specifications.

Two-thirds of the property-owners on a piece of road can compel the County Commissioners to petition and take action under this law if the owners pledge 10 per cent of the cost.

SEC. 2. *Be it enacted,* That whenever the owners of two-thirds of the lands binding upon any public road or section of road, not less than one mile long, shall present a petition to the County Commissioners of the County where such road, or section of road, may be situated, stating in said petition the desire of said petitioners to have said road, or section thereof, constructed or repaired under the provisions of this Act, and stating further the willingness of such petitioners to pay for the said construction or repairs, a sum equal to ten per centum of the cost of such construction or repairs, it shall be the duty of said Board of County Commissioners to make such a request to the Commission designated by this Act, as is set forth in Section 1 hereof, upon the payment by the said petitioners of said ten per centum, or the giving by them of an approved bond to the County Commissioners for the payment thereof at any time it may be

demanded by said County Commissioners. Upon the filing of a similar petition, and the taking of similar proceedings regarding the extension of any road which, in the opinion of said Commission, has been properly improved, a similar request shall be made to the aforesaid Commission by the Board of County Commissioners of the County where such extension may lie, even though such proposed extension be less than a mile in length.

Commission shall make plans and estimates of the cost.

SEC. 3. *Be it enacted,* That if the said Commission, after receipt of the notice mentioned in the first section, or that mentioned in the second section of this Act, and due examination, shall be of the opinion that the proposed construction or repair of roads mentioned in such notice would be generally promotive of the objects herein contemplated, and that the said road or proposed road is a right and proper one under the circumstances to be built or improved, and if the amount appropriated by the State under Section 16 of this Act and apportioned by Section 12 of this Act to the roads of the county in which said proposed road or extension is located shall be sufficient for the outlay necessary therefor, the said Commission shall make or cause to be made the necessary surveys and draw up or cause to be drawn up plans and specifications for the proposed work, and shall furnish an estimate in detail of the cost of performing such work according to such plans and specifications.

Specifications shall require a road made of stone or other good material.

SEC. 4. *Be it enacted,* That the specifications shall require the construction or improvement, within a reasonable time, of a macadamized or of a telford or of other stone road, or of a road constructed of gravel, or of other good material, in such a manner that the same will be, with reasonable repairs thereto, at all seasons of the year firm, smooth, and convenient for travel.

County Commissioners not to pay over $50 per mile for surveys.

SEC. 5. *Be it enacted,* That the Board of County Commissioners so requesting plans and specifications of said Commission shall on the order of the said Commission, and within one month of the receipt of said order, pay out of the funds of the county such cost of surveying, mapping, calculating, printing, etc., in the preparation of said plans and specifications and estimate as may be required by said Commission; but no county shall be compelled to pay for such plans, specifications, and estimates, an amount greater than fifty dollars ($50.00) per mile.

County Commissioners shall advertise for bids for doing the work.

SEC. 6. *Be it enacted,* That after the receipt of such plans and specifications and estimate by the Board of County Commissioners of any county in Maryland from said Commission, said Board of County Commissioners, if they elect to proceed further hereunder, or if ten per centum of the estimated cost has been paid or secured as hereinbefore provided, shall advertise for two consecutive weeks in at least one newspaper published in such county, and also during the time of such publication in said county newspapers, at least three consecutive times in at least one newspaper published in Baltimore City, for bids for such road-building or improvements setting forth the place where such road is to be built or improved, and giving a general description of said proposed work, and stating that sealed proposals for the performance of said proposed work in accordance with the plans and specifications will be received until a day named in the advertisement, provided that nothing in this section shall require the County Commissioners of any county, upon the petition of such persons agreeing to pay ten per centum, to advertise for work to be done under the provisions of this Act to an amount greater than 25 per centum of the road levy of said county; and the Board of County Commissioners shall furnish a copy of the said specifications for such proposed work to any prospective bidder who may request the same; and the said Board shall reserve the right to reject any and all bids and to do the work according to said plans and specifications by such arrangement as they may deem best, but under no conditions shall the amount to be paid by the State, under the provisions of this Act, exceed one-half of the detailed estimates furnished as hereinbefore provided.

Property-owners cannot compel County Commissioners to contract for an amount greater than one-fourth of the road levy of a county.

Proposals shall be opened publicly.

SEC. 7. *Be it enacted,* That on the day stated in such advertisement, the proposals shall be publicly opened and read and the contract shall be awarded to the lowest responsible bidder, provided his bid does not exceed the amount estimated by the Commission aforesaid as a proper maximum cost of said work; and if all bids shall exceed the amount specified, then no contract shall be given, but proceedings may be had anew in the same manner as first provided. And the contractor shall in all cases before entering upon his work be required to execute a contract with the Board of County Commissioners to perform the work according to the specifications, and also

Contractors must give bond.

give bond to said County Commissioners conditioned for the faithful performance of such contract in a sum not less than the total amount of the contract and with such incorporated surety company as surety as the Board may approve.

All contracts subject to approval of the Commission.

SEC. 8. *Be it enacted,* That all contracts for work to be done under the provisions of this Act shall be subject to the approval of the Commission designated by this Act.

Commission shall maintain supervision of the work.

SEC. 9. *Be it enacted,* That in order that the State may be assured of the proper execution and performance of each contract made under the provisions of this Act, it shall be the duty of the Commission to maintain immediate supervision of such execution and performance of each of said contracts; the cost of such supervision shall be paid to said Commission by the Comptroller of the State of Maryland out of the appropriation apportioned to the county and applicable to the particular road or extension being constructed as provided for by this Act.

Comptroller to pay to the County Commissioners one-half of the total cost upon certificate of the Commission.

SEC. 10. *Be it enacted,* That when the work under any such approved contract shall have been fully completed as provided in said plans and specifications, it shall be the duty of the said Commission to certify the fact of such completion to the Comptroller of the State of Maryland, together with the statement of the cost of the work under said contract, including therein the amount of the expenses incurred by the Board of County Commissioners for surveys, plans, specifications, printing, and advertising, and thereupon the said Comptroller shall, upon such certification, accompanied by the certificate of the said Board of County Commissioners of such county that the payment of the said total amount so certified by said Commission has been made, pay to the Board of County Commissioners of such county one-half of the said total amount of cost and expenses so certified, not to exceed one-half of the estimate as hereinbefore provided.

The State not to pay for land.

SEC. 11. *Be it enacted,* That no portion of the cost of acquiring land for any road, nor any damages caused by the construction or improvement of any road, shall be paid by the State.

Apportionment to the counties of the State appropriation.

SEC. 12. *And be it enacted,* That no one county of the State shall receive in any year a larger proportion of the total amount appropriated by this Act for said year than the proportion which the then existing miles of public road in said county bear to the then existing miles of public road in all of the counties applying, as determined by the said Commission, unless a balance remains unallotted under the arrangement above prescribed, in which event said balance may be apportioned in the same manner among the counties which have not received the full amount of their application.

All roads built under this law to be county roads and maintained by the counties.

SEC. 13. *Be it enacted,* That any road constructed under the provisions of this Act shall thereafter be a county road, and the duty of keeping the same in repair shall devolve upon the county in which it is situated; and all other powers and duties respecting such roads shall be imposed upon and vested in said county; and the Board of County Commissioners shall provide all moneys necessary to keep in a proper state of repair the roads constructed under this Act; and it shall be the duty of the Commission to notify the Board of County Commissioners of all such repairs as they may deem necessary to be made to such county roads, and immediately on such notification the Board of County Commissioners of such county shall cause such repairs to be made according to the direction and to the satisfaction of said Commission, and if said Board shall refuse or neglect to make such repairs within thirty days from the date of such notification by said Commission, said county shall not thereafter receive any further assistance provided for in this Act until such repairs have been made; and any five taxpayers of such county may apply to the Circuit Court for said county for a writ of mandamus to compel said Board to make such repairs as aforesaid; and when such application is made, the Court, upon a rule to show cause or otherwise, in such manner as the Court shall prescribe, shall ascertain and determine whether such road as aforesaid is in a proper state of repair, and if not shall issue a mandamus requiring said Board to make the necessary repairs, and may also, in its discretion, allow to the attorney of the applicants a reasonable counsel fee to be paid by said county.

Commission to notify County Commissioners to make repairs.

Mandamus to compel County Commissioners to make repairs.

Other boards in control of public roads.

SEC. 14. *Be it enacted,* That any county in which the control of the public roads is now or may hereafter be vested in any Body other than the Board of County Commissioners, said Body shall have all the powers and privileges conferred by this Act

on the Board of County Commissioners, and be subject to all the duties and obligations imposed by the terms of this Act upon the Board of County Commissioners of the respective counties of the State.

SEC. 15. *Be it enacted,* That nothing in this Act shall be taken to alter, abridge, or in any way affect the present method of road construction or repair by the respective counties, at their own expense or otherwise, as now authorized by law. Does not affect present methods of road construction.

SEC. 16. *And be it further enacted,* That the sum of two hundred thousand dollars ($200,000) annually, or so much thereof as may be necessary, be and the same is hereby appropriated, out of any money in the Treasury not otherwise appropriated, for the purpose of carrying out the provisions of this Act. Appropriation $200,000 annually.

SEC. 17. *And be it further enacted,* That the provisions of this Act shall be regarded as adding, to such an extent as may be necessary to enable it to perform the additional duties hereinbefore imposed upon it, to the powers and duties conferred upon the said Commission by the Act of the General Assembly of 1898, Chapter 454. Increased duties of Commission.

SEC. 18. *And be it further enacted,* That this Act shall take effect from January first, nineteen hundred and five.

Approved April 2, 1904.

PRELIMINARY REQUESTS.

Although it was yet too early for any definite action to be taken under the provisions of this law, a method was adopted whereby it was possible to make surveys of roads in those counties which were ready to go ahead with the work in the event of the State Aid Law being declared constitutional. Pursuant to this idea the following form for preliminary requests for surveys and estimates was sent to all County Commissioners, and was also included in the pamphlet just described.

FORM OF PRELIMINARY REQUEST FOR STATE AID PENDING THE SETTLEMENT OF THE CONSTITUTIONALITY OF THE STATE AID LAW.

MARYLAND GEOLOGICAL SURVEY,
HIGHWAY DIVISION.

The Board of County Commissioners for.....
County hereby signify their intention to petition for State aid under the provisions of Chapter 225, Laws of Maryland, 1904, for the improvement of

the road between.....

.....

known as the.....

.....

In order that there may be no delay in beginning the actual construction, the said County Commissioners request that the Highway Division of the Maryland Geological Survey make, in advance of the date on which the above

law becomes operative, such surveys and plans as may be necessary properly to draw up estimates of the cost and specifications for construction of said road under the provision of the said law.

The County Commissioners of.....County agree to meet one-half of the cost of such survey, not to exceed fifty dollars a mile, with the understanding that such expense for the surveys, plans, etc., shall be charged to the cost of the construction of the road, and thus the amount paid by the county will be returnable to the county if the road is constructed under the provisions of the new road law above mentioned.

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Board of County Commissioners

for.....County.

Date.....

[THIS BLANK FORM IS TO BE DETACHED AND SIGNED BY THE COUNTY COMMISSIONERS.]

Great interest was taken in this new law in nearly every county. Many of the county authorities requested that the Highway Engineer should visit them for the purpose of explaining what would be the method of procedure under the new law. Such invitations were received from Allegany, Cecil, Frederick, Dorchester, Harford, Howard, Montgomery, Washington, and Wicomico counties. As stated in the pamphlets sent out explaining the law, the Highway Division of the Maryland Geological Survey had agreed to make preliminary surveys and specifications for road construction under the new law for those counties which desired this to be done, and expressed the intention of availing themselves of the benefits of the law if it should be declared constitutional. The surveys of the roads selected by the counties and the preparation of the plans and estimates for their improvement was carried on as vigorously as the limited appropriation at the command of the Highway Division would permit. Surveys and plans were made during 1904 and the early spring of 1905 as follows:

LIST OF ROAD SURVEYS COMPLETED BEFORE MAY 1, 1905, PRELIMINARY TO CONSTRUCTION UNDER THE NEW STATE AID ROAD LAW, WITH THEIR MILEAGE.

County.	Road.	Mileage.
Allegany	Bedford	1.10
"	National	1.35
"	Barrelville	1.00
"	Lonaconing	1.05
Baltimore	Chatsworth Avenue	1.00
"	Park Heights Avenue	2.35
"	Wilkens Avenue	2.35
"	Garrison	2.64
"	Seminary Avenue	2.00*
"	Timonium	1.00
Carroll	Mt. Airy	1.00
Cecil	Rising Sun-Farmington	1.00*
Frederick	Monrovia	1.52
Harford	Churchville-Worthingtons Cor.	4.00
"	Darlington	1.10
"	Earlton-Havre de Grace	1.80
"	Fallston	2.35*
"	Forest Hill	1.00*
"	Pylesville	1.10
Howard	Lower Sykesville	1.07
Montgomery	Germantown	1.00
"	Laytonsville	2.02
Prince George's	Marlboro	2.00
" "	Washington-Baltimore	2.20
Washington	Clearspring	4.25
Total		43.25

* These surveys had been made in previous years by the Highway Division and were available for use in preparing plans and estimates for State road construction with but little additional field work.

Owing to the exceptional severity of the winter the time that could be given to field work was somewhat less than had been anticipated; otherwise it would doubtless have been possible to have surveyed an additional number of miles.

CONSTITUTIONALITY TESTED.

As soon after the first of January as it could possibly be arranged a test case was made and brought in the Circuit Court of Baltimore County, which upheld the constitutionality of the act.

An appeal was immediately taken to the Court of Appeals which in turn rendered a decision on February 9, 1905, also upholding the constitutionality of the law.

REQUESTS FOR STATE ROADS.

As soon as the decision declaring the law constitutional became known, the following circular letter which had been prepared, together with blank application forms, was mailed to all the county authorities. Accompanying this was also a circular entitled, "How to Apply for State Roads," according to the procedure adopted by the Geological Survey Commission at its meeting on February 14. Under date of February 15 another circular letter, also given below, was sent to all the counties with a copy of the resolutions passed by the Survey Commission.

MARYLAND GEOLOGICAL SURVEY,
HIGHWAY DIVISION.
JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

February 9, 1905.

County Commissioners for.....County.

Gentlemen:—

Pursuant to the intention expressed by you in your preliminary application for State aid in the construction of certain roads in your county, you will find inclosed blank forms which

MUST BE FILLED OUT ON OR BEFORE MARCH 1,

if your board still desires to make formal applications for State aid in the construction of these roads.

A list of the roads for which your board signified its intention to petition for State aid is attached, together with instructions as to how formal applications under the law should be made.

Owing to the fact that the constitutionality of the law had been questioned and brought to the attention of the courts, it has been necessary to delay action on the part of this office until the Court of Appeals should render a decision upholding the law. Such a decision has just been rendered and it is now possible to proceed under the law.

Very respectfully,

HIGHWAY DIVISION,
Maryland Geological Survey.

MARYLAND GEOLOGICAL SURVEY,

HIGHWAY DIVISION.

JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

How to Apply for State Roads.

1. All applications for surveys of roads, under the State Aid Road Law (Chapter 225, Laws of Maryland, 1904), are to be made out on the regular blanks furnished by the State Commission.

2. Applications must be signed by the County Commissioners or when the control of the county roads is vested in other boards by the members of such boards.

3. All applications are required by law to be made on or before March 1, of each year. Those counties not so applying forfeit their apportionment for that year.

4. A separate blank must be used for each section of road.

5. The blanks are numbered consecutively, and the surveys and construction of the different roads will be pursued in the order of these numbers unless the county road officials designate in writing a different order.

6. If a blank is lost or destroyed, this office should be notified, and a new one will be issued on application. It is important that notice be given of the loss of any blanks in order that they may be checked off from the list of those issued.

7. Additional blanks will be furnished as needed at any time.

FORM OF REQUEST FOR STATE AID.

Series of.....County.

Request No.....

STATE OF MARYLAND.

Office of.....

For.....County.

.....190..

Chief Engineer of the State Geological Survey Commission,
Maryland Geological Survey,
Baltimore, Md.

Sir:—

The.....of .....County having by resolution, passed at a meeting of said Board of.....held at .....190.., declared their intention to improve a portion of the county road between.....and.....

known as.....for a distance of about.....miles, according to the provisions of Chapter 225, Laws of Maryland, 1904, do hereby request of said State Geological Survey Commission plans and specifications and an estimate of the cost of the proper performance of said work according to said plans and specifications.

Inclosed is a copy of said resolution, attested by the Clerk to the Board of

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(SEAL.)

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Clerk to the Board of

.....County.

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.....County.

MARYLAND GEOLOGICAL SURVEY,
HIGHWAY DIVISION,
JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

February 15, 1905.

County Commissioners for.....County.

Gentlemen:—

At a meeting of the State Geological Survey Commission, comprising Governor Warfield, State Comptroller Atkinson, President Ira Remsen of the Johns Hopkins University, and President R. W. Silvester of the Maryland Agricultural College, held February 14, 1905, the inclosed resolutions were adopted. In accordance with instructions therein a copy is forwarded your board, together with a second copy of the circular giving instructions how to apply for State roads, which are the rules of procedure established by the commission as noted in the resolutions inclosed.

Your attention is again respectfully called to the importance of making your applications before March 1.

Very respectfully,
HIGHWAY DIVISION,
Maryland Geological Survey.

Resolved, That the Court of Appeals having decided that the State Aid Highway Law (Acts of 1904, Chapter 225) is constitutional, we begin work at once under its provisions.

Further, That the Boards of Commissioners of the respective counties be notified that the State Geological Survey Commission will proceed in accordance with the circular already sent out and that a second copy of these instructions be mailed to each board immediately, informing them that applications for State aid must be filed on or before March 1, next, if it is their plan to take advantage of the law during the year 1905, and that any balance remaining to the account of any county and unapplied for on that date will be allotted to the other counties applying in accordance with their public road mileage as required by law.

Further, That the necessary surveys will be commenced as soon as practicable after March 1, and that plans and estimates will be submitted at the earliest possible day.

Some confusion arose due to the fact that a number of the Boards of County Commissioners thought that by filling out the preliminary application form they had filed a regular application for State aid. In order that there could be no possible doubt on this point, the following letter was sent to the Boards of County Commissioners:

MARYLAND GEOLOGICAL SURVEY,
HIGHWAY DIVISION.
JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

February 17, 1905.

County Commissioners for.....County.

Gentlemen:—

There seems to be some misapprehension on the part of some of the Boards of County Commissioners who filled out preliminary application blanks for State aid.

These preliminary application blanks are not sufficient, but the formal application blanks which were mailed to your board a week or more ago must be filled out. Owing to the fact that misapprehension did exist with some of the boards, it has been thought best to notify all to the above effect. If your board, therefore, still intends to apply for State aid, do not fail to have the commissioners *fill out the formal blanks* which were sent recently to you. If it is necessary arrange to have a special meeting of your commissioners for this purpose, so that the applications will be filed out before March 1.

Your attention is again called to the enclosed circular of instructions.

Very respectfully,

HIGHWAY DIVISION,
Maryland Geological Survey.

As the time drew near when according to the law it would be impossible for counties to receive any of the appropriation for 1905, a circular letter was sent to all the Boards of County Commissioners which had not up to February 27 filed a formal application. The following letter was therefore sent to the County Commissioners for Calvert, Charles, Dorchester, Garrett, Kent, Prince George's, Queen Anne's, St. Mary's, Somerset, and Washington counties:

MARYLAND GEOLOGICAL SURVEY,
HIGHWAY DIVISION.
JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

February 27, 1905.

County Commissioners for.....County.

Gentlemen:—

We have not received from your board formal applications for State aid in the construction of roads in your county. We again beg to remind you that all such applications must be made on or before the first of March, if your county is to receive any benefit under the law. We therefore suggest that you communicate with the members of your board immediately that applications may be signed on or before the first of March. Applications signed and dated March 1 will come within the provision of the law, although there may be one or two days' delay before their receipt at this office.

If the formal blanks have been mislaid, a resolution to the effect that applications are to be made and sent to this office will fulfill the requirements, as the formal blanks can then be filled out later, with date agreeing to that of the resolution.

Very respectfully,

WM. BULLOCK CLARK,
Superintendent.
A. N. JOHNSON,
Highway Engineer.

RE-ALLOTMENT.

The foregoing account with the copies of forms and letters concludes all that it seemed possible to do in order to have the different counties make application for at least a part of their share of the State appropriation. On March 1 formal applications had been received from 18 of the 23 counties in the State. These 18 counties would, according to the law, divide among themselves, in proportion to their road mileage,

the whole of the appropriation of $200,000. The re-allotment made on this basis is given in the adjoining table:

RE-ALLOTMENT OF THE STATE APPROPRIATION FOR ROADS, ACCORDING TO THE PUBLIC ROAD MILEAGE OF THOSE COUNTIES PETITIONING FOR THE SAME, EXCLUDING ALL THAT MADE NO PETITION.

County.	Mileage.	Re-allotment.
Allegany	693	$11,072.06
Anne Arundel	521	8,324.01
Baltimore	1,119	17,878.25
Caroline	547	8,739.42
Carroll	770	12,302.29
Cecil	638	10,193.32
Charles	465	7,429.30
Dorchester	600	9,586.20
Frederick	1,151	18,389.51
Harford	822	13,133.09
Howard	413	6,598.50
Montgomery	798	12,749.64
Prince George's	892	14,251.47
Queen Anne's	563	8,995.05
St. Mary's	602	9,618.15
Talbot	397	6,342.87
Washington	695	11,104.01
Worcester	832	13,292.86
Total	12,518	$200,000.00

ORGANIZATION.

In addition to the preliminary work as already outlined, every detail of organization for carrying on the work was perfected so far as this was possible in advance. A special form of book with suitable headings was devised whereby the various accounts that it would be necessary to keep could be entered and an exact accounting be made at any time that it might be required. Forms of contract and specifications were drawn which in the main are the same as those found in the Third Highway Report on pages 203-218. The printed specifications which were already on hand were slightly modified and one or two pages reprinted in order to conform with the requirements of the new law.

Blank forms were prepared on which inspectors were to make a daily report of the construction work in all of its details. Printed forms were also prepared for reporting every step required in making a complete estimate of proposed improvement. On these forms are recorded the names of the field party making the road surveys and the person drawing the plans, making the profile, in fact, records of each step of the work, thus making a complete and ready form for reference.

POSITIONS IN THE DIVISION OF HIGHWAYS.

The Geological Survey Commission at its meeting held March 8, 1905, voted to adopt certain rules and regulations to govern admission of applicants for positions in the Division of Highways, and accordingly a set of rules was drawn up by the Highway Engineer and regular blank application forms were prepared on which the applicants were to state their experience and qualifications for the particular positions they desired.

GENERAL CLASSIFICATION.

A general classification for all of the engineering force was made as follows: surveyors, inspectors, and engineer inspectors. The requirements for each of these grades as stated on the application forms are as follows:

SURVEYORS.—All applicants will be rated according to their training and experience. Those certified to as qualified to act as chief of parties must have had thorough training and experience in surveying, and have had at least two years' experience in actual survey work.

Instrument men must have had training and experience in the use of transit and level and be able to keep and plat notes.

Rodmen need not have had any practical experience, but should be at least high school graduates with some knowledge of plane trigonometry.

INSPECTORS.—Applicants to be certified to for the grade of inspectors should be young, active men, good observers, and should have had engineering training sufficient to enable them to give grades and set stakes from plans and profiles.

ENGINEER INSPECTORS.—Applicants to be certified to for the grade of engineer inspectors should be trained engineers, and also have had at least two years' actual experience on construction work, preferably road work.

RULES GOVERNING APPLICATIONS FOR POSITIONS.

The following rules governing applications were also printed on the same form:

1. All the statements in the application are to be made under oath.
2. Every false statement knowingly made by the applicant in this paper, or connived at by him in any certificate which may accompany the same, is good cause for removal.
3. The application paper must be filled by the applicant in his *own* handwriting.
4. Send application, properly filled out with the certificates signed, to the "Superintendent of the Maryland Geological Survey, Baltimore, Maryland."
5. A failure to fill the blanks properly or to send satisfactory certificates will cause the application to be returned for correction, but no such opportunity will be given a second time. Applications which show that the applicant is manifestly unfit for the service will be rejected.
6. The receipt of the application, in proper form, will be acknowledged.
7. Before any appointments are made the applicant must pass satisfactorily the requirements prescribed by the examining committee appointed by the Geological Survey Commission.
8. Whenever written examinations shall be required the applicants will be duly notified of the time and place thereof. Where the number of applicants will warrant, examinations will be held at other places outside of Baltimore, as will serve best the convenience of those applying.
9. Applicants will be notified of their appointment to any position.
10. Notice should be given of any change in postoffice address.

STATE HIGHWAY CONTRACTS.

Anticipating considerable doubt in the minds of many of the County Commissioners as to the exact procedure necessary on their part to let a contract for building a State road, a printed circular was prepared and sent to all of the County Commissioners explaining as briefly as possible the essential points to be observed. This notice was as follows:

HOW TO LET A STATE HIGHWAY CONTRACT.

IMPORTANT NOTICE TO COUNTY COMMISSIONERS OR OTHER COUNTY OFFICIALS LETTING CONTRACTS FOR STATE HIGHWAYS.

It is necessary that all boards of County Commissioners or other county officials having power to make contracts for State Highway construction should see that every requirement herein mentioned is strictly observed. Failure to do so will be deemed sufficient cause by the commission for not approving any contract, and no money can by law be paid by the State for work done under contracts not so approved.

All forms of contracts and specifications will he furnished hy the State and no other forms are to he used. Sets of the specifications will be mailed on request direct from this office to prospective bidders.

Your board is to make no change whatsoever in any specification or drawing; such changes can he made only by this office.

If your hoard deems it advisable to make any change, immediate notice thereof should he made in writing, and all the forms and drawings relating thereto that have been furnished should he returned to this office.

1. After the estimates are made advertise the work as required by law, using the form of advertisement furnished your board.

2. No information concerning the figures in the estimate is to he given out to anyone not a member of your board before the hids are opened.

3. All prospective bidders are to be furnished a set of specifications. These sets will he supplied hy the State. The addresses of all who desire them should be sent to this office, from which copies will be mailed direct.

4. Copies of the plans and specifications are to be kept on file at your office, where ready access should he granted to all who desire to examine them, hut on no account are the plans to be taken from your office for any purpose whatsoever, but any data contained therein may he copied hy anyone desiring to do so.

5. Bidders are to make all hids on the regular forms; any made out otherwise must be rejected without further consideration.

6. The hidders will fill out only the hlanks on the first page, headed "Proposal Sheet," which must not be detached.

7. The sets of specifications containing the hids are to he folded and securely sealed and delivered at your office.

8. No bids are to be unsealed under any circumstances whatsoever before the hour and date named in the advertisement, at which time all hids must he publicly opened and read by your hoard.

9. The bids should then he inclosed in a sealed package, without signing or making any marks whatsoever on them, and sent immediately hy registered mail to this office for the approval of the State Commission, as required hy law.

10. No bid is to he considered, or forwarded to this office, that is received at your office after the hour named in the advertisement.

11. There must he inclosed with the bids the certified checks of all bidders, together with the attached certificate attested hy the clerk to your board.

12. A canvass of the hids will be made and the results returned to your board, who will announce either that all hids are rejected, or that the lowest hid is accepted, unless the State Commission should fail to approve making a contract with the lowest hidder.

CERTIFICATE.

(This certificate is not to be detached, but is to be signed and inclosed with the hids, as ahove directed.)

We, the undersigned, members of the hoard of.....

Commissioners for.....County, do hereby forward the

inclosed bids received for work to be done under the State road law for the approval of the State Geological Survey Commission, as required by law.

We do hereby certify that to the best of our knowledge and belief the bids inclosed were received and opened in full compliance with each of the above requirements.

.....

.....

[SEAL.] .....

.....

Attest:

.....Commissioners

for.....County.

.....

Clerk to.....Commissioners

for.....County.

ADVERTISING CONTRACTS.

Instructions for advertising proposed State highway work were also sent to the Boards of County Commissioners together with a complete form of advertisement. This was filled out and sent to the County Commissioners as soon as they decided to call for bids for any particular road. Instructions for advertising with the form of advertisement are here given:

When a contract for State highway construction is to be given out the law requires that the County Commissioners shall advertise for bids for two consecutive weeks in at least one newspaper in their county, and also during the time of such publication in said county newspapers at least three consecutive times in at least one newspaper published in Baltimore City.

FORM OF ADVERTISEMENT.

Office of the.....Commissioners

for.....County,

.....Maryland.

Sealed proposals addressed to the.....Commissioners of.....County, ...Maryland, endorsed "Proposals for Improving the Public Highway between.....and....."

will be received up to 12 o'clock noon, ...190.., when they will be publicly opened and read.

All proposals must be made on the regular forms furnished by the State Geological Survey Commission, to be obtained through the office of the

.....Commissioners. Bids otherwise made out will not be received.

All contracts for State highway construction are subject by law to the approval of the State Geological Survey Commission, and must be so approved before they can be executed.

The work to be done includes the grading and macadamizing of about

.....miles of road to be built under State supervision, according to the plans and specifications on file at the office of the.....

Commissioners at.....Maryland.

All proposals must be accompanied by a certified check for two hundred dollars ($200.00), payable to the.....Commissioners of

.....County, which will be returned unless the successful bidder fails to execute a contract, in which case the check will become the property of the county.

The.....Commissioners reserve the right to reject any or all bids.

LABORATORY WORK.

Owing to the large amount of time it was found necessary to devote to the more important field work, only routine tests have been made in the laboratory during 1904. It was the intention to continue certain investigations begun in previous years and described in the Third Report on the Highways of Maryland, particularly on the relative resistance to wear by grinding of different varieties of rock. This work, however, had to be postponed.

BRICK TESTS.

By far the larger proportion of work done in the laboratory was routine tests of paving brick. The method of making these tests is the same as that described on page 191 in the Third Report on the Highways of Maryland. This method differs slightly from the standard rattler test for paving brick by replacing the cast-iron shot with cast-steel shot.

All the results obtained have been reduced 4 points in accordance with the conclusions reached from investigations in this laboratory on the use of steel and cast-iron shot.[1]

It is of interest to note that the weight of the small pieces of steel shot was reduced but 23 pounds during 102 tests. As the original weight of the small shot in the charge was 223 pounds, it is seen that it would be necessary to add but 2 pounds per test if the charge is to be renewed when 10 per cent has been worn off, as required by the standard test. When cast-iron shot was used, from 8 to 14 pounds was supplied at every test, depending on the quality of the iron.

The results of the rattler tests made in 1904 are given in the following table. The method of reporting the results is somewhat different from that shown in the Second and Third Highway Reports, where only the average loss is given, whereas in the following table the individual loss for each brick in a test is recorded as well as the average loss. It is more essential that paving brick be of as uniform hardness as possible rather than that some shall be exceptionally harder than the rest, producing, perhaps, a higher average result than a much more uniform grade of brick may show. This subject was discussed at some length with the City Engineer's department of Baltimore, with the result that the specifications adopted by the city provided a maximum loss of 30 per cent for any individual brick, and an average loss of 22 per cent.

[1] Third Report on the Highways of Maryland, pp. 191-3.

TABLE SHOWING RESULTS OF TESTS OF PAVING BRICK OBTAINED AT THE LABORATORY OF THE HIGHWAY DIVISION OF THE MARYLAND GEOLOGICAL SURVEY DURING 1904.

Number.	Name.	Color.	Percentage Lost in Rattler 1800 Revolutions. Percentage lost by each brick in a test. No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No 10	Average.	Date of Test.	Made at the request of	Sample selected by
210	Clearfield Clay Working Co.	Lt. Buff.	20	22	24	24	25	25	27	27	30	30	26	Jan. 28.	City Eng., Balto.	Maker.
211	Clearfield Clay Working Co.	Lt. Buff.	24	27	28	28	29	29	29	34	34	34	..			
			35	35	37	..	..	..	..	..	..	..	31	Jan. 30.	"	"
212	"Shawmut" Pine Grove V. B. Co.	Dk. Red.	21	22	23	23	24	26	26	27	28	28	..			
			28	29	35	..	..	..	..	..	..	..	26	Jan. 30.	"	"
213	Clay Products Supply Co., Pa.	Dk. Red.	21	28	28	29	29	31	31	35	38	42	31	Feb. 1.	"	"
214	Clay Products Supply Co., Pa.	Lt. Buff.	33	33	36	39	40	40	45	49	57	58	43	Feb. 1.	"	"
215	Clay Products Supply Co., Pa.	Dk. Red.	22	25	27	27	27	30	30	31	31	31	..			
			32	33	33	..	..	..	..	..	..	..	30	Feb. 1.	"	"
216	Clay Products Supply Co., Pa.	Lt. Buff.	23	27	28	33	39	39	43	51	54	58	39	Feb. 1.	"	"
217	"Mack Block," New Cumberland, W. Va.	Dk. Buff.	16	16	16	18	18	18	18	19	20	25	19	Feb. 1.	"	"
218	"Mack Block" New Cumberland, W. Va.	Lt. Buff.	10	13	13	15	15	15	16	23	36	..	18	Feb. 6.	"	"
219	W. P. Kelly Brick Co.	Lt. Buff.	31	33	33	37	37	40	40	43	46	48	39	Feb. 6.	"	"
220	W. P. Kelly Brick Co.	Lt. Buff.	30	31	31	32	36	37	39	40	41	41	..			
			43	45	46	46	51	52	..	..	..	..	40	Feb. 6.	"	"
221	Welsh, Gloninger & Maxwell.	Dk. Buff.	26	30	31	32	32	33	35	35	40	..	33	April 20.	"	"
222	"Metropolitan Block," Canton, O.	Dk. Red.	14	16	18	18	19	20	20	21	22	..	19	April 26.	"	City Eng.
223	"Maxwell Block"	Dk. Red.	..	..	..	..	..	..	..	..	..	..	33	May 20.	"	"
224	"Maxwell Block"	Dk. Red.	..	..	..	..	..	..	..	..	..	..	28	May 20.	"	"
225	"Maxwell Block"	Dk. Red.	20	20	24	25	25	26	30	31	34	..	26	May 21.	"	"
226	"Maxwell Block"	Dk. Red.	22	23	27	27	30	40	41	48	49	..	35	May 21.	"	"
227	"Maxwell Block"	Dk. Red.	25	25	27	30	35	36	36	37	42	..	32	May 25.	"	Maker.
228	"Maxwell Block"	Dk. Red.	18	19	23	24	27	28	28	28	..	..	24	June 9.	"	"
229	"Maxwell Block"	Dk. Red.	22	22	23	23	25	26	29	33	..	..	24	June 9.	"	"
230	Chas. A. Hook, Jr.	Dk. Red.	23	24	27	28	31	34	35	36	30	..	30	June 25.	"	Cont'r.

TABLE SHOWING RESULTS OF TESTS OF PAVING BRICK OBTAINED AT THE LABORATORY OF THE HIGHWAY DIVISION OF THE MARYLAND GEOLOGICAL SURVEY DURING 1904.—Continued.

Number	Name.	Color.	Percentage Lost in Rattler 1800 Revolutions.											Date of Test.	Made at the request of	Sample selected by
			Percentage lost by each brick in a test.										Average.			
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10				
231	"Maxwell Block"	Dk. Red.	18	21	23	24	24	24	25	29	37	..	25	June 25.	City Eng., Balto.	Maker.
232	"Maxwell Block"	Dk. Red.	20	20	22	23	23	23	24	28	..	..	23	July 5.	"	"
233	"Maxwell Block"	Dk. Red.	24	24	25	26	28	29	30	31	36	..	28	July 13.	"	"
234	"Porter Block", New Cumberland, W. Va.	Lt. Buff,	19	20	20	20	23	23	24	25	25	28	23	July 13.	Roads Eng., Balto. Co.	"
235	"Maxwell Block"	Dk. Red.	21	29	30	30	32	32	34	34	36	..	31	July 13.	"	"
236	C. P. Byrd & Co.	....	22	24	25	27	27	29	29	30	33	..	27	July 13.	City Eng., Balto.	"
237	"Metropolitan Block"	Dk. Red.	16	16	16	18	19	20	20	21	24	..	19	July 19.	Roads Eng., Balto. Co.	"
239	"Mack Block"	Buff.	26	26	26	26	27	27	28	30	35	..	28	July 13.	"	"
240	"R. P. C. C. Block" C. P. Byrd & Co.	....	18	20	24	26	27	28	30	..	..	..	25	July 14.	City Eng., Balto.	"
241	"Windber Brick"	Lt. Buff.	28	29	29	30	30	34	34	35	43	50	34	July 13.	Roads Eng., Balto. Co.	"
242	Clearfield Clay Working Co.	Buff.	20	22	22	23	24	26	26	27	28	42	26	July 14.	"	"
243	"Maxwell Block"	Dk. Red.	20	21	23	23	24	25	27	30	38	..	26	Aug. 2.	City Eng., Balto.	City Eng.
244	"Maxwell Block"	Dk. Red.	17	19	20	20	21	21	22	24	30	..	21	Aug. 5.	"	Inspector.
245	"Porter Block"	Buff.	24	25	27	27	29	30	31	31	38	..	29	Aug. 10.	Roads Eng., Balto. Co.	"
246	"Porter Block"	Buff.	19	21	21	21	22	22	23	23	25	..	22	Aug. 11.	"	"
247	"Porter Block"	Buff.	18	20	21	22	23	23	23	24	30	..	23	Aug. 13.	"	"
248	"Porter Block"	Buff.	21	21	23	24	24	24	26	27	30	..	25	Aug. 16.	"	"
249	"Porter Block"	Buff.	19	21	23	23	23	23	24	26	27	..	23	Aug. 16.	"	"
250	Thornton Fire Brick Co.	Buff.	20	22	23	26	27	27	28	29	33	36				
			38	38	..	..	..	..	..	..	..	..	29	Aug. 16.	City Eng., Balto.	Maker.
251	"Maxwell Block"	Red.	13	14	14	16	16	16	20	21	30	..	18	Aug. 19.	"	"
252	"Porter Block"	Medium.	21	23	24	24	24	26	26	27	29	..	25	Aug. 19.	Roads Eng., Balto. Co.	Inspector.
253	"Porter Block"	Dark.	20	22	25	27	27	30	30	38	38	..	27	Aug. 19.	"	"
254	"Porter Block"	Light.	18	20	24	25	26	26	31	33	35	..	26	Aug. 19.	"	"

TABLE SHOWING RESULTS OF TESTS OF PAVING BRICK OBTAINED AT THE LABORATORY OF THE HIGHWAY DIVISION OF THE MARYLAND GEOLOGICAL SURVEY DURING 1904.—Continued.

Number	Name.	Color.	Percentage Lost in Rattler 1800 Revolutions.											Date of Test.	Made at the request of	Sample selected by
			Percentage lost by each brick in a test.										Average.			
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10				
255	"Barrington Pavers"	Dk. Red.	14	21	21	21	22	25	25	27	28	..				
			28	31	31	33	34	..	..	..	..	..	26	Aug. 19.	City Eng., Balto.	Maker.
256	"Porter Block"	Buff.	19	19	20	21	22	24	24	26	26	..	22	Aug. 22.	Roads Eng., Balto. Co.	Inspector.
257	"Porter Block"	Buff.	20	22	22	23	23	24	25	25	27	..	23	Aug. 22.	"	"
258	"Porter Block"	Buff.	20	21	23	23	24	25	25	34	40	..	26	Aug. 22.	"	"
259	"Porter Block"	Buff.	22	22	23	24	27	28	29	32	37	..	27	Aug. 22.	"	"
260	"Porter Block"	Buff.	16	17	19	21	21	23	25	31	34	..	23	Aug. 23.	"	"
261	"Maxwell Block"	Dk. Red.	10	10	13	14	14	15	17	19	19	..	15	Aug. 23.	City Eng., Balto.	Maker.
262	"Porter Block"	Buff.	18	20	22	22	23	24	25	26	30	..	23	Aug. 23.	Roads Eng., Balto. Co.	Inspector.
263	"Porter Block"	Buff.	20	22	24	25	25	25	26	28	..	..	24	Aug. 23.	"	"
264	"Porter Block"	Buff.	20	21	24	26	28	29	33	36	46	..	29	Aug. 23.	"	"
265	"J. M. Porter Block"	Red.	19	19	20	25	26	26	27	29	32	..	25	Aug. 31.	City Eng., Balto.	"
266	"Maxwell Block"	Red.	15	15	17	18	20	23	25	32	59	..	25	Sept. 9.	"	"
267	"Maxwell Block"	Red.	18	20	20	21	21	25	27	29	30	..	23	Sept. 9.	"	"
268	"Maxwell Block"	Red.	17	17	18	20	20	22	22	24	32	..	21	Sept. 16.	"	"
269	"Maxwell Block"	Red.	15	15	16	18	19	20	26	27	28	..	20	Sept. 16.	"	"
270	"Maxwell Block"	Red.	13	14	16	16	16	17	19	21	29	..	18	Sept. 17.	"	"
271	"Maxwell Block"	Red.	14	16	17	18	18	18	21	29	31	..	20	Sept. 20.	"	"
272	"Maxwell Block"	Red.	13	17	17	17	20	20	23	26	44	..	22	Sept. 21.	"	"
273	"Maxwell Block"	Red.	11	11	12	16	17	18	23	27	36	..	19	Sept. 21.	"	"
274	"Maxwell Block"	Red.	12	13	13	13	14	18	21	40	41	..	20	Sept. 28.	"	"
275	"Maxwell Block"	Red.	13	13	16	18	18	18	21	29	34	..	20	Sept. 28.	"	"
276	"Maxwell Block"	Red.	11	12	13	14	15	18	18	20	20	..	16	Sept. 28.	"	"
277	"Porter Block"	Buff.	19	21	21	21	25	26	29	32	32	..	25	Oct. 4.	Roads Eng., Balto. Co.	"
278	"Maxwell Block"	Red,	11	13	13	15	15	16	16	17	20	..	15	Oct. 6.	City Eng., Balto,	"

TABLE SHOWING RESULTS OF TESTS OF PAVING BRICK OBTAINED AT THE LABORATORY OF THE HIGHWAY DIVISION OF THE MARYLAND GEOLOGICAL SURVEY DURING 1904.—Continued.

Number.	Name.	Color.	Percentage lost in Rattler 1800 Revolutions.											Date of test.	Made at the request of	Sample selected by
			Percentage lost by each brick in a test.										Average			
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10				
279	"Maxwell Block"	Red.	14	15	15	17	18	19	19	20	21	..	18	Oct. 6.	City Eng., Balto.	Inspector.
280	"Porter Block"	Buff.	18	19	21	22	22	23	28	30	30	..	23	Oct. 8.	Roads Eng., Balto. Co.	"
281	"Maxwell Block"	Red.	17	19	19	22	26	27	29	32	50	..	26	Oct. 11.	City Eng., Balto.	"
282	"Maxwell Block"	Red.	14	16	18	20	22	24	24	29	30	..	22	Oct. 12.	"	"
283	"Maxwell Block"	Red.	14	14	15	16	16	16	17	18	40	..	18	Oct. 13.	"	"
284	"Maxwell Block"	Red.	11	14	17	17	17	18	18	20	21	..	17	Oct. 13.	"	"
285	"Porter Block"	Buff.	20	24	25	25	26	26	28	29	33	..	26	Oct. 17.	Roads Eng., Balto. Co.	"
286	"Maxwell Block"	Red.	14	16	17	19	22	24	25	29	35	..	22	Nov. 8.	City Eng., Balto.	City Eng.
287	"Maxwell Block"	Red.	16	18	19	24	24	24	27	27	31	..	24	Nov. 8.	"	"
288	"Maxwell Block"	Red.	15	20	20	23	23	23	25	31	44	..	25	Nov. 8.	"	"
289	"Maxwell Block"	Red.	16	21	22	23	24	25	25	25	38	..	24	Nov. 9.	"	"
290	"Maxwell Block"	Red.	15	17	22	25	28	29	30	32	36	..	26	Nov. 9.	"	"
291	"Maxwell Block"	Red.	17	20	22	23	24	28	28	28	30	..	24	Nov. 9.	"	"
292	"Maxwell Block"	Red.	16	17	17	19	19	20	22	38	46	..	24	Nov. 9.	"	Maker.

MACADAM TESTS.

Few macadam tests have been made during 1904. The standardizing of these tests has been under consideration by a special committee of the American Society for Testing Materials, but up to the present time (December, 1905) only the methods of making the Duval or rattler test and the toughness test have been standardized. The method of making the cementation test is still a matter of investigation. It has been found from work done in the laboratory for testing road materials in the Department of Agriculture at Washington, that the cementing value of rock dust varies greatly according as the rock powder is ground while dry or wet, the results being invariably higher with the wet grinding. In fact, many rocks which had little or no cementing value when dry-ground showed an increase of twenty to forty times as much when wet-ground. The conclusion to be drawn from this phenomenon is that it will be somewhat difficult at first to get a properly bonded road with some varieties of rock screenings, but where the wet-ground cementation test is high there will be no question but that the road surface will eventually become thoroughly compacted either by continued rolling or under the action of traffic if water is applied in the meantime.

In order to make dry-ground and wet-ground rock dust, a ball mill such as was described in the Second Report on the Highways of Maryland, page 130, is used. This machine, however, has not as yet been installed, as it was decided to await the final standardization of the method to be used in making this test.

PART IV

FIRST REPORT ON STATE HIGHWAY CONSTRUCTION

BY

WALTER WILSON CROSBY

CHIEF ENGINEER, HIGHWAY DIVISION

FIRST REPORT ON STATE HIGHWAY CONSTRUCTION FOR PERIOD FROM MAY 1, 1905, TO JANUARY 1, 1906

BY

WALTER WILSON CROSBY

CHIEF ENGINEER, HIGHWAY DIVISION

INTRODUCTORY.

The court of Appeals rendered a decision on February 9, 1905, declaring the State Aid Road Law, which by act of the General Assembly was to become operative on January 1, 1905, constitutional. The work of completing the detailed plans for improving the roads on which surveys had previously been made was carried forward, and as much additional surveying as could be carried along with the force at the disposal of the office was taken up immediately. On March 1, the allotments among the different counties were made, and those counties ready to do so advertised for bids for the work. Owing to unavoidable delays and the necessity in some cases of readvertising, the first contract was not signed until June 9. In the meantime, however, Harford County had itself undertaken, after advertising and receiving no tenders for the same, the work of improving two sections of road.

The present Chief Engineer entered on his duties May 1, Mr. A. N. Johnson, the Highway Engineer of the Survey since 1898, acting as Chief Engineer from January 1, 1905, when the act became operative, to the date of his resignation on April 22.

This office was somewhat hampered in prosecuting its work by being obliged to commence with a very small force of men, and to push the work forward as best it could, increasing the number as opportunity offered. To date the following work has been done:

Of the 155 miles petitioned for by eighteen of the twenty-three counties of the State, estimates have been furnished on 73.09 miles. The work has been limited to the latter figures at the request of the county authorities. Thirty-five arrangements have been entered into by fourteen counties for the improvement of 40.46 miles. The estimated cost, according to the contract prices, is $212,592.63. Seventeen and one-half miles of road have been turned over for acceptance, and 5¾ more miles will be completed this year; 15½ miles contracted for will be finished as soon as the weather permits in the spring; 1.7 miles, the balance of the 40.46 miles contracted for, may remain uncompleted until new arrangements can be made for the proper performance of the work.

The principal reasons for not completing the whole of the 40.46 miles contracted for this year are the following: First, the inevitably late date this first year at which it was possible to commence construction under contracts; second, the extremely large amount of wet weather during the summer, especially during the months of July and August, when the records show that rain fell on 36 days, thereby seriously interfering with, or rendering impossible, the use of the steam rollers for the greater portion of those two months; third, the difficulty of procuring proper equipment in the quantity desired for performing the work, such as steam rollers, labor, etc.; and fourth, the difficulty of securing material in the shape of crushed stone of proper sizes and quality for the work.

These difficulties were not entirely unexpected. It is probable that most of them would exist during the first year's operation of any similar law. The continued operation of the law is the only remedy, and it seems probable that this will in Maryland, as has been the case elsewhere, afford a certain relief. Of 19 roads petitioned for by Baltimore County alone, 10 pieces are uncontracted for at this time, principally because of the lack of bidders on the work. Sixteen pieces, totaling 18.27 miles in the State, have been offered to bidders at good prices, thus far without success. Some of these contracts may be let within the next few weeks, in which case they will be completed early in the summer.

The high cost of crushed stone for road purposes at the freight stations on the Eastern Shore, has seriously interfered with the progress of permanent road construction in that section of the State. An effort has been made by this office to have this matter seriously considered by the transportation companies, with a view to a reduction in the cost of this material, and encouragement of road improvement thereby to the benefit of all concerned. On the Western Shore of Maryland, stone ranges in price from 50 cents to $1 per ton on the cars at the crushers, and the freight rate varies from 25 cents to 50 cents per ton, according to the haul. For instance, stone from quarries in West Virginia and western Maryland is delivered at freight stations between these points and Baltimore City, for from 80 cents to $1 per ton; but on the Eastern Shore, although the price of crushed stone at Wilmington, Delaware, is about 45 cents per ton, the freight rates are, for example, 50 cents per ton to Elkton, a distance of 17 miles; $1.35 per ton to Queenstown, a distance of 80 miles; $1.10 per ton to Snow Hill, a distance of 133 miles; and $1.35 per ton to Vienna, a distance of 117 miles. These figures would make the cost of the stone at the stations vary from 95 cents to $1.80 per ton, which accounts for the high estimates on the cost of stone roads for those sections. It would seem, from the interest of the transportation companies in the condition of the highways leading to their stations, especially in view of the comparatively low cost per mile of railroad construction in this section, and the low cost of operation on these roads, that these figures might be considerably reduced by the companies without disadvantage to themselves. The Highway Division presented this matter for the consideration of the authorities of the Pennsylvania Railroad system, and asked that they give the matter careful thought and advise us of their conclusions. After discussions with various parties, the statement was made to the railroad authorities, that it was believed that were the freight rates so reduced as to bring the price of crushed stone from $1 to $1.25 per ton, that such prices would be reasonably satisfactory to those localities and would considerably encourage the permanent improvement of their main highways.

The matter has been under consideration by the railroad company for several months, and this office has held two conferences with the railroad officials. As yet, however, no definite response has been received from them regarding their conclusions.

An effort was also made to investigate the possibilities of transporting road material from Western Maryland across the bay, with a view to a possible reduction in the cost of such material delivered at points on the Eastern Shore. The material could be delivered into barges or scows at Baltimore City for $1 per ton or less, but so far the lowest bid we have been able to obtain for transporting the material to Snow Hill was $1 per ton, making the cost of the material $2 per ton delivered at the wharf, thus offering no advantage over rail shipments.

It is felt that when we consider the lack of income in some of the counties, where they now have shell or gravel roads and have no accurate idea of the cost of the same, their total lack of appreciation of the commercial value of good roads, together with their natural conservatism; that a comparison with the results obtained during the first year of similar improvements in other States that have taken up road improvement, shows that the results obtained in Maryland are particularly encouraging. So far as it has been possible to ascertain, the work finished seems to be greatly appreciated and most pleasing to the travelling public, and the improvement in every case over the previous conditions most noticeable. Preparations are now being made for the work of 1906, with the idea of thus being able to begin actual construction at a much earlier date, and to secure a far larger mileage of improved work during the year. The indications are that the applications for aid by the various counties during 1906 will greatly exceed those of 1905.

It might not be amiss to suggest in this report some details of the work of road improvement. As will be noticed, the average cost per mile of the work undertaken under the State Aid Act has been less than $5300 per mile. This rate of $5300 per mile for the first year's work is surprisingly low when viewed in the light of local conditions or compared with the experience in other States during the first year of opera-

tion of similar laws. The average cost of modern roads in Tennessee has been $4770.38 per mile, and this where material not requiring crushing was available; in Rhode Island it was $5300; in Connecticut $6170; in New Jersey $7700; in Delaware $8350; in New York $8560; in Massachusetts $9500; averaging $7192.90 per mile for all the States.

The number of miles built in Maryland this year will compare most favorably with the first year's record of other States in this respect. The experience of other States has been that the cost per mile has been reduced as time went by. This would naturally be so for the following reasons: First, because it is reasonable to suppose that the county authorities apply first for aid on those roads which receive the most travel and require the largest expenditure for maintenance, or they apply for aid on those roads which, at the time of the application, considering their relative importance, are in the worst possible condition, and would require an unusual expenditure on the part of the county authorities to put in shape. Second, because the number of skilled road builders in a locality is increased as work of this nature is offered for construction, and with the increase in skill and in competition between skilled parties, the price of work naturally decreases. There is every reason to expect this result in Maryland.

DETAILS OF IMPROVEMENTS UNDER CHAPTER 225, ACTS OF 1904, FROM MAY 1, 1905, TO JANUARY 1, 1906.

ALLEGANY COUNTY.

BARRELVILLE ROAD.

Survey finished .....Oct. 26, 1905.
Estimate submitted .....June 24, 1905, for 1 mile = $5730.25
Contract signed .....Aug. 8, 1905, for 1 mile = 4527.98
Work begun .....Aug. 8, 1905.
Work stopped[1] .....Dec. 12, 1905, 0.57 mile built.
Maximum grade before improvement, 4.44%.
Maximum grade after improvement, 2.90%.

[1] On account of weather.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.		Price.	Total.
Excavation [2]	2000	cu. yds.	$0.55	$1100.00
Cement masonry	34.5	cu. yds.	4.25	146.63
Vit. clay pipe, 15″	48	ft.	.75	36.00
Vit. clay pipe, 18″	26	ft.	.95	24.70
Vit. clay pipe, 24″	26	ft.	1.80	46.80
Iron water pipe, 14″	24	ft.	2.25	54.00
6″ macadam	6933	sq. yds.	.35	2426.55
Rolling and watering				693.30
				$4527.98

[2] Includes widening old road and raising same above flood mark.

Remarks.—Notwithstanding the expense of widening the old road and of raising the same, to bring it above high water of an adjacent stream, owing to the proximity of good limestone, it was possible to keep the cost of this road below the average. The condition of the surface of this road, before the improvement was begun, was worse than that of almost any other whose improvement was attempted under State aid this year.

BEDFORD ROAD.

Survey finished ..... Oct. 18, 1904.
Estimate submitted ..... Mar. 27, 1905, for 1.1 miles = $5978.79
Contract signed ..... June 9, 1905, for 1.1 miles = 5926.14
Work begun ..... June 6, 1905.
Work stopped ..... Dec. 15, 1905, 1.1 miles built.
Maximum grade before improvement, 10.65%.
Maximum grade after improvement, 5.80%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.		Price.	Total.
Excavation [1]	2953	cu. yds.	$0.60	$1771.80
Cement masonry [2]	39.55	cu. yds.	4.00	158.20
Vit. clay pipe, 12″	6	ft.	.55	3.30
Vit. clay pipe, 15″	34	ft.	.74	25.16
Vit. clay pipe, 18″	22	ft.	.88	19.36
Vit. clay pipe, 4″ [3]	320	ft.	.40	128.00
Iron water pipe, 14″ [4]	96	ft.	1.13	108.48
6″ macadam	7273	sq. yds.	.38	2763.74
8″ macadam	427	sq. yds.	.30	128.10
Rip rap [5]	100	sq. yds.	.50	50.00
Rolling and watering (estimated)				770.00
				$5926.14

[1] Includes grading hills.
[2] To protect ends of pipe culverts.
[3] Underdrain in springy place.
[4] For culverts too near the surface for use of clay pipe.
[5] For protection of embankments.

Remarks.—Some delay in the completion of this work was occasioned by difficulties met with by the contractor in operating his quarry. This road as a whole is a very fair average as to the cost per mile of the road improvements undertaken in the State this year.

LONACONING ROAD.

Survey finished .....Nov. 3, 1904.
Estimate submitted .....June 24, 1905, for 1.05 miles = $8536.72
Contract signed .....Oct. 28, 1905, for 1.05 miles = 9360.92
Work begun .....Nov. 1, 1905.
Work stopped[1] .....Dec. 12, 1905.
Maximum grade before improvement, 15%.
Maximum grade after improvement, 4.6%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation	6000 cu. yds.	$0.55	$3300.00
Steel concrete masonry.....	10 cu. yds.	13.75	137.50
Cement rubble masonry	28 cu. yds.	5.50	154.00
Vit. clay pipe, 15".....	24 ft.	.88	21.12
Vit. clay pipe, 30".....	50 ft.	3.85	192.50
Guard railing	1500 ft.	.11	165.00
Iron water pipe, 12".....	24 ft.	2.20	52.80
6" macadam	6993 sq. yds.	.71½	5000.00
8" macadam	400 sq. yds.	.84½	338.00
			$9360.92

[1] On account of weather.

Remarks.—This road is being built on a new location for practically its whole length to avoid a bad hill. The estimated quantities also include those rendered necessary by building the road with extra width enough for a single electric railway track, the cost for these extras to be met by the railway company.

NATIONAL ROAD, 1ST SECTION.

Survey finished .....Oct. 20, 1904.
Estimate submitted .....Aug. 12, 1905, for 0.6 mile = $2125.75
Contract signed[1] ..... ————————, for 0.6 mile = 2125.75
Maximum grade before improvement, 2.38%.
Maximum grade after improvement, 2.15%.

[1] Will be built in 1906 by county, no bids having been received in response to advertisement.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation	530 cu. yds.	$0.50	$265.00
Cement masonry	40 cu. yds.	4.00	160.00
6″ macadam	467 sq. yds.	.50	233.50
Resurfacing	3640 sq. yds.	.35	1274.00
			$1932.50
Contingencies, 10%			193.25
			$2125.75

NATIONAL ROAD, 2D SECTION.

Survey finished .....Nov. 5, 1904.
Estimate submitted .....Aug. 8, 1905, for 0.85 mile = $2961.86
Contract signed[1] ..... ————, for 0.85 mile = 2961.86
Maximum grade before improvement, 5.45%.
Maximum grade after improvement, 4.60%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation	700 cu. yds.	$0.50	$350.00
6″ macadam	1384 sq. yds.	.50	692.00
Resurfacing	4716 sq. yds.	.35	1650.60
			$2692.60
Contingencies, 10%			269.26
			$2961.86

[1] Will be built in 1906 by county, no bids having been received in response to advertisement.

ANNE ARUNDEL COUNTY.

ANNAPOLIS ROAD.

Survey finished .....May 18, 1905.
Estimate submitted .....June 16, 1905, for 2 miles = $10,305.56
Maximum grade before improvement, 8.31%.
Maximum grade after improvement, 4.80%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.		Price.	Total.
Excavation [1]	3110	cu. yds.	$0.50	$1555.00
Vit. clay pipe, 15″	48	ft.	.75	36.00
Vit. clay pipe, 18″	116	ft.	.90	104.40
Vit. clay pipe, 24″	32	ft.	1.50	48.00
Iron water pipe, 12″	24	ft.	1.60	38.40
Iron water pipe, 14″	24	ft.	2.00	48.00
Steel concrete masonry [2]	26	cu. yds.	12.00	312.00
Cement masonry [2]	97.4	cu. yds.	6.00	584.40
8″ gravel macadam	12,533	sq. yds.	.53	6642.49
				$9368.69
Contingencies, 10%				936.87
				$10,305.56

[1] Includes reducing grade and widening roadway.
[2] Includes new bridge.

Remarks.—This work was not advertised by the county.

LIGHT STREET.

Survey finished .....May 22, 1905.
Estimate submitted .....July 12, 1905, for 1.1 miles = $5917.45.
Maximum grade before improvement, 7.10%.
Maximum grade after improvement, 6.10%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.		Price.	Total.
Excavation [1]	2000	cu. yds.	$0.50	$1000.00
Steel concrete masonry [2]	40	cu. yds.	11.00	440.00
Cement masonry [2]	1	cu. yd.	6.00	6.00
8″ gravel macadam	7867	sq. yds.	.50	3933.50
				$5379.50
Contingencies, 10%				537.95
				$5917.45

[1] Includes cutting hills.
[2] Includes new bridge.

Remarks.—The county authorities did not ask for bids on this work.

BALTIMORE COUNTY.

BACK RIVER ROAD.

Survey finished .....Aug. 14, 1905.
Estimate submitted .....Sept. 8, 1905, for 1 mile = $6845.85
Maximum grade before improvement, 3.80%.
Maximum grade after improvement, 2.90%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation	950 cu. yds.	$0.50	$475.00
Concrete masonry	5 cu. yds.	6.50	32.50
Iron water pipe, 12".....	48 ft.	1.75	84.00
6" macadam 7040	sq. yds.	.80	5632.00
			$6223.50
Contingencies, 10%			622.35
			$6845.85

Remarks.—The distance of this road from the nearest shipping point for crushed stone is largely responsible for the high cost of the work. After twice advertising for bids, the county authorities received one bid, which might have been accepted by them, but as yet no contract is executed for this work.

CHATSWORTH AVENUE.

Survey finished .....April 12, 1905.
Estimate submitted .....May 22, 1905, for 0.8 mile = $4282.97
Contract signed .....July 6, 1905, for 0.8 mile = 4749.39
Work begun .....Aug. 10, 1905.
Work stopped[1] .....Dec. 20, 1905, 0.5 mile built.
Maximum grade before improvement, 6.20%.
Maximum grade after improvement, 5.25%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation[2] 1960	cu. yds.	$0.45	$882.00
Cement masonry 22.5	cu. yds.	6.00	135.00
Iron water pipe, 14"..... 72	ft.	2.37½	171.00
6" macadam 5653	sq. yds.	.63	3561.39
			$4749.39

[1] On account of weather.
[2] Includes cutting hills and widening roadway.

Remarks.—Some grading was necessary to secure proper drainage. The progress of this work has been most unsatisfactory, owing to the

delays incidental to the lack of proper management, wet weather, delivery of materials, etc.

None of the work has been completed according to the contract.

FREELANDS ROAD.

Survey finished .....Sept. 6, 1905.
Estimate submitted .....Oct. 18, 1905, for 0.4 mile = $3740.00
Maximum grade before improvement, 11.57%.
Maximum grade after improvement, 5.5%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	2000 cu. yds.	$0.45	$900.00
Steel concrete masonry[2]	20 cu. yds.	12.50	250.00
Cement masonry[2]	21 cu. yds.	6.00	126.00
Vit. clay pipe, 18"	24 ft.	1.00	24.00
6" macadam	2800 sq. yds.	.75	2100.00
			$3400.00
Contingencies, 10%			340.00
			$3740.00

[1] Includes reducing grades.
[2] Includes new bridge.

Remarks.—Lack of proper bids prevented the County authorities from executing a contract for this work.

GARRISON ROAD, 1ST SECTION.

Survey finished .....April 10, 1905.
Estimate submitted .....June 14, 1905, for 0.85 mile = $6612.63
Contract signed .....July 6, 1905, for 0.85 mile = 5481.85
Work begun .....July 19, 1905.
Work stopped[1] .....Nov. 30, 1905, 0.54 mile built.
Maximum grade before improvement, 7.45%.
Maximum grade after improvement, 2.5%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation	500 cu. yds.	$0.47	$235.00
Borrow[2]	2000 cu. yds.	.57	1140.00
Cement masonry[3]	9 cu. yds.	7.00	63.00
Reinforced concrete masonry[3]	28.5 cu. yds.	10.50	299.25
Vit. clay pipe, 15"	24 ft.	.75	18.00
Macadam, 6"	5733 sq. yds.	.63	2611.79
Resurfacing	267 sq. yds.	.43	114.81
			$5481.85

[1] On account of weather.
[2] Filling low places and widening roadway.
[3] Includes new bridges.

Remarks.—The progress of the work on this road, and on the 3d section of the Garrison Road, has been most unsatisfactory. Some allowance must be made for the unusual amount of rainy weather in July and August, and for the difficulties incidental to obtaining labor and material for this road, but beyond this a lack of progress on the part of the contractor existed. This office used its utmost endeavors to secure all possible speed in the prosecution of this work, but is finally forced to recommend that the existing contract be cancelled when that portion of the work begun is completed, and that a new arrangement be made with parties for the completion of the improvement of this road, in order to avoid further unnecessary delay and inconvenience to the public.

GARRISON ROAD, 3D SECTION.

Survey finished .....April 10, 1905.
Estimate submitted .....June 28, 1905, for 0.7 mile = $4836.98
Contract signed .....July 21, 1905, for 0.7 mile = 4104.20
Work begun .....Aug. 28, 1905.
Work stopped[1] .....Nov. 30, 1905, 0.34 mile built.
Maximum grade before improvement, 5.95%.
Maximum grade after improvement, 5.00%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation[2]	1700 cu. yds.	$0.60	$1020.00
Cement masonry[3]	9 cu. yds.	8.00	72.00
Steel concrete masonry[3]	12 cu. yds.	10.00	120.00
Vit. clay pipe, 18"	26 ft.	1.50	39.00
6" macadam	4400 sq. yds.	.60	2640.00
Resurfacing	533 sq. yds.	.40	213.20
			$4104.20

[1] On account of weather.
[2] Includes reduction of grades.
[3] Includes new bridge.

Remarks.—(See Remarks Sec. 1, Garrison Road.)

GARRISON OR VALLEY ROAD, 4TH SECTION.

Survey finished .....May 31, 1905
Estimate submitted .....July 26, 1905, for 1.3 miles = $10,380.59
Contract signed[1] ..... ————.
Maximum grade before improvement, 11.73%.
Maximum grade after improvement, 4.80%.

[1] No contract executed by county.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.		Price.	Total.
Excavation [2]	5100	cu. yds.	$0.50	$2550.00
Steel concrete masonry [3]	33.3	cu. yds.	12.00	399.60
Cement masonry [3]	15	cu. yds.	7.00	105.00
Vit. clay pipe, 15″	26	ft.	1.00	26.00
Iron water pipe, 12″	24	ft.	1.80	43.20
Iron water pipe, 16″	24	ft.	2.50	60.00
6″ macadam	8933	sq. yds.	.70	6253.10
				$9436.90
Contingencies, 10%				943.69
				$10,380.59

[2] Includes reducing grades and widening roadway.
[3] Includes new bridge.

Remarks.—Lack of proper bids has prevented the execution by the county authorities of a contract for this work.

GARRISON OR VALLEY ROAD, 6TH SECTION.

Survey finished .....May 31, 1905.
Estimate submitted .....July 19, 1905, for 1.2 miles = $8379.80
Maximum grade before improvement, 9.91%.
Maximum grade after improvement, 5.00%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.		Price.	Total.
Excavation [1]	3740	cu. yds.	$0.45	$1683.00
Cement masonry	13.5	cu. yds.	7.00	94.50
Iron water pipe, 12″	24	ft.	2.00	48.00
6″ macadam	8275	sq. yds.	.70	5792.50
				$7618.00
Contingencies, 10%				761.80
				$8379.80

[1] Includes reducing grades.

Remarks.—Lack of proper bids has prevented the execution by the county authorities of a contract for this work.

MANOR ROAD.

Survey finished .....Aug. 30, 1905.
Estimate submitted .....Oct. 18, 1905, for 0.5 mile = $3476.00
Maximum grade before improvement, 3.80%.
Maximum grade after improvement, 1.80%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	1340 cu. yds.	$0.50	$670.00
Cement masonry	14 cu. yds.	7.00	98.00
Vit. clay pipe, 15″	52 ft.	1.00	52.00
6″ macadam	3600 sq. yds.	.65	2340.00
			$3160.00
Contingencies, 10%			316.00
			$3476.00

[1] Includes widening and straightening roadway.

Remarks.—Lack of proper bids has prevented the execution by the county authorities of a contract for this work.

O'DONNELL STREET.

Survey finished .....July 7, 1905.
Estimate submitted .....Aug. 1, 1905, for 1 mile = $7506.40
Contract signed .....Sept. 14, 1905, for 1 mile = 7634.25
Work begun .....Sept. 26, 1905.
Work stopped ..... ————.
Maximum grade before improvement, 8.12%.
Maximum grade after improvement, 5.33%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	1400 cu. yds.	$0.60	$840.00
Borrow[1]	700 cu. yds.	.60	420.00
Steel concrete masonry[2]	14.5 cu. yds.	6.50	94.25
6″ macadam[3]	8000 sq. yds.	.78½	6280.00
			$7634.25

[1] Includes reduction of grade and raising low place.
[2] New bridge to replace old wooden one.
[3] Trap rock specified on account of heavy travel; 14 foot macadam.

Remarks.—Considerable delay in the completion of this work has been apparently unavoidable, owing to the difficulty in securing the necessary crushed stone. Previous experience in this locality has shown the futility of using anything on this road but the better grades of trap rock. The specifications were accordingly drawn to provide for this material, but the demands of other markets for it have been more than equal to the supply.

Owing to the travel on this road, it was recommended by this office and approved by the county authorities, that the width of the macadam be increased to 14 feet.

PHILADELPHIA ROAD.

Survey finished .....July 26, 1905.
Estimate submitted .....Aug. 16, 1905, for 1 mile = $6100.66
Contract signed .....Sept. 14, 1905, for 1 mile = 6231.28
Work begun .....Oct. 16, 1905.
Work stopped .....Jan. 22, 1906, 0.34 mile built.
Maximum grade before improvement, 3.50%.
Maximum grade after improvement, 3.00%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation	1000 cu. yds.	$0.60	$600.00
6″ macadam[1]	6751 sq. yds.	.78	5265.78
Resurfacing	1462 sq. yds.	.25	365.50
			$6231.28

[1] Trap rock specified on account of heavy travel; 14 foot macadam.

Remarks.—Considerable delay has been experienced in completing this work on account of the difficulty in obtaining the necessary crushed stone. Previous experience has shown the absolute futility of using on this road anything short of the better grades of trap rock. Four years ago this road was surfaced heavily under improper methods with a rather high grade of crushed gneiss, at a cost of over $5000 but at the beginning of this season the road was in a very bad condition. Owing to the large amount of travel on this road, 14-foot macadam was recommended by this office and approved by the county authorities.

PAPER MILL ROAD.

Survey finished .....Aug. 23, 1905.
Estimate submitted .....Oct. 18, 1905, for 1 mile = $7988.37
Maximum grade before improvement, 12.80%.
Maximum grade after improvement, 8.00%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.		Price.	Total.
Excavation[1]	5000	cu. yds.	$0.50	$2500.00
Cement masonry	18.5	cu. yds.	6.00	111.00
Vit. clay pipe, 18"	48	ft.	1.00	48.00
Iron water pipe, 12" (Relaying)	24	ft.	.40	9.60
6" macadam	7067	sq. yds.	.65	4593.55
				$7262.15
Contingencies, 10%				726.22
				$7988.37

[1] Includes reducing grades.

Remarks.—Lack of proper bids has prevented the execution by the county authorities of a contract for this work.

SEMINARY AVENUE.

Survey finished .....Aug. 5, 1905.
Estimate submitted .....Aug. 23, 1905, for 1.13 miles = $7988.26
Contract signed .....Oct. 5, 1905, for 1.13 miles = 8573.93
Work begun .....Oct. 10, 1905.
Work stopped .....Dec. 21, 1905, 0.3 mile built.
Maximum grade before improvement, 6.00%.
Maximum grade after improvement, 6.00%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.		Price.	Total.
Excavation	3000	cu. yds.	$0.65	$1950.00
Cement masonry[1]	16.4	cu. yds.	7.00	114.80
Steel concrete masonry[1]	45.75	cu. yds.	15.00	686.25
Iron water pipe, 16"	24	ft.	4.00	96.00
Iron water pipe, 16" (Relaying)	28	ft.	1.00	28.00
6" macadam	5813	sq. yds.	.76	4417.88
Resurfacing	2135	sq. yds.	.60	1281.00
				$8573.93

[1] Includes new bridges.

Remarks.—The high cost of this work is partly due to lack of competition for the work and partly to the necessity of rebuilding the bridges and culverts, and the advisability of grading the old road before improving it with a permanent surface. The excess, in the cost of the work over the estimate, is borne by the county authorities. A delay by the county of nearly a month, in executing the contract, is partly responsible for the non-completion of the work this year.

TRENTON ROAD.

Survey finished .....Sept. 9, 1905.
Estimate submitted .....Nov. 1, 1905, for 0.75 mile = $5167.09
Maximum grade before improvement, 10.00%.
Maximum grade after improvement, 5.75%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1] 2000	cu. yds.	$0.50	$1000.00
Cement masonry 19.3	cu. yds.	6.00	115.80
Vit. clay pipe, 15"..... 26	lin. ft.	1.00	26.00
Iron water pipe, 12"..... 48	lin. ft.	1.75	84.00
Iron water pipe, 14"..... 24	lin. ft.	2.00	48.00
6" macadam 5267	sq. yds.	.65	3423.55
			$4697.35
Contingencies, 10%			469.74
			$5176.09

[1] Includes reduction of grades, widening and straightening road.

Remarks.—Lack of proper bids has prevented the execution by the county authorities of a contract for this work.

WASHINGTON ROAD.

Survey finished .....Aug. 1, 1905.
Estimate submitted .....Aug. 31, 1905, for 1 mile = $6939.46
Maximum grade before improvement, 7.40%.
Maximum grade after improvement, 6.33%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation 1300	cu. yds.	$0.60	$780.00
6" macadam 2956	sq. yds.	.80	2364.80
4" resurfacing 5273	sq. yds.	.60	3163.80
			$6308.60
Contingencies, 10%			630.86
			$6939.46

Remarks.—The contract for this work has not been executed, owing to the lack of bids for the same. This road is an important one, and badly in need of improvement. The demands are such, that the plans

and specifications must call for unusually heavy work, with the best of material, nothing but first-class trap rock being allowed in the macadam. This is one of the most heavily travelled roads out of the city of Baltimore, and is a portion of the main highway between Baltimore and Washington.

WHITE HALL ROAD.

Survey finished .....Sept. 2, 1905.
Estimate submitted .....Oct. 18 1905, for 0.55 mile = $6931.05
Maximum grade before improvement, 14.4%.
Maximum grade after improvement, 7.5%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1] 4600	cu. yds.	$0.60	$2760.00
Steel concrete masonry[2]..... 5.1	cu. yds.	12.00	61.20
Cement masonry[2] 25	cu. yds.	6.00	150.00
Cobble gutters 333	sq. yds.	.75	249.75
Rip rap 700	sq. yds.	.50	350.00
6″ macadam 3900	sq. yds.	.70	2730.00
			$6300.95
Contingencies, 10%			630.10
			$6931.05

[1] Includes reducing grades and widening roadway.
[2] Includes new bridge.

Remarks.—Lack of proper bids has prevented the execution by the county authorities of a contract for this work.

WILKENS AVENUE.

Survey finished .....April 3, 1905.
Estimate submitted .....May 5, 1905, for 2.35 miles = $7893.74
Contract signed .....June 16, 1905, for 2.35 miles = 7878.24
Work begun .....July 5, 1905.
Work stopped ..... ————————, 2.35 miles built.
Maximum grade before improvement, 5.45%.
Maximum grade after improvement, 5.45%.

FIG. 1.—Churchville-Worthington Corner Road, Harford County.
BEFORE IMPROVEMENT.

FIG. 2.—Churchville-Worthington Corner Road, Harford County.
AFTER IMPROVEMENT.

FIG. 3.—Earlton-Havre de Grace Road, Harford County.
BEFORE IMPROVEMENT.

FIG. 4.—Earlton-Havre de Grace Road, Harford County.
AFTER IMPROVEMENT.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation	1000 cu. yds.	$0.40	$400.00
Cement rubble masonry[1]	12 cu. yds.	4.00	48.00
Steel concrete masonry[1]	40 cu. yds.	10.00	400.00
Vit. clay pipe, 15″	64 ft.	.60	38.40
6″ macadam	1733 sq. yds.	.55	953.15
Resurfacing	14854 sq. yds.	.40	5941.60
Cobble gutters[2]	133 sq. yds.	.73	97.09
			$7878.24

[1] Includes a new concrete bridge to replace an old wooden one.
[2] To prevent future washouts.

Remarks.—The old road, while it had been stoned in previous years, was rough and uneven in the extreme. An average of $600 for material alone had been expended upon it each year from 1901 to 1903. By proper attention in the care of the improved road, the saving of almost this amount annually should be the result for the next ten years.

WINDSOR ROAD.

Survey finished .....Aug. 26, 1905.
Estimate submitted .....Oct. 18, 1905, for 0.8 mile = $6530.04
Maximum grade before improvement, 9.36%.
Maximum grade after improvement, 6.20%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	5700 cu. yds.	$0.40	$2280.00
Cement masonry	8 cu. yds.	6.50	52.00
Iron pipe, 12″	48 lin. ft.	1.75	84.00
6″ macadam	4267 sq. yds.	.70	2986.90
Resurfacing	1067 sq. yds.	.50	533.50
			$5936.40
	Contingencies, 10%		593.64
			$6530.04

[1] Includes reduction of bad hill.

Remarks.—Lack of proper bids has prevented the execution by the county authorities of a contract for this work.

CAROLINE COUNTY.

FEDERALSBURG-HOUSTON'S BRANCH ROAD.

Survey finished .....Sept. 12, 1905.
Estimate submitted .....Aug. 30, 1905, for 1 mile = $2623.50
Contract signed .....Oct. 5, 1905, for 1 mile = 2623.20
Work begun .....Nov. 8, 1905.
Work stopped ..... ————, 1 mile built.
Maximum grade before improvement, 2.50%.
Maximum grade after improvement, 0.38%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	900 cu. yds.	$0.24	$216.00
Iron water pipe, 12".....	24 ft.	1.30	31.20
Shell macadam[2].....5280	sq. yds.	.45	2376.00
			$2623.20

[1] Includes widening road and material for shoulders.
[2] Nine feet wide.

Remarks.—The grading accounted for above was not rendered necessary by the presence of any particularly bad grades on the old road, but is almost entirely made up of the material required by the shoulders. Had the shells been spread directly on the old surface without any shaping of the same, and the material gathered up from the sides to form the shoulders, it was estimated that more shells would have been required and more material moved, and the resulting expense would have been greater than in following out these plans. As will be seen, the main cost is in the material required. Approximately 33,000 bushels of shells were used, at a cost of about 6 cents per bushel delivered on the road. Had the road not been shaped, or shoulders built properly, at least 10,000 more bushels of shells would have been required to secure approximately equal results, and the cost from such methods would have accordingly exceeded the cost of the method shown, to say nothing of the more lasting qualities obtained in the road by rolling, etc. The estimated difference in cost between the shell road and a road of shell with a stone surface was $2112. The county authorities decided to build a shell road.

GREENSBORO ROAD.

Survey finished .....Sept. 14, 1905.
Estimate submitted .....Sept. 27, 1905, for 1 mile = $4921.40
Maximum grade before improvement, 3.00%.
Maximum grade after improvement, 1.85%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation	1500 cu. yds.	$0.30	$450.00
Concrete masonry	6 cu. yds.	6.00	36.00
Vit. clay pipe, 12"	700 ft.	.60	420.00
Iron water pipe, 12"	24 ft.	2.00	48.00
8" and 6" shell macadam	7040 sq. yds.	.50	3520.00
			$4474.00
Contingencies, 10%			447.40
			$4921.40

Remarks.—Bids for the work on this road were advertised for, but none within the estimate were received. As yet the county authorities have made no arrangements for proceeding with the improvements.

The excavation estimated is rendered necessary in order to secure proper drainage.

CARROLL COUNTY.

ELDERSBURG ROAD.

Survey finished .....June 15, 1905.
Estimate submitted .....Sept. 2, 1905, for 1.5 miles = $11,828.17
Contract signed .....Oct. 5, 1905, for 1.1 miles = 8,500.00
Work begun .....Nov. 6, 1905.
Work stopped ..... ————————.
Maximum grade before improvement, 12.10%.
Maximum grade after improvement, 6.00%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	4500 cu. yds.	$0.59	$2655.00
Cement masonry	16 cu. yds.	4.50	72.00
Vit. clay pipe, 18"	24 ft.	1.75	42.00
Vit. clay pipe, 24"	24 ft.	3.00	72.00
6" macadam	7467 sq. yds.	.46	3584.16
			$6425.16

[1] Includes straightening road, reducing grades and filling on new location.

Remarks.—The location of the old road now under improvement was very faulty for about one-half a mile. It was extremely crooked, and, owing to its faulty location and improper construction, the grades were very bad. Its general condition was of the worst. Through the public spirit of the Hon. Johnzie Beaseman, of the Board of Trustees of the State Hospital for the Insane, and of other owners of land lying on either side of the road, it was possible to greatly improve the road by straightening, shortening, and grading the same. As will be seen by the above figures, a large proportion of the cost of the improvement was due to the grading, but had the relocation not been made, the cost of obtaining comparatively equal results would have been still greater.

MT. AIRY ROAD.

Survey finished .....April 27, 1905.
Estimate submitted .....May 29, 1905, for 1 mile = $5753.88
Contract signed .....July 13, 1905, for 0.6 mile = 2581.69
Work begun .....Sept. 6, 1905.
Work stopped .....Dec. 14, 1905, 0.6 mile built.
Maximum grade before improvement, 8.60%.
Maximum grade after improvement, 6.10%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation	1400 cu. yds.	$0.30	$420.00
Cement masonry	11.5 cu. yds.	5.00	57.50
Vit. clay pipe, 15" [1]	26 ft.	1.20	31.20
6" macadam	4800 sq. yds.	.47	2256.00
			$2764.70 [1]

[1] Not including 24' of 12" Iron Pipe on a "cost + 10%" basis.

Remarks.—The county authorities decided to execute a contract for a little over half of the original distance for which aid had been applied. The difficulty in securing the crushed stone needed for the work has caused some delay in its completion.

CECIL COUNTY.

AIKEN AVENUE.

Survey finished .....May 6, 1905.
Estimate submitted .....June 10, 1905, for 1 mile = $5667.78
Contract signed .....Sept. 29, 1905, for 1 mile = 5667.68
Work begun .....Sept. 7, 1905.
Work stopped .....Nov. 30, 1905, 1 mile built.
Maximum grade before improvement, 11.35%.
Maximum grade after improvement, 6.20%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.		Price.	Total.
Excavation	2174	cu. yds.	$0.40	$869.60
Cement masonry	12.35	cu. yds.	4.50	55.58
Vit. clay pipe—				
Relaying, 12″	30	ft.	.25	7.50
New, 15″	24	ft.	.60	14.40
8″ macadam	7040	sq. yds.	.50	3520.00
Gravel shoulders[1]	5220	sq. yds.	.23	1200.60
				$5667.68

[1] Used on heavily travelled section.

Remarks.—Owing to the large amount of travel over a portion of this road, it was deemed advisable to widen the metalling of this section, by using selected gravel for the shoulders, as it was the opinion of the county authorities that a 12- or 14-foot macadam would be insufficient to meet the demands. The construction of these shoulders forms a considerable item in the cost. The presence of fairly satisfactory gravel near the road, however, enabled some reduction to be made in the cost of the macadam, by making the first course with gravel, instead of crushed stone.

RISING SUN ROAD.

Survey finished .....Sept. 11, 1903.
Estimate submitted .....April 7, 1905, for 1.1 miles = $5202.29
Contract signed .....June 13, 1905, for 1.1 miles = 5199.39
Work begun .....June 19, 1905.
Work stopped .....Sept. 8, 1905, 1.1 miles built.
Maximum grade before improvement, 8.50%.
Maximum grade after improvement, 4.20%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.		Price.	Total.
Excavation	1500	cu. yds.	$0.33	$495.00
Cement masonry	21.1	cu. yds.	4.00	84.40
Vit. clay pipe, 15″	30	ft.	.68	20.40
Vit. clay pipe, 20″	24	ft.	.98	23.52
Vit. clay pipe, 4″[1]	1750	ft.	.16	280.00
Iron water pipe, 14″	48	ft.	1.62½	78.00
6″ macadam	4779	sq. yds.	.50	2389.50
8″ macadam	1981	sq. yds.	.70	1386.70
Resurfacing	1133	sq. yds.	.39	441.87
				$5199.39

[1] Underdrain in wet places. This item was afterward changed to day labor at cost + 10%.

Remarks.—Notwithstanding the expense necessary for drainage, grading, etc., on this road, before the surfacing could be attempted, the fortunate proximity of satisfactory stone for the macadam enabled the cost to be kept below the average. A quarry has been opened in the vicinity, which will be of great advantage in extending this improvement in the future, at probably an even lower rate per mile.

CHARLES COUNTY.

PORT TOBACCO ROAD.

Survey finished .....May 18, 1905.
Estimate submitted .....June 22, 1905, for 0.95 mile = $8476.05
Maximum grade before improvement, 9.50%.
Maximum grade after improvement, 8.88%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	6530 cu. yds.	$0.35	$2285.50
Vit. clay pipe, 18"	26 ft.	1.00	26.00
Steel concrete masonry[1]	31 cu. yds.	12.00	372.00
Cement masonry[1]	37 cu. yds.	6.00	222.00
8" gravel macadam	6400 sq. yds.	.75	4800.00
			$7705.50
Contingencies, 10%			770.55
			$8476.05

[1] New bridges.

Remarks.—The existing conditions on this road are about the worst of any road submitted by the county authorities. For a considerable distance the bed of a brook exists in the middle of the road, and on either side is low swampy land. There are several places where streams cross the road and no bridges exist. As will be seen by the above estimate, nearly half the estimated cost of the permanent improvement is due to the grading necessary to raise the road above the water-level and secure proper drainage, and for building permanent bridges and culverts. The estimate also includes a macadam surface for the road. It is be-

lieved that this would be the best investment for the county in the end, but it is admitted that some portion of the first cost might be saved, by using gravel entirely instead of macadam; and should the county desire to save something in the first cost, and assume the responsibility for the additional maintenance, this office would be entirely willing to consider the gravel road. It is not likely, however, that over $2000 in the first cost could be saved by the use of gravel, while the cost of maintenance of a gravel surface would be double that of a stone surface.

DORCHESTER COUNTY.

ALLEN'S CORNER ROAD.

Survey finished .....June 12, 1905.
Estimate submitted .....June 13, 1905, for 2.1 miles = $15,469.30
Contract signed .....Nov. 14, 1905, for 1.5 miles = 4,064.60
Work begun .....Nov. 9, 1905.
Work stopped ..... ————————, 1 mile built.
Maximum grade before improvement, 5.00%.
Maximum grade after improvement, 2.10%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	2700 cu. yds.	$0.20	$540.00
Concrete or brick masonry ..	6 cu. yds.	7.00	42.00
Vit. clay pipe.....	44 ft. (relay)	.15	6.60
Shell or gravel macadam[2] ...	7900 sq. yds.	.44	3476.00
			$4064.60

[1] Includes widening and straightening old road.
[2] Nine feet wide.

Remarks.—In response to the original application of the county authorities, an estimate was submitted for the construction of a shell road with a stone surface. The estimated difference in cost between the shell road and the road with a stone surface was $5600 for the 2.1 miles. The county authorities decided to build the shell road.

FREDERICK COUNTY.

MONROVIA ROAD.

Survey finished .....Dec. 14, 1905
Estimate submitted .....May 3, 1905, for 1.4 miles = $9326.63
Contract signed .....June 7, 1905, for 1.4 miles = 9316.40
Work begun .....July 19, 1905.
Work stopped ..... ————————, 1 mile built.
Maximum grade before improvement, 12.85%.
Maximum grade after improvement, 9.00%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	8792 cu. yds.	$0.40	$3516.80
Cement masonry[2]	415 cu. yds.	3.00	124.50
Vit. clay pipe, 15"	44 ft.	.75	33.00
Vit. clay pipe, 18"	202 ft.	1.00	202.00
Tile underdrain, 4"[3]	1000 ft.	.10	100.00
6" macadam	8534 sq. yds.	.45	3840.30
8" macadam	1333 sq. yds.	.60	799.80
Cobble gutters[4]	400 sq. yds.	1.75	700.00
			$9316.40

[1] Includes grading hills and filling low places.
[2] New bridges not included.
[3] Drain in springy places.
[4] To prevent washouts.

Remarks.—The high cost of this improvement, as will be seen, is largely due to the grading necessary for widening and reducing the grades of a narrow, steep hill, and for new culverts. A great improvement, however, has resulted. Inefficient equipment of the contractor, and difficulties and delays in securing crushed stone, have prevented the completion of the improvement this season.

HARFORD COUNTY,

CHURCHVILLE ROAD.

Survey finished .....June 22, 1905.
Estimate submitted .....July 6, 1905, for 2.35 miles = $10,069.62
Contract signed .....County, for 2.35 miles = 10,069.62
Work begun .....Sept. 5, 1905.
Work stopped ..... ————————, 1.3 miles built.
Maximum grade before improvement, 4.10%.
Maximum grade after improvement, 2.15%.

FIG. 1.—Churchville-Worthington Corner Road, Harford County.
BEFORE IMPROVEMENT.

FIG. 2.—Churchville-Worthington Corner Road, Harford County.
AFTER IMPROVEMENT.

FIG. 3.—Wilkens Avenue, Baltimore County.
BEFORE IMPROVEMENT.

FIG. 4.—Wilkens Avenue, Baltimore County.
AFTER IMPROVEMENT.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	4400 cu. yds.	$0.40	$1760.00
Tile underdrain, 4" [2]	400 ft.	.25	100.00
Iron water pipe, 12"	144 ft.	1.80	259.20
Cement masonry	23 cu. yds.	5.00	115.00
6" macadam	16,000 sq. yds.	.42	6720.00
8" macadam	400 sq. yds.	.50	200.00
			$9154.20
Contingencies, 10%			915.42
			$10,069.62

[1] Includes widening road and reducing hills.
[2] In springy places.

Remarks.—The accounts for this road are not yet in. This office is not informed as to the figures of the cost, as the work was done by the county forces in the absence of outside bidders.

EARLTON ROAD.

Survey finished ..... April 21, 1904.
Estimate submitted ..... Mar. 30, 1905, for 1.8 miles = $7828.54
Contract signed ..... County, for 1.8 miles = 7828.54
Work begun ..... April 24, 1905.
Work stopped ..... Sept. 14, 1905, 1.8 miles built.
Maximum grade before improvement, 8.10%.
Maximum grade after improvement, 6.00%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	3250 cu. yds.	$0.35	$1137.50
Cement masonry	41.7 cu. yds.	4.50	187.65
Tile underdrain, 4" [2]	1125 ft.	.40	450.00
Vit. clay pipe, 18"	72 ft.	.85	61.20
Iron water pipe, 12"	24 ft.	1.60	38.40
Iron water pipe, 14"	96 ft.	2.00	192.00
Iron water pipe, 18"	24 ft.	3.00	72.00
6" macadam	10,845 sq. yds.	.40	4338.00
8" macadam	400 sq. yds.	.50	200.00
Resurfacing	1467 sq. yds.	.30	440.10
			$7116.85
Contingencies, 10%			711.69
			$7828.54

[1] Includes reducing grades and widening road.
[2] In wet places.

Remarks.—This improvement was undertaken by the county, with its own forces, after properly advertising for bids and receiving none. From the accounts sent in by the county, the cost of the work has exceeded the estimate, but it appears on analysis that the excess is entirely covered by the excess in cost of the crushed stone delivered by the county on the road, over the cost of similar material delivered by private parties. Less than 4000 cubic yards of crushed stone should have been required for the macadam. The county purchased 1000 yards from private parties, who delivered the same, after quarrying, crushing, and hauling it nearly four miles, at $1.65 a cubic yard. The cost to the county of the balance of the stone used on this road was $6125, with an average haul, from the county crusher to the work, of less than a mile. It can be readily seen that had the county purchased all the material from these private parties at the rate paid for the 1000 cubic yards actually bought, the cost would have been kept well within the estimate.

FALLSTON ROAD.

Survey finished .....June 28, 1905.
Estimate submitted .....July 13, 1905, for 2.35 miles = $13,042.57
Contract signed .....County, for 2.35 miles = 13,042.57
Work begun .....Aug. 3, 1905.
Work stopped .....Dec. 23, 1905, 1 mile built.
Maximum grade before improvement, 10.78%.
Maximum grade after improvement, 4.30%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	7544 cu. yds.	$0.30	$2263.20
Cement masonry	30 cu. yds.	5.00	150.00
Tile underdrains, 4" [2]	300 ft.	.40	120.00
Vit. clay pipe, 15"	48 ft.	.80	38.40
Iron water pipe, 12"	96 ft.	1.75	168.00
Iron water pipe, 14"	24 ft.	2.00	48.00
6" macadam	13,841 sq. yds.	.53	7335.73
8" macadam	2667 sq. yds.	.65	1733.55
			$11,856.88
Contingencies, 10%			1185.69
			$13,042.57

[1] Includes widening and straightening old road and cutting hills.
[2] In springy places.

Remarks.—The work on this road was undertaken by the county, with its own labor and machinery, after receiving no bids. Of the 2¼ miles proposed to be improved, about one mile has been completed to date. The cost of this mile has been $7490.32 according to the vouchers submitted by the county to this office. The large excess of the cost of this mile over the rate per mile of the estimate, is due to the high cost of the crushed stone delivered on the road by the county. The county's vouchers show that the cost of quarrying, freighting, and crushing the 2250 cubic yards of crushed stone used on the road was $4787.55 or $2.12 per cubic yard. The average haul from the crusher to the road was 1¼ miles, and would have been the same from the nearest freight station, at which crushed stone could have been delivered by private parties for $1.25 per cubic yard. The work of quarrying, crushing, and hauling the stone was done directly by the county authorities, and entirely independent of the State.

FOREST HILL ROAD.

Survey finished .....April 22, 1905.
Estimate submitted .....Mar. 30, 1905, for 0.9 mile = $4616.92
Contract signed .....County, for 0.9 mile = 4616.92
Work begun .....April 20, 1905.
Work stopped .....Dec. 12, 1905, 0.9 mile built.
Maximum grade before improvement, 7.80%.
Maximum grade after improvement, 3.50%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.		Price.	Total.
Excavation[1]	2700	cu. yds.	$0.30	$810.00
Iron water pipe, 12″.....	48	ft.	1.60	76.80
Iron water pipe, 14″.....	72	ft.	2.00	144.00
Cement masonry	22.2	cu. yds.	4.50	99.90
6″ macadam	6133	cu. yds.	.45	2759.85
				$3890.55
Contingencies, 10%				389.06
				$4279.61

[1] Includes widening road and reducing knolls.

Remarks.—Work on this road was undertaken by the county, with its own labor and machinery, after receiving no bids in response to the

advertisements. From the accounts turned in to this office, the cost has been $5335.29. The excess over the estimate is principally due to the excessive cost of the crushed stone delivered on the road by the county. Some criticism may be made of the management of the work by the county, and some excess of cost is due to this poor management. Had the crushed stone, however, been delivered on the road by the county at a reasonable figure, the cost of the work would not have greatly exceeded the estimate. The quarrying of the crushed stone and its delivery was entirely in charge of the county authorities, and beyond the jurisdiction of this office.

HOWARD COUNTY.

SYKESVILLE ROAD.

Survey finished .....April 1, 1905.
Estimate submitted .....May 15, 1905, for 1 mile = $7310.93
Contract signed .....July 18, 1905, for 0.55 mile = 4670.50
Work begun .....Aug. 11, 1905.
Work stopped .....Nov. 23, 1905, — miles built.[1]
Maximum grade before improvement, 12.10%.
Maximum grade after improvement, 6.00%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.		Price.	Total.
Excavation[2]	5540	cu. yds.	$0.35	$1939.00
Dry rubble masonry[3]	35	cu. yds.	2.00	70.00
Cement masonry[3]	92½	cu. yds.	1.80	166.50
Concrete masonry[3]	11	cu. yds.	12.00	132.00
Rip rap[4]	200	sq. yds.	1.00	200.00
Cobble gutters	365	sq. yds.	1.00	365.00
Vit. clay pipe, 15"	44	ft.	1.00	44.00
Vit. clay pipe, 18"	28	ft.	1.25	35.00
6" macadam	3820	sq. yds.	.45	1719.00
				$4670.50

[1] Grading, masonry and pipe practically completed, but no macadam laid.
[2] Grading hills.
[3] Includes new bridge.
[4] None used.

Remarks.—One of the principal reasons leading the county authorities to petition for assistance in the improvement of this road, was their recognition of the importance of reducing the extremely heavy grades

and their desire for State assistance in doing the work. The cost also includes relocating and straightening the road and the construction of a permanent concrete bridge in place of the existing wooden one.

Owing to difficulties in securing crushed stone for the macadam and a proper steam roller, the contractor, with the consent of the county and State authorities, has postponed the macadamizing of the new grades until spring.

WASHINGTON-BALTIMORE ROAD.

Survey finished .....May 4, 1905.
Estimate submitted .....July 24, 1905, for 1 mile = $5847.41
Contract signed .....Aug. 22, 1905, for .51 mile = 2654.40
Work begun .....Sept. 14, 1905.
Work stopped ..... ————————, 0.5 mile built.
Maximum grade before improvement, 8.87%.
Maximum grade after improvement, 5.50%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.		Price.	Total.
Excavation [1]	1180	cu. yds.	$0.35	$413.00
Cement rubble masonry [2]	7	cu. yds.	7.00	49.00
Steel concrete masonry [2]	4.6	cu. yds.	18.00	82.80
Vit. clay pipe.....	24	ft.	.90	21.60
6″ macadam	3600	sq. yds.	.58	2088.00
				$2654.40

[1] Includes cutting down hills.
[2] Includes new bridge.

Remarks.—The county authorities decided to reduce by approximately one-half the amount of work to be done and executed a contract for this portion of the work. Poor management is partly responsible for the delay in its completion. As will be noticed, new bridges, culverts, and some grading, form a considerable part of the cost.

MONTGOMERY COUNTY.

BLAIR ROAD.

Survey finished .....July 18, 1905.
Estimate submitted .....Oct. 2, 1905, for 1 mile = $6398.04
Maximum grade before improvement, 14.80%.
Maximum grade after improvement, 6.00%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	3800 cu. yds.	$0.40	$1520.00
Cement masonry	32 cu. yds.	5.00	160.00
Vit. clay pipe, 15″	72 ft.	.80	57.50
Vit. clay pipe, 18″	24 ft.	1.00	24.00
Iron water pipe, 12″	24 ft.	1.75	42.00
6″ macadam	7040 sq. yds.	.57	4012.80
			$5816.40
Contingencies, 10%			581.64
			$6398.04

[1] Includes reducing grades.

Remarks.—The county authorities did not advertise for bids on this work.

FREDERICK ROAD.

Survey finished .....July 14, 1905.
Estimate submitted .....Sept. 22, 1905, for 1 mile = $6238.65
Maximum grade before improvement, 8.11%.
Maximum grade after improvement, 3.25%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	2370 cu. yds.	$0.40	$948.00
Cement masonry	16 cu. yds.	6.00	96.00
Tile underdrain, 4″	500 ft.	.40	200.00
Iron water pipe, 12″	24 ft.	1.70	40.80
Iron water pipe, 14″	48 ft.	2.00	96.00
6″ macadam	6373 sq. yds.	.60	3823.80
8″ macadam	667 sq. yds.	.70	466.90
			$5671.50
Contingencies, 10%			567.15
			$6238.65

[1] Includes reducing grades.

Remarks.—The county authorities did not advertise for bids on this work.

GERMANTOWN ROAD.

Survey finished .....April 18, 1905.
Estimate submitted .....June 26, 1905, for 1 mile = $5654.88
Contract signed .....July 25, 1905, for 1 mile = 4501.50
Work begun .....Sept. 27, 1905.
Work stopped ..... ————————, 0.5 mile built.
Maximum grade before improvement, 6.50%.
Maximum grade after improvement, 3.33%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	2700 cu. yds.	$0.30	$810.00
Cement rubble masonry	14 cu. yds.	4.00	56.00
Vit. clay pipe, 15"	26 ft.	.75	19.50
Iron water pipe, 12"	48 ft.	2.00	96.00
6" macadam	7040 sq. yds.	.50	3520.00
			$4501.50

[1] Includes cutting down hills.

Remarks.—Owing to the delay of the contractor in beginning work on this road after the execution of the contract, and to subsequent delays in securing the necessary materials, the progress of the work has not been as rapid as it should have been.

LAYTONSVILLE ROAD.

Survey finished .....April 14, 1905.
Estimate submitted .....May 9, 1905, for 1 mile = $5656.37
Contract signed .....June 13, 1905, for 1 mile = 4210.76
Work begun .....July 6, 1905.
Work stopped .....Oct. 21, 1905, 1 mile built.
Maximum grade before improvement, 9.00%.
Maximum grade after improvement, 3.33%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	2936 cu. yds.	$0.31⅝	$928.51
Cement rubble masonry	27 cu. yds.	4.35	117.45
Vit. clay pipe, 18"	48 ft.	1.00	48.00
Tile underdrain, 4"	100 ft.	.16	16.00
Iron water pipe, 14"	72 ft.	2.00	144.00
6" macadam	6640 sq. yds.	.42	2788.80
8" macadam	400 sq. yds.	.42	168.00
			$4210.76

[1] Includes reduction of grades.

Remarks.—The prices made by the contractor are considerably lower than estimated by this office, but as the same contractor, after completing the first mile, offered to extend the work for another half a mile at the same prices, with the exception of the price for excavation, in which he made an increase of 9 cents per cubic yard, it is to be presumed that they were satisfactory to him, and that owing to his ability to secure satisfactory material advantageously near the work and by efficient management, the cost was thus kept down.

OLD BALTIMORE ROAD.

Survey finished .....July 10, 1905.
Estimate submitted .....Aug. 16, 1905, for 1 mile = $7049.30
Contract signed .....Oct. 17, 1905, for 1 mile = 6627.35
Work begun ..... ————.
Work stopped ..... ————.
Maximum grade before improvement, 11.00%.
Maximum grade after improvement, 7.00%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation	5730 cu. yds.	$0.45	$2578.50
Cement rubble masonry	19 cu. yds.	4.00	76.00
Vit. clay pipe, 15″.....	32 ft.	.75	24.00
Vit. clay pipe, 18″.....	28 ft.	1.00	28.00
Vit. clay pipe, 30″.....	28 ft.	2.00	56.00
6″ macadam	7027 sq. yds.	.55	3864.85
			$6627.35

Remarks.—A considerable proportion of the cost of this road is accounted for by the grading necessary before permanently improving the surface.

OLD GEORGETOWN ROAD.

Survey finished .....June 30, 1905.
Estimate submitted .....Aug. 31, 1905, for 1 mile = $6219.57
Contract signed .....Nov. 8, 1905, for 1 mile = 5593.60
Work begun .....Nov. 22, 1905.
Work stopped ..... ————.
Maximum grade before improvement, 9.20%.
Maximum grade after improvement, 3.00%.

FIG. 1.—Aiken Avenue, Cecil County.
BEFORE IMPROVEMENT.

FIG. 2.—Aiken Avenue, Cecil County.
BEFORE IMPROVEMENT.

FIG. 3.—Garrison Road, Green Spring Valley, Baltimore County.
BEFORE IMPROVEMENT.

FIG. 4.—Earlton-Havre de Grace Road, Harford County.
AFTER IMPROVEMENT.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	2700 cu. yds.	$0.50	$1350.00
Cement rubble masonry	3 cu. yds.	6.00	18.00
Iron water pipe, 12″	24 ft.	3.00	72.00
6″ macadam	7040 sq. yds.	.59	4153.60
			$5593.60

[1] Includes grading hill.

Remarks.—It will be noted that a considerable sum was spent in securing a large improvement in the grades.

POOLESVILLE ROAD.

Survey finished .....June 17, 1905.
Estimate submitted .....July 21, 1905, for 1 mile = $7824.85
Contract signed .....Aug. 24, 1905, for 1 mile = 6633.55
Work begun ..... ————.
Work stopped ..... ————.
Maximum grade before improvement, 12.30%.
Maximum grade after improvement, 7.00%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	8500 cu. yds.	$0.38	$3230.00
Cement rubble masonry	25.3 cu. yds.	3.50	88.50
Vit. clay pipe, 15″	30 ft.	.75	22.50
Vit. clay pipe, 24″	54 ft.	1.75	94.50
Vit. clay pipe, 24″ (relaying)	56 ft.	1.25	70.00
6″ macadam	6800 sq. yds.	.46	3128.00
			$6633.55

[1] Includes grading heavy hills.

Remarks.—As will be seen by the above figures, a large portion of the cost of this work was due to a desire to reduce the heavy grades of the old road, and as shown a large reduction was made.

PRINCE GEORGE'S COUNTY.

LIVINGSTON ROAD.

Survey finished .....May 13, 1905.
Estimate submitted .....June 19, 1905, for 1.4 miles = $9279.05.
Contract signed .....Sept. 5, 1905, for 1.2 miles = 8745.25
Work begun .....Sept. 20, 1905.
Work stopped ..... ————, 1 mile built.
Maximum grade before improvement, 8.05%.
Maximum grade after improvement, 6.20%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	3120 cu. yds.	$0.50	$1560.00
Cement masonry [2]	8 cu. yds.	6.00	48.00
Steel concrete masonry [2]	11 cu. yds.	12.50	137.50
8″ gravel macadam	9333 cu. yds.	.75	6999.75
			$8745.25

[1] Includes reducing grades.
[2] Includes new bridge to replace old wooden one.

Remarks.—The difficulties met with by the contractor, in securing crushed stone for this road, have delayed its completion. The cost of the work has been high for the following reasons; first, lack of competition among bidders; second, distance of the work from stone supply, it being a haul of about four miles from the center of the improvement to the nearest freight station; third, the necessity for reducing some bad grades; fourth, the desire to replace an old wooden bridge with a permanent structure.

MARLBORO ROAD.

Survey finished ..... Dec. 3, 1904.
Estimate submitted ..... Mar. 31, 1905, for 2 miles = $12,765.06
Contract signed ..... June 22, 1905, for 1.3 miles = 13,008.54
Work begun ..... June 26, 1905.
Work stopped ..... ————————, 0.95 mile built.
Maximum grade before improvement, 9.60%.
Maximum grade after improvement, 5.00%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	6427 cu. yds.	$0.50	$3213.50
Cement masonry	73.44 cu. yds.	6.00	440.64
Vit. clay pipe, 15″	132 ft.	.85	112.20
Vit. clay pipe, 18″	44 ft.	1.10	48.40
Vit. clay pipe, 30″	22 ft.	1.90	41.80
8″ gravel macadam	14,080 sq. yds.	.65	9152.00
			$13,008.54

[1] Includes reducing grades.

Remarks.—Owing to lack of competition, prices are higher than usual for this work. The county, however, accepted the responsibility for any excess of cost over the estimate.

The reduction of some bad grades added to the cost, while the presence of a very fair quality of gravel along the line of the road, enabled, by its use in the first course of the macadam, a considerable reduction to be made in the cost. The average haul for the stone on this road was 1½ miles, which partially accounts for the high cost of the macadam.

WASHINGTON-BALTIMORE ROAD.

Survey finished .....Nov. 28, 1904.
Estimate submitted .....July 12, 1905, for 1.35 miles = $8880.43
Contract signed .....Nov. 26, 1905, for 1.25 miles = 9778.55
Work begun .....Sept. 8, 1905.
Work stopped ..... ————————, 1.3 miles built.
Maximum grade before improvement, 7.86%.
Maximum grade after improvement, 4.47%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.		Price.	Total.
Excavation[1]	4800	cu. yds.	$0.50	$2400.00
Cement masonry	12.7	cu. yds.	6.00	76.20
Vit. clay pipe, 12″ (relaying)	60	ft.	.45	27.00
Vit. clay pipe, 15″.....	34	ft.	.85	28.90
Vit. clay pipe, 18″.....	10	ft.	1.10	11.00
Vit. clay pipe, 18″ (relaying)	20	ft.	.60	12.00
8″ gravel macadam	11,113	sq. yds.	.65	7223.45
				$9778.55

[1] Includes widening road and reducing grades. This road is an important one, and was thought worthy of more work in this line than many others.
[2] Fourteen foot macadam.

Remarks.—Owing to the lack of competition among bidders, the contract was awarded at prices unusually high, the county being responsible for any excess of cost over the estimate.

QUEEN ANNE'S COUNTY.

CENTERVILLE-BROWN'S CORNER ROAD.

Survey finished .....May 27, 1905.
Estimate submitted .....Aug. 2, 1905, for 3 miles = $23,519.32
Maximum grade before improvement, 10.55%.
Maximum grade after improvement, 4.75%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation	7150 cu. yds.	$0.40	$2860.00
Steel concrete masonry[1]	14 cu. yds.	12.00	168.00
Brick masonry	16 cu. yds.	6.00	96.00
Concrete masonry[1]	36 cu. yds.	6.00	216.00
Vit. clay pipe, 12″	6 ft.	.60	3.60
Vit. clay pipe, 12″ (relaying)	44 ft.	.20	8.80
Iron water pipe, 12″	48 ft.	1.60	76.80
6″ macadam	21,120 sq. yds.	.85	17,952.00
			$21,381.20
Contingencies 10%			2,138.12
			$23,519.32

[1] Includes new bridges.

Remarks.—The necessity for the reduction of some bad grades on this road, and the desire to replace several rickety wooden bridges with permanent structures, contributed considerably toward the cost of the work. The remainder of the excess in cost of these three miles of road is principally due to the high cost of suitable material delivered on the road. This is one of the most important roads in the county, leading out from the county seat toward Chestertown. In its present state it is practically impassable at certain seasons of the year, as the drainage as a whole is bad. The cost to the county, under the prices obtained by advertising, for permanently improving the road as planned, and including a first-class macadam surface, good for at least twenty years without material repairs, would be less than $4000 per mile. The clerk to the County Commissioners makes the statement that, for the past ten years, the county has been spending an average of $500 per annum on this road, not including bridge repairs, or a sum equal to the annual interest on an investment of over $4000 per mile. A still further saving by this improvement would have been shown, had the amount spent for repairs on the wooden bridges been ascertainable, as the new bridges were to be of concrete and would have required no repairs, to say nothing of the advantages to be derived from easy grades and a smooth, hard road, convenient for travel at all seasons, and under any weather conditions.

SUDLERSVILLE-DIXON'S TAVERN ROAD.

Survey finished .....May 13, 1905.
Estimate submitted .....Aug. 19, 1905, for 1.3 miles = $8615.31
Maximum grade before improvement, 4.08%.
Maximum grade after improvement, 0.78%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	3200 cu. yds.	$0.40	$1280.00
Concrete masonry	11 cu. yds.	6.00	66.00
Iron water pipe, 12".....	72 ft.	1.80	129.60
Iron water pipe, 12" (relaying)	24 ft.	.40	9.60
6" macadam	9067 sq. yds.	.70	6346.90
			$7,832.10
Contingencies 10%			783.21
			$8,615.31

[1] Necessary for proper drainage and width of roadway.

Remarks.—The county decided not to improve this road.

SUDLERSVILLE-DUDLEY'S SCHOOL HOUSE ROAD.

Survey finished .....May 11, 1905.
Estimate submitted .....June 17, 1905, for 1.72 miles = $10,607.19
Maximum grade before improvement, 3.00%.
Maximum grade after improvement, 1.34%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation	2500 cu. yds.	$0.40	$1000.00
Iron water pipe, 12".....	120 ft.	1.75	210.00
Cement masonry or concrete masonry	21 cu. yds.	6.00	126.00
6" macadam	11,867 sq. yds.	.70	8306.90
			$9,642.90
Contingencies 10%			964.29
			$10,607.19

Remarks.—No contract for this road was executed by the county authorities.

ST. MARY'S COUNTY.

MECHANICSVILLE ROAD.

Survey finished .....May 25, 1905.
Estimate submitted .....Aug. 22, 1905, for 1 mile = $2986.17
Maximum grade before improvement, 8.33%.
Maximum grade after improvement, 2.40%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	2600 cu. yds.	$0.30	$780.00
Concrete masonry	13.5 cu. yds.	6.00	81.00
Vit. clay pipe, 15"	22 ft.	.80	17.60
Vit. clay pipe, 18"	24 ft.	1.00	24.00
Vit. clay pipe, 24"	26 ft.	2.00	52.00
8" gravel macadam	5867 sq. yds.	.30	1760.10
			$2,714.70
Contingencies 10%			271.47
			$2,986.17

[1] Includes cutting hills, raising low places and widening roadway.

Remarks.—The county authorities did not advertise for bids on this work.

TALBOT COUNTY.

BAYSIDE ROAD.

Survey finished .....July 31, 1905.
Estimate submitted .....Aug. 11, 1905, for 1.12 miles = $4913.37
Contract signed .....County, for 1.12 miles = 4147.77
Work begun .....Oct. 17, 1905.
Work stopped ..... ————————, 0.5 mile built.
Maximum grade before improvement, 1.95%.
Maximum grade after improvement, 0.90%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation [1]	1100 cu. yds.	$0.50	$550.00
Brick masonry	13.3 cu. yds.	6.00	79.80
Vit. clay pipe, 15" (relaying)	22 ft.	.35	7.70
Vit. clay pipe, 24" (relaying)	22 ft.	.60	13.20
Iron water pipe, 14"	24 ft.	2.00	48.00
Iron water pipe, 18"	24 ft.	3.00	72.00
Shell macadam [2]	6000 sq. yds.	.50	3000.00
			$3,770.70
Contingencies 10%			377.07
			$4,147.77

[1] Includes widening road.
[2] Nine feet wide.

Remarks.—At the request of the county authorities, the use of shell was considered by this office. The improvement, according to the same plans, but with macadam surfacing over a first course of oyster shells, would have cost $5577.77. By omitting the stone surface and building the road entirely of oyster shells, it was estimated that the cost could be reduced to the above figures. The saving to the county is $715. The maintenance of the road when improved must be borne entirely by the county, and it is extremely doubtful if a better investment would not have been made by following the original plans for a stone surface, especially in view of the fact that the stone surface would not only require less repairs, but would last probably five times as long as the shell road, before needing a thorough resurfacing. The cost of resurfacing the road at the end of that period with stone would not greatly exceed the cost of resurfacing with shells.

Owing to poor management on the part of the county, the actual cost of the work on this road will probably be excessive.

WASHINGTON COUNTY.

CLEARSPRING ROAD.

Survey finished .....Nov. 19, 1904.
Estimate submitted .....Mar. 30, 1905, for 2 miles = $10,200.10
Contract signed .....June 27, 1905, for 2 miles = 6,371.17
Work begun .....July 11, 1905.
Work stopped .....Dec. 23, 1905, 0.4 mile built.
Maximum grade before improvement, 9.40%.
Maximum grade after improvement, 7.70%.

ESTIMATED QUANTITIES AND CONTRACT PRICES.

Item.	Quantity.		Price.	Total.
Excavation[1]	5134	cu. yds.	$0.55	$2823.70
Borrow	850	cu. yds.	.22½	191.25
Cement masonry	46.46	cu. yds.	2.40	111.50
Vit. clay pipe, 15″	22	ft.	.75	16.50
Vit. clay pipe, 18″	88	ft.	.85	74.80
Iron water pipe, 12″	120	ft.	1.42	170.40
6″ macadam	7811	sq. yds.	.22	1718.42
Resurfacing	6323	sq. yds.	.20	1264.60
				$6,371.17

[1] Includes grading hill.

Remarks.—The desire to materially reduce some of the bad grades on the old road, including a relocation to straighten and shorten the road at one point, together with the necessity for several culverts, has added considerably to the cost of this improvement. The progress of the work has been most unsatisfactory. The contract called for its completion on or before September 2, 1905, and with proper equipment and methods this would have been entirely possible. The contractor, however, lost some time in beginning the work, and since then has never pushed the work as he should. The equipment has been inefficient and the management of the work poor. Both the contractor and his bondsmen have been repeatedly notified of this condition of affairs, with but little effect on the progress of the work. It is to be hoped that entirely different methods and management may be substituted at the starting up of the work in the spring, and that it may be pushed to an early completion.

HANCOCK ROAD.

Survey finished .....June 26, 1905.
Estimate submitted .....July 10, 1905, for 1.6 miles = $9366.79
Maximum grade before improvement, 12.52%.
Maximum grade after improvement, 8.00%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.		Price.	Total.
Excavation 7000	cu. yds.		$0.50	$3500.00
Vit. clay pipe, 15″..... 120	ft.		.80	96.00
Vit. clay pipe, 18″..... 26	ft.		1.00	26.00
Iron water pipe, 14″..... 24	ft.		2.00	48.00
Steel concrete masonry..... 3.2	cu. yds.		12.00	38.40
Cement masonry 43	cu. yds.		5.00	215.00
6″ macadam 10933	sq. yds.		.42	4591.86
				$8,515.26
Contingencies 10%				851.53
				$9,366.79

Remarks.—As will be noticed, grading, culverts, etc., make up a large part of the estimated cost. This work is rendered necessary by the present faulty location and condition of the road, and its cost includes the

cost of relocating, straightening, and widening the same and for securing permanent and satisfactory results.

Owing to delays on the part of the county authorities and to some difficulties over the bids received, the contract has not yet been executed.

WORCESTER COUNTY.

BERLIN-HAYES' LANDING ROAD.

Survey finished .....June 5, 1905.
Estimate submitted .....July 19, 1905, for 1.12 miles = $8623.56
Maximum grade before improvement, 1.90%.
Maximum grade after improvement, 0.80%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.		Price.	Total.
Excavation[1]	830	cu. yds.	$0.40	$332.00
Borrow[1]	900	cu. yds.	.60	540.00
Cement, concrete, or brick masonry	17.5	cu. yds.	6.00	105.00
Vit. clay pipe, 15".....	24	ft.	.80	19.20
Vit. clay pipe, 12" (relaying)	48	ft.	.25	12.00
Vit. clay pipe, 18" (relaying)	30	ft.	.30	9.00
Vit. clay pipe, 24" (relaying)	56	ft.	.40	22.40
6" macadam 8000		sq. yds.	.85	6800.00
				$7,839.60
Contingencies 10%				783.96
				$8,623.56

[1] Includes shaping, grading for drainage, and widening roadway.

Remarks.—Owing to lack of acceptable bids, no contract has been executed. The County Commissioners decided to go ahead with the improvement, with the county forces, but owing to their inability to secure a proper steam roller, no actual construction has been begun up to this time.

GOOD WILL ROAD.

Survey finished .....June 29, 1905.
Estimate submitted .....Sept. 7, 1905, for 2 miles = $15,052.07
Maximum grade before improvement, 2.80%.
Maximum grade after improvement, 0.57%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	3066 cu. yds.	$0.40	$1226.40
Concrete masonry or brick masonry	36.5 cu. yds.	6.00	219.00
Vit. clay pipe, 12"	76 ft.	.60	45.60
Vit. clay pipe, 24"	10 ft.	1.75	17.50
Vit. clay pipe, 15" (relaying)	28 ft.	.30	8.40
Vit. clay pipe, 18" (relaying)	24 ft.	.40	9.60
Vit. clay pipe, 24" (relaying)	40 ft.	.50	20.00
Iron water pipe, 12"	72 ft.	1.60	115.20
Iron water pipe, 16"	24 ft.	2.25	54.00
6" macadam	14,080 sq. yds.	.85	11,968.00
			$13,683.70
Contingencies 10%			1,368.37
			$15,052.07

[1] Includes shaping, grading for drainage, and widening roadway.

Remarks.—The proper drainage of this road and provision for taking care of storm water necessitates a considerable expenditure, as will be noted.

No contract for this work has been executed by the county authorities.

MILE POST ROAD.

Survey finished .....June 23, 1905.
Estimate submitted .....Sept. 27, 1905, for 1 mile = $9224.60
Maximum grade before improvement, 3.25%.
Maximum grade after improvement, 0.75%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	5000 cu. yds.	$0.40	$2000.00
Concrete masonry or brick masonry	4 cu. yds.	6.00	24.00
Vit. clay pipe, 18"	26 ft.	1.00	26.00
6" macadam	7040 sq. yds.	.90	6336.00
			$8,386.00
Contingencies 10%			838.60
			$9,224.60

[1] Includes shaping, grading for drainage, and widening roadway.

Remarks.—Owing to lack of aeceptable bids on this road, no contract was exeeuted. The County Commissioners deeided to go ahead with the improvement, with the eounty forees, but owing to their inability to seeure a proper steam roller, no aetual construction has been begun up to this time.

SNOW HILL-PURNELLS ROAD.

Survey finished .....June 1, 1905.
Estimate submitted .....June 28, 1905, for 1 mile = $8211.28
Maximum grade before improvement, 3.70%.
Maximum grade after improvement, 2.42%.

ESTIMATED QUANTITIES AND PRICES.

Item.	Quantity.	Price.	Total.
Excavation[1]	3000 cu. yds.	$0.40	$1200.00
Brick masonry or cement Rubble masonry	18 cu. yds.	6.00	108.00
Iron water pipe, 12"	96 ft.	1.80	172.80
6" macadam	7040 sq. yds.	.85	5984.00
			$7464.80
Contingencies 10%			746.48
			$8,211.28

[1] Includes shaping, grading for drainage, and widening roadway.

Remarks.—No eontract for this work has been executed by the county authorities.

GENERAL ASSISTANCE TO COUNTIES.

Most of the counties which have heretofore engaged in permanent road improvements and have applied, as mentioned in the reports for 1904 and previously, for assistance from this office in the matter of the proper planning, estimating, and supervising such work, have turned their full energies this year to taking advantage of the State Aid Act, and consequently this office has furnished but little general assistance to the counties during 1905. This office has offered particularly to furnish all the assistanee possible to those Eastern Shore counties desiring to proceed on their own account with the construction of sand-clay roads, which

have not been felt by this Commission to come within the provisions of the State Aid Act, and to do what it could and they desired, in the matter of planning and supervising the same. No county, however, has yet reached the point in this matter where the services of this office have been requested.

SURVEYS OF STATE PROPERTIES.

Owing to the demands on the working force of the Highway Division under the State Aid Law this year, the prosecution of the surveys of State property, begun last year, has been postponed temporarily. With the shutting down of road construction on the approach of winter, every effort will be made to push these surveys by utilizing, as far as possible, the employes of the Survey, who have been up to this time otherwise engaged.

LABORATORY TESTS.

Following is a list of the tests made in the laboratory of the Survey during 1904 and 1905. No changes have been made in the tests or the methods since they were described in previous reports. The total number of tests made in the two years was:

	1904.	1905.
Paving Brick Tests	81	118
Macadam Tests	5	54
Grand Total	86	172

CONCLUSION.

Some criticism, evidently from parties unacquainted with actual conditions, has reached this office that the cost of work in Maryland has been too great, and unnecessarily so. As before shown, the average cost per mile of our work has been considerably less, than similar work in other States, and it is believed by those who have had the opportunity to compare the results in the different localities, that the work completed in this State is as serviceable and permanent as the more costly work

elsewhere, although perhaps slightly less attention has been paid to finish and the appearance of details, and less grading done.

Could the figures in the different counties of the cost of construction and maintenance of county roads be accurately secured, they would undoubtedly show that it is not only good business for the counties to invest their half of the average of $5300 per mile in improving the more important county roads, according to the methods of modern road building, but, that a still greater investment would be warranted. In such individual cases where the figures can be ascertained, this statement is fully borne out. For instance, in Queen Anne's County, this office, in response to an application, planned and estimated the cost of improving three miles of road out of Centerville. On account of the desired reduction of some bad grades on hills and the necessity for rebuilding several old rickety wooden bridges, the cost of the work ran up to $7000 per mile, which figure included a macadam surface for the road. The clerk to the County Commissioners informed us that the county had spent, during the past ten years, an average of $500 per year on this stretch of road, not including the amount spent for repairs to bridges. The cost to the county, under the State Aid Act, of the proposed improvement would have been less than $11,000, interest on which at 4 per cent would be $440 per annum, a saving over the amount actually expended on this road of at least $60 per annum, neglecting entirely the total saving in repairs to bridges—as the new bridges were planned to be of concrete and would have required no repairs—and neglecting further the advantages of reduced grades and a stone surface in good condition every day in the year, over steep grades and an impassable road during certain seasons. A modern macadam road in such a locality should require no material repairs for at least twenty years, and at that time the resurfacing necessary would amount to less than $2000 per mile.

It has been said that "*good enough* roads should be built for $1000 per mile." All employers and business men have their opinion of "*good enough*" work. To macadamize a mile of road with stone 12 feet wide and 6 inches thick after rolling, requires from 1900 tons of

limestone to 2300 tons of trap rock. This material costs, delivered on the road, from $2000 to $4500. It will be seen that the material alone is a large part of the cost per mile, and to meet the objections or some criticisms from those who have watched the construction of turnpikes, or what has been called permanent work, in some of the counties, would require the use of at least 50 per cent more material, thus materially raising the cost. By the use of modern machinery and methods it has been proved that even with the apparently thin layer of macadam used, a modern road is fully as permanent and more satisfactory than those built of considerably more material under old methods, and that an actual saving in cost is made. Many of those who estimate that roads should be macadamized for $1000 per mile have in mind particular instances where, through contributions from those interested, of labor, or men and teams, where no grading, culverts, or bridges were required, and at a period when materials could be secured more cheaply than at present, perhaps the bare cash expenditure was kept approximately to this figure, although it is extremely doubtful if the figures are exact and cover all the items. The records show that the turnpikes of Maryland cost from $7000 to $10,000 per mile, and even more in some cases. Some figures on recent work in this vicinity are as follows:

GREEN SPRING AVENUE.

In June, 1902, the Park Commission of Baltimore City requested estimates and specifications from this office for the improvement of about three miles of this road, extending from the northerly side of Druid Hill Park to West Branch Bridge, in Baltimore County. Plans, specifications, and estimates were furnished the Park Commission, as requested, for doing the work in a permanent and suitable manner. The estimated cost was approximately $13,000. The Park Commission felt at that time unable to put this amount of money into the work proposed, and patched up the road according to their own ideas, at a cost, we understand, of about $6000. Recent inspection seems to indicate that at an early date an approximately equal sum will have to be expended to

restore the surface of this road to fair condition. There is every reason to suppose that, had the work been done according to the original plans and specifications furnished in 1902 by this office, it would have been entirely possible to have maintained the road in first-class condition at a nominal expense for at least ten years.

WARREN ROAD.

This road extends from the York Turnpike easterly and northerly to the mills of the Warren Manufacturing Company, on the Gunpowder River. A contract has recently been executed between the county and Hook & Ford, of Baltimore City, for the improvement of this road, at a contract price of approximately $14,000. The work covered by the contract is on 4500 feet of road, which would make the average cost per mile of this work $16,500. The high cost of this piece of road is principally due to the necessity for building a large amount of masonry to protect the road from floods, and also because considerable grading is included.

WORCESTER COUNTY.

The Town Council of Snow Hill has, within the past few years, surfaced some of the more important streets of the town with crushed stone. Details of the work are not at hand but the statement has been made by one of the council that the cost of this work has averaged about five thousand dollars ($5000) per mile and that no bridges or culverts were included in this figure.

PARK HEIGHTS AVENUE.

In 1903 this office, at the request of the Baltimore County Roads Engineer, made surveys of Park Heights Avenue from the City limits to the Old Court Road, and drew up plans and specifications for the improvement of the same under his direction. The work was advertised and bids were received for performing the same, but no contract was let. In 1904 the citizens of the locality, by contributing 25 per cent of the estimated cost of the work, secured the execution of a contract between

the county and Hook & Ford, of Baltimore City, for the construction of this road according to the original plans and specifications, slightly modified. The work has just been completed and the results seem entirely satisfactory to those interested. The contrast between the old road and the new work is most marked. This avenue now more nearly approaches the best modern work in this country than anything else in the State. The cost has been approximately $8870 per mile, and the width of the macadam averages 24 feet. There was practically no grading done, nor was the construction of any new bridges or large culverts necessary.

GENERAL AND SPECIAL POINTS FOR CONSIDERATION IN CONNECTION WITH ROAD IMPROVEMENT.[1]

In its Report for 1893, the Massachusetts Highway Commission says:

"Among the several influences which have led to the decay of New England agriculture, the tax imposed by bad roads, which serves to favor the distant producer, deserves a foremost place. Of all the burdens which our farmers bear, this is one which can be most readily and completely removed. That it ever was imposed is a discredit to our people.

"Although the commercial value of good roads is a matter of the utmost importance to a people, their greatest value is to be found in the influence they exercise on the social and moral conditions of the districts which they serve. In all societies the tone of the life to a great extent depends on the ease with which the intercourse between the households can be maintained. The people of this country are, however, particularly dependent on their contacts; a self-governed folk, their counties need a ready access to each other. Common understandings, bred of close acquaintance are the basis of their life. The tax which bad roads put upon public meetings, attendance on schools and churches, and their other modes of associated action, is an evil which should not be patiently endured."

"The statistics of this country show an ever-increasing tendency on the part of our people to gather into the cities. Although this relative gain in the urban population is doubtless due to a diversity of influences, there can

[1] Many of the paragraphs which follow have been taken directly from the Annual Reports of the State Commissions of Massachusetts, Connecticut, New Jersey, Ohio, and other States. In some instances the matter was so well expressed and so applicable that it was incorporated bodily into the discussion. In other instances it was felt that the material, with slight changes to meet local conditions, was exactly what was needed, and with these changes, has been used. We wish to acknowledge, in this place, our indebtedness to the original authors.

FIG. 1.—Churchville-Worthington Corner Road, Harford County.
BEFORE IMPROVEMENT.

FIG. 2.—Churchville-Worthington Corner Road, Harford County.
AFTER IMPROVEMENT.

FIG. 3.—Earlton-Havre de Grace Road, Harford County.
AFTER IMPROVEMENT.

FIG. 4.—Earlton-Havre de Grace Road, Harford County.
AFTER IMPROVEMENT.

be no question that one of the reasons for it is to be found in the condition of our country roads. In the present state of these, country life is made much less agreeable and profitable than it would be if the tax which bad roads imposed was done away with. The evidence goes to show that our people are in many regards better placed in well-conditioned rural districts than in the great towns. All those who are considerate of our future desire to see every hindrance to the development of our rural population removed, in order that the folk may be induced to retain that hold upon the soil which has been for ages the basis of their strength. Clearly the first step to attain this end is to improve the condition of our highways."

The last Federal census, taken in 1900, shows that there has been an increase in the farm values of the United States amounting to twenty-seven per cent, and that only four States of the Union show a depreciation in farm values. Massachusetts shows the largest percentage of increase in these values, and this increase has developed since the road improvements there were begun. Prior to that time farm values in that State were also depreciating.

Generally speaking, the highways of Maryland may properly be said to be in bad shape. In part, this unsatisfactory condition of the public roads in the State should be attributed to the defective ways of construction, and a lack of knowledge as to the proper means of administering the appropriations for that work and for repairs. In many cases, also, the evils arise from the relatively small amount of money which is devoted, or perhaps can properly be given, by the counties for use on the highways.

Lack of expert knowledge is one of the most important causes of our bad roads, and if they are to be improved, it is absolutely necessary that they should not only be constructed, but also supervised in their maintenance, by experienced and competent road builders. Until this is done it is useless to expect an efficient expenditure of the road funds.

The large majority of the people, including the officers in charge of the roads, do not travel far from home and do not know what a first-class road really is, and the advantages which it offers; but occasionally when some one does, he is enthusiastic in his praises of such roads, and denounces the people at home for not improving their roads. He has had an object lesson not enjoyed by his neighbors. When the people at

large are familiar with good roads, there is no doubt, judging by the result in other States, but that they will be equally impressed with their advantages and will make the necessary effort and take the necessary steps to improve all the roads. Something must be done to bring this knowledge home to the people, and of all methods that of building model roads in different sections is the most effective; but it is absolutely essential that such roads be built under the direction of persons who know what good roads are and understand thoroughly how they should be built.

The art of road building consists mainly in constructing a wearing surface which shall be able at all times to bear up the load that may be hauled over it.

The farmer by using very broad tires may be able to haul small loads for a limited number of times over the greensward. If the amount of the load is increased, the width of the tire decreased, or the vehicle passed repeatedly in the same tracks, the wheels soon cut through the sod and softer soil until they reach a comparatively firm foundation. The depth of the ruts thus formed would depend on the character and number of loads hauled, the condition of the soil, and the state of the weather. These facts should be most carefully noted by those who have any roads to construct. A light carriage which might do no injury to a dry road would soon destroy a wet road.

Water may reach a roadway either by falling as rain directly upon it, by flowing upon it from either side, or by lateral seepage through the ground. Rain falling directly on the surface will do little or no harm to a well-constructed road, on the contrary often improving it, but if it be allowed to reach and remain in the foundation, the road will soon be destroyed. There are two rules which must be observed in order to maintain a road in good condition; first, to take the water out; second, to keep the water out. If these simple rules are followed, the foundation will be dry and therefore well fitted to uphold the surface, while the surface, being impervious to water at all times and under all conditions, is fitted to withstand the wear it may properly be called upon to bear.

Where sand or gravel underlies a road which is moderately elevated, no special precaution need be taken to carry off the water, as it will

quickly pass downward to where it can do no harm. If a road is constructed over a clay or loam foundation, then the safer method will be to put in suitable drains. If the ground is level or rises on both sides, one drain may be placed on each side; if the road traverses the side of a hill, one drain constructed on the uphill side will cut off the ground water and prevent its passage into the road.

Whatever method of drainage be used, the drains themselves should be connected with the natural watercourses. Drains should be built by excavating longitudinal trenches from two and a half to three feet deep and ten to twelve inches wide, to be filled in with broken stone, coarse gravel screenings, or pebbles. A small drain tile is usually placed in the bottom of the trench, the stone to be thoroughly tamped over it, to prevent any further settlement of the surface. By careful underdraining an otherwise poor material may make a good roadway.

Either iron or vitrified clay pipes may be used for culverts up to 24 inches in diameter, the ends being in all cases protected by stone masonry. The larger culverts may be built of concrete. From experience, this office has felt justified in accepting only good materials and workmanship in all masonry. The first cost of good work may be slightly greater, but the final cost is surely less.

The sub-grade, or the ground on which the surfacing rests, must be thoroughly compacted by rolling. If necessary, gravel may be laid on before rolling, to prevent the soil of the sub-grade from pressing up among the stone.

The wearing surface of a road may consist of broken stone, gravel, oyster shells, marl, etc.

For surfacing a roadway it may be said in general that a rock should be at once hard, tough, resistant to the ordinary agents of decay, yet capable of being broken into bits by the road hammer or the stone crusher. When fractured, the fragments of stone should not be scaly nor have smooth faces; they should on the contrary be cubical with rough surfaces, in order that when driven together they may unite in a somewhat solid manner. It is also most advantageous for the finer sizes of the broken stone to have some of that cementing or "setting" quality

which belongs to mortars and cements. Within the limits of Maryland two groups of rocks, those known as "traps," and the "limestones," possess in a high degree the above-mentioned qualities.

The limestones, especially the harder varieties, are particularly desirable for country road purposes. Their high cementing value prevents a road constructed of them from "ravelling,"—as is often the case when some "traps" are used,—and further resists the washing effect of storms. There is danger, in an indiscriminate use of limestone, that varieties too soft for the purpose may be offered, in which case, not only will the road wear out rapidly, but ground for severe criticism of the road, on account of the resulting mud and dust, will be afforded.

If, before attempting to construct a stone road these fundamental requirements are observed, better results are sure to be obtained and money saved. The most important of all, and on which too much stress cannot be laid, is that of previously grading the road-bed before surfacing. This is referred to elsewhere, but is such an important consideration, and a part of road-construction which has been so much neglected, that repetition is not amiss. In fact, the surfacing of steep grades is otherwise an absolute waste of money and material. After a road has received a layer of stone it is very difficult to have further improvements made, as these necessitate the removal of the stone surfacing, and there always exists a prejudice against improving what is already considered an "improved road." The surfacing of an ungraded road simply preserves it in a bad condition, making it more expensive to reconstruct as it should be. Furthermore, the expense entailed for use and maintenance by an excessive grade should be considered.

No greater improvement of the highways of Maryland can be suggested than a reduction of the excessive grades now found in so many counties. It is an improvement which does not need to be and cannot be made upon all the roads at once, but it is one toward which much of the money now spent on useless so-called repairs can be applied with real and lasting benefit to the roads.

It is impossible to find a single material and method of road construction which will suit all conditions. A material and method of

construction perfectly adapted to a road in one locality may be entirely unsuited to a road in another. The reason for this is obvious. The traffic may be entirely different in kind, and the local physical conditions may vary in a host of important particulars. The surest criteria by which to select methods and materials are those obtained by experience.—criteria dearly bought in most instances, and slow of attainment in all. The average constructor of roads must rely to a very great extent on the observations and experience of others. The laboratory tests of road materials, by means of which the physical properties of the available materials may be ascertained from small samples, will, however, permit a rapid and accurate estimation of the value of a material.

In the construction of roads, the attempt should be made to get a perfectly smooth surface, not too hard, too slippery, or too noisy, and as free as possible from mud and dust; and these results are to be attained and maintained as cheaply as possible. Such results, however, can be had only by selecting the material and methods of construction best suited to the conditions.

When crushed stone is used for road building, the best results are generally obtained when rock suited to the conditions is laid in courses on a perfectly drained foundation, sufficiently rolled and properly crowned to shed the surface water, and the finished surface is made to conform to the foundation. The thickest course, which is composed of stones of the largest size, is placed at the bottom; one or more thinner layers of finer stone cover this, and a very thin layer of binder, or screenings of the same stone, is placed on top. Each course is thoroughly rolled before the next is spread over it. Too much attention cannot be given to the binder, for, if it is of a poor quality or improperly used, not only will it be difficult to make the material compact under the roller, but it will not shed the surface water properly, and the coarse stone is sure to work loose and up on the surface in dry weather.

The surface of the roadway should be so shaped as to allow the water to flow quickly into the gutter. If the rise from the gutter is great, the travel is forced to pass along the center, and this will soon wear down to such an extent that water will stand on the surface of the way. In

addition to this, the water will make gullies in the sides of the roadway, which will at all times be a discomfort and often indeed dangerous to travelers. The crown to be given is not to be determined by any fixed rule, but the best roadmasters allow from one-half to an inch on level ground, and as much more on a hill as will allow the water to reach the gutters before it can attain a velocity that will do any harm.

A macadamized road will endure for a longer time if its surface is sprinkled often enough to keep it damp. The screenings when damp possess greater cementing powers, and the stone will not so easily be kicked out by the horses' feet. It must be borne in mind that the covering of screenings should be expected to do more than bind the metal firmly together.

As regards the width adopted for the hardened way, this office has considered that the main aim of the laws under which they were acting was to secure the greatest possible length of good roads at the least possible expense.

The width adopted by other States has varied from ten to fifteen feet for the macadam or from sixteen to twenty-one feet for the roadway. The standard macadam adopted by this office for this year's work has been twelve feet, with modifications under certain conditions. In one or two instances this width has been increased to a maximum of fourteen feet and decreased to a minimum of nine feet in others. In these cases the total width of the roadway including shoulders, available for travel has varied from a minimum of nineteen feet to a maximum of twenty-four.

The bridges which existed on the roads which have been improved under State Aid have been found in most cases to be in a very unsatisfactory condition. The improvement of the existing bridges has in many cases added materially to the cost per mile of road built, especially in the cases of the shorter sections. The reconstruction of practically every wooden bridge has been a necessity in order that it might support safely the steam roller as well as the traffic. Also this office has felt that the intention of the act providing for assistance by the State in public road improvement was to include the proper improvement, as de-

manded, at the same time, of the unsatisfactory and expensively maintained wooden structures.

The general plan has been to replace these with pipe culverts or concrete bridges and thus forever do away with further expense for the maintenance of expensive and dangerous wooden structures. In but two instances has the State approved the use of other materials. There the conditions required the approval of the use of a steel bridge with a wooden floor.

There is no more forceful argument for road improvement than a sample of good road, and it has been the experience, not only in Maryland but elsewhere, that very frequently those who oppose building a piece of road do so through ignorance of the results, and, when once these results are made evident by a practical example, no further argument is needed. There is no doubt of the great advantages accruing from a system of model roads in every county in the State. Such roads have been built in a number of other States where, in many cases, the work has been much extended beyond that of merely model roads. A practical and more effective impetus is in this way given toward universally better methods of road construction and maintenance than could ever be produced by all the road literature and conventions combined.

The interesting feature of this work is the beneficial effect it has upon the county officials. With the small local appropriation for road repairs in many of these counties, there is but little opportunity for the road officers to experiment. The methods of past generations are generally followed, and ordinarily no permanent work results. The road machine moves the worn-out material from the sides to the center of the road, where it remains for a short time only, as the wheels stir it up and the rain moves it back to the gutters. The gutters which should exist along the roads have gradually filled up to a level with the roadway, and the rain water, instead of flowing freely and quickly to the natural watercourses, filters slowly into the ground, or in some instances remains in pools until it evaporates.

The fault is not wholly with these men; they may be honest and earnest, but they seldom learn from experience on account of the meager-

ness of the appropriations and their usual short term of office, and their home work is such that time cannot be spared for trips of observation.

The work done by the State in the counties is carefully planned by trained men,—men who have not only laid out similar work, but who by observation have eliminated weak points. The local road man can watch the execution of this plan under the direction of these experts; and thus acquire valuable knowledge which later on may be applied to his own roads.

In their Annual Report of 1902, the Massachusetts Highway Commission says:

"The commission finds that each year the number of good road builders is increasing. In its early work few of the engineers employed by the commission, or of the superintendents or road commissioners engaged on town work, had had experience in modern road building. A marked improvement is shown in the engineers, while many of the towns' road officers are capable of building as good a road as is built by the commission. In many cases where a town has taken the contract to build a State road, and their superintendent is fitted to do so, he is allowed to proceed without a resident engineer. It is the intention of the commission to conduct the work in this manner whenever possible, as by so doing a large saving can be made in the engineering expenses, while the town officers will be benefited by the experience. An occasional visit of the division engineers to the different roads under construction will enable the commission to see that the contracts are being properly carried out."

The intelligence and character of the citizens of Maryland should certainly warrant the expectation of similar conclusions here within a reasonable period.

GRADES AND GRADING.

So far as the grades are concerned, the roads of Maryland have been generally neglected. The alignment of our roads with reference to natural conditions, such as the nature of the ground or accessibility to materials for construction, has not been considered. The information which it is felt possible to give in this report concerning the matter of grades is but limited, for the reason that all such questions need to be discussed with reference to the particular geographical and physical conditions of the site where a road is proposed.

Very carefully made experiments show that on perfectly level surfaces the character of the roadway may very much affect the amount of power required to move a given load; thus, on a smooth-paved surface of ordinary character, 33.4 pounds of traction will start a load weighing one ton; on a first-class macadamized road, 44 pounds of traction; on a thin macadam road, with a foundation of somewhat springy nature, 62 pounds; while on a gravel road of good character, 140 pounds is required to start the load.

The same facts may be otherwise expressed by the statement that where one horse would pull a load on a good pavement four are required on a gravel road. These differences in the pulling power required on roads apparently level is due to the existence of slight irregularities, which are in fact grades; that is, they require a load to be drawn up hill. When a road has a measurable incline, the effect is to give a constant element of grade or of difficulty which may be definitely measured.

It has been experimentally determined that on a grade of two and one-half per centum, that is, with a rise of two and one-half feet in elevation in a hundred feet of length, the load on ordinary wheels will not run down hill, or in other words, the team can be stopped without "chucking." This seems also to be the grade at which a horse can pull, while moving at a walk, a load of given weight as easily as he can draw it at a trot on a level surface. On these accounts the above-mentioned grade has been accepted by the best roadmasters as that which should be used wherever the expense involved in so doing is not likely to be excessive.

In a similar way, though from less definite sources of determination, the conclusion has been reached that grades as steep as six feet in the hundred are about the maximum which should be allowed on any high-class roads.

It is a well-recognized fact that with the increased steepness of a road the difficulties arising from the fall of rainwater over its surface are rapidly enlarged, and that a considerable expense in reducing grades above a certain figure may easily be warranted by the resulting reduction in the annual cost of future maintenance.

The only question concerning alignment which has other than local and immediate interest is the relation of the line of the way to the grades which are to be encountered and to the materials to be used in construction. In general, it may be said that the roads in Maryland have had their position determined without a proper consideration as to the course which it was best for them to follow. A large part of the cost which the present ill condition of our highways imposes upon our people is due to bad defects of position.

By far the most serious defect in the old county highways is the heavy grades. These are not only a tax on the user, but they are a constant and burdensome cost to the municipalities having to care for them. Not only is the wash of storm water much greater on heavy than on light grades, but also the wear and tear due to the horses' feet.

The question as to the maximum grades to be allowed on the State Aid roads has engaged much attention from this office. In France and elsewhere in Europe no cost is spared to reduce the grades to or below five per cent. An examination of the topography of this State has shown that to fix such a limit would involve the expenditure of an exceedingly large amount of money; and it has, therefore, seemed best not to adopt any fixed rule concerning grades, but to make the determination with reference to the traffic and the cost of maintenance of each road. In the hills, where many of the ways which are likely to be improved by the aid of the State have occasional grades of from 10 to 25 per cent. it may be advisable to adopt a heavy grade until the needs of the district are provided for, rather than to delay the progress of the work by seeking a more ideal system. To reduce the declivities of these roads to five feet in one hundred would in many cases require the complete relocation of the ways. In some instances the steep grade may be considerably reduced by short detours without affecting the general plan of the ways. In a word, it seems well for the present to limit the work of improvement mainly to the existing lines of road, accepting the routes as they exist, save where it is expedient to insist on the widening of the location. On the other hand, it seems not only a good investment but mandatory to reduce within these limits the excessive grades before a perma-

nent improvement of the surface postpones indefinitely, as well as accentuates the desirability of, a reduction of the heavy grade.

GRAVEL ROADS.

There has been some discussion lately regarding the advisability of more extensive construction of gravel roads, it being assumed by some that this would make it possible to build more miles of road with the amount of money annually appropriated for the State highway work. There has been little complaint as to the excellence of the roads already built; but it has been contended that greater use of gravel for surfacing would so lessen the cost that a very much greater number of miles could be built, and in this way many localities might be relieved in the cost of caring for their roads.

With the number of miles of road in the State, and the amount of money annually appropriated, it is impossible to build macadam roads in all localities, and no one believes that such a course would be wise. In the construction of a good road with any surfacing material, there must always be a large amount of grading, drainage (both surface and underground), bridge work, including culverts, guard rails, etc., the cost of which will be a large share of the whole, and will not be affected by the character of surface material.

There are some places in the State where good gravel is obtainable at comparatively small expense, and there is no doubt but that in such places gravel roads could be built for less money than macadam roads; but there are many other cases where it would be quite as expensive to build a gravel road as it would be to build one of macadam.

Nor can there be any doubt that a macadam road, once properly built, is the cheapest road in the end, on account of the small expense for annual maintenance. Owing to the varying conditions in different parts of the State, a careful study must be made of each individual case before it can be decided what kind of a road should be built, and consideration must be given to the amount and character of traffic to which the road is subjected. In some cases elsewhere gravel roads have been built which have turned out very satisfactorily. How far this can be carried out here is

a question which can better be decided by a few years' experience; but this office should be understood as distinctly favoring the use of gravel or other less expensive road material whenever the local conditions are such as to justify it in so doing. In determining this, however, it is necessary to keep in view the fact that the final and continued cost of the system will be measured by the cost of maintenance, and also the fact that the public highways are sure to be used by a much larger number of people in the future than in the past.

It is entirely probable that good gravel can be obtained in some localities which have heretofore been thought to possess none that could be used for road building.

Roads built of screened gravel, the stone of which corresponds in size to the stone used in macadam construction, have given good satisfaction, but the wear is considerably more marked on the gravel roads.

Many prefer gravel roads to macadam to drive over. They keep in good condition the greater part of the year, but in spring and fall, if there is much rain and cloudy weather, the gravel road dries out slowly and ruts form easily. This occasions more or less adverse criticism.

The screened gravel roads are easily maintained, but wear rapidly, and, as the cost of resurfacing is nearly as great as the cost of resurfacing a macadam road, it does not seem to be economy to advise their construction, except in localities of light travel where stony gravel is abundant and broken stone obtainable only at great expense.

The gravel beds of the State vary exceedingly in their fitness for road construction. In most of them, where the pebbles are mainly of quartz or other flinty rock, and have been much rounded and smoothed by water action, the material is certain to afford a shifting foundation for ordinary wheels, unless a large amount of binding material is used with the pebbles, in which case the road becomes very muddy in wet weather. In cases where the pebbly matter has been derived from rocks of varied constitution, especially where, as is often the case, the bits have undergone a certain amount of decay, the mass may, when well rolled either by steam rollers or even by broad-tired wheels, become consolidated so as to afford a fairly good road.

Nearly all gravel banks now in use contain more or less stone from the size of an egg upward, with quite a large percentage exceeding two and one-half inches in diameter. No stones larger than two and one-half inches should be used within four inches of the surface in the construction of a road. The general tendency is for these large stones to work to the surface and to make a very rough, uneven road after it has been in use for a short time. Fine gravel will not make a good road if the travel is at all heavy. The small stones quickly crush up, and the surface of the road becomes uneven and muddy. It is very doubtful if in a term of years a gravel road will not cost as much as a macadam road, and it can never be as enduring. The wearing surface receives the shock of all traffic, and the materials for its construction must be carefully selected.

The fundamental difficulty with all roads made of ordinary gravel is to be found in the fact that the fragments of the material cannot be made to bind together, however well they may be compressed by the use of the roller; the result is that the first condition of the roadway surface which should shed water like a roof is not obtained. The rain penetrates vertically downward through the mass, breaking up what little adhesion may have been brought about, so that when a heavy team passes over it the load is not upheld. The wheels do not penetrate to any great depth in the roadway, but they form ruts, by loss of material which is ground up by that passage. Moreover, this rut becomes a place in which the water is held, and its penetration downward and the consequent softening of the roadway insures its destruction.

It is not only the duty of the roadmaster to build well, but it is as much his duty to build economically. As a general rule, the main thoroughfares throughout the State can be built and maintained by the use of broken stone for less money than by the use of any other material.

There are some of the roads of the State that might be surfaced with gravel, and its use would satisfy the demands of the traffic. It is, however, an unfortunate fact that good road-building gravel is, as compared with stone, a scarce article. It is by no means as well distributed as is stone. Saving of cost in its use is generally prohibited when the supply has to be carted more than one and one-half miles, or when screening is necessary to remove a surplus of fine sand or dirt or of coarse stone.

No just comparison can be made between gravel roads and macadam, as at no time is a gravel road in a condition to give first-class results. Suppose a two-horse load of gravel delivered on the road costs from one dollar to one dollar and twenty-five cents a load of about one and a quarter cubic yards. A road made about six inches in depth at this price would cost from twenty to twenty-five cents a square yard. More or less new gravel has to be put on each year, and it is safe to say that at the end of each five years an amount equal to the original depth has been used. This makes the total cost about four to five cents a square yard annually. If a macadam road be built of broken stone costing two dollars and fifteen cents per cubic yard of metal on the road, including rolling, the cost per square yard would be about forty-seven cents. A road built in such a manner would easily withstand the traffic common to localities removed from the business centers for twenty years, with slight repairs during that time. This would make the annual cost per square yard about two and one-third cents. By these estimates the macadam road in a term of twenty years will cost from about one and two-thirds cents to two and two-thirds cents per square yard less annually than the gravel road.

The same argument could be continued by a comparison between trap rock as the best metalling for macadam roads, or mica schist the poorest. With light traffic in a district abounding in the poorer material it might be shown to be economy to use it. On the other hand, if the traffic was known to be heavy, it would probably cost less in a term of years to use the best of trap rock, although it might have to be shipped a long distance by rail.

SHELL ROADS.

The cost of constructing and maintaining a shell road 12 feet wide and 12 inches thick in the center, reducing to 10 inches at the side, may be based upon the following estimates: Such a road requires about 9 bushels of shells per linear foot, or approximately 48,000 bushels of shells per mile, the cost of which is about 5 cents per bushel for the

material and 1 cent per bushel for the hauling, making a total of $2880. For the maintenance of shell roads in the vicinity of Salisbury, from 2000 to 3000 bushels per mile are required each year, which, at the rate of 6 cents per bushel, annually cost about $150 a mile for keeping the road in good condition. Distributing the original cost over say 40 years would make it $72 per year to add to the $150 per year for repair material, a total of $222 per year.

If, instead of shells for a wearing surface, there should be used material which offers ten or fifteen times as great resistance to wear, repairs would necessarily be much lighter and less frequent. Reference to the tables, Vol. I, pp. 327-9, giving the relative wearing qualities of the different road materials, shows that the relative value of shells as compared with the average limestone is as 9 to 1; compared to granite as 11 to 1; compared with trap rock as 16 to 1. Thus, under similar conditions, a stone road would last about twelve times as long as one built of shells.

The cost of shell roads is estimated to be from $2000 to $3000 per mile according to the width and thickness of the shell covering. It would then be a saving if a surface could be constructed of material, for example, which had ten times the wearing qualities of shells, and costing, perhaps, five times as much.

There is scarcely an important center on the Eastern Shore not in the immediate neighborhood of a wharf. Thus to all parts of this section of the State there could be sent, by water, broken stone from some of the numerous points at the head of the Bay, where there is abundant material. The estimated cost of broken stone per cubic yard, delivered at the wharf, in places on the Eastern Shore varies from $1.00 to $2.00 Shipped by rail, the cost would be greater.

Suppose that instead of shell at $2000 to $3000 per mile, stone were used, at $1.50 per ton delivered at the railroad station (that figure is the figure at Berlin now). Using 2000 tons to the mile of road would make the cost of the stone for the mile, including hauling at twenty-five cents per ton = $3750. Allow $1250 for spreading, rolling, profit, etc., and call the total cost of the macadam in place $5000 per mile. At the

end of twenty years such a road will require resurfacing at a cost of not over one-half the first cost = $2500, so that the total cost for say forty years will be $188 per year. This would be an advantage for the macadam over the shell surface of $34 per year. For a longer term, the advantage would be still greater. The indications at present point to decreased prices for crushed stone in the future and increased prices for oyster shells.

SAND CLAY ROADS.

In a large part of the Eastern Shore the surface is covered with sand. Attempts have been made here and elsewhere, and with varying degrees of success, to harden such roads by the use of clay. An effort has been made to ascertain the cost of this work. Little exact information was to be had, but a fairly accurate estimate has been made from the quantity of material used, the length of haul, and cost of labor and teams. This we find to average fifteen cents a square yard for first cost, with renewal necessary once in three years, or five cents a square yard annually. If a good macadam road can be constructed there for seventy cents a square yard, taking into consideration the small amount of travel, and that the road is estimated to last twenty years with hardly any repairs, the annual cost will be three and one-half cents per square yard, or a saving of one and one-half cents per square yard ($105.60 per mile) per year to say nothing of saving in hauling on the macadam road and further saving in the second twenty years. The macadam road would not have to be entirely rebuilt at the end of twenty years, but merely the top course renewed, at an expense of not over forty cents per square yard. In that case the average saving per year for fifty years would be two and one-half cents per square yard ($176 per mile), for the macadam as against the sand clay.

BURNT CLAY SURFACING.

Clay or soil vitrified by burning has been used satisfactorily for railroad ballast, and to a slight extent for common road surface, but by reason of the difficulty of securing complete vitrification, has not given

FIG. 1.—FEDERALSBURG-HOUSTON'S BRANCH ROAD, CAROLINE COUNTY.
BEFORE IMPROVEMENT.

FIG. 2.—FEDERALSBURG-HOUSTON'S BRANCH ROAD.
AFTER IMPROVEMENT.

very great satisfaction. Its use is considered advisable in localities where nothing better is available, but at the most, in the light of experience, it effects a temporary and not a permanent improvement.

OILED ROADS.

The use of oil for the improvement of the roads in California has brought that material into prominent consideration as a material that might be available for road improvement in the East. Two or three conditions there conspire to the result that has given locally so much satisfaction. First, the nature of the oil, having an asphalt base as distinguishing it from Ohio and Pennsylvania oils with a naphtha base. Second, the exceedingly low price at which the Los Angeles and Bakersfield oils can be secured and applied. Third, the climatic conditions, which are: dryness of climate and freedom from alternate freezing and thawing.

Experiments in a small way have been tried with oil in the moist climate and with alternate freezing and thawing in the Eastern States. Among the trials has been that at Washington City. The results at Washington, and, in fact, at any place in the East, have not been satisfactory, and at present oil cannot be classed as a satisfactory and valuable material for use on our public roads where the soil is saturated with moisture and subjected to deep and heavy alternate freezing and thawing.

COST OF WORK.

The Survey has had constantly in mind the cost of the roads built under its supervision, and, by a careful study of each road to be built, striven to eliminate every item which appears to be unnecessary for good and lasting results. The conditions met with in some parts of the State are so complex that the average cost per mile for the entire Commonwealth will continue to be fairly high, notwithstanding the simple requirements of other sections.

No class of public work offers greater opportunity for watchfulness than does road building. This watchfulness must begin with the pre-

liminary survey and continue throughout the planning and building, and end only when the last stroke of work is performed. Imperfect planning and incompetent management of the work are the two principal causes of unnecessarily high-cost work. When the survey of a road is requested, as far as possible time is allowed to carefully study the quality and location of materials, the nature of the sub-soil which is to constitute the foundation, the different parts of the drainage problem, and the grades. Particular attention is paid to the old surfacing material, with reference to utilizing it as far as possible; and it frequently happens that this last item determines the thickness of broken stone or gravel to be placed on the improved roadway. With the increased experience, which can only come from long-continued practice, the engineers charged with looking after the interests of the Commonwealth, and the contractors, who are building the roads, will perform their duties more intelligently and consequently more economically.

The cost of building roads varies with the conditions, and in no two parts of the State do the conditions agree; hence the great variation in the cost of State roads.

There are several reasons why the average cost of State Aid roads has been greater than expected by some. In its effort to accomplish the greatest good, the State has undertaken to build the most difficult sections on petitioned lines. In carrying out this policy it has been necessary to reduce heavy grades; to widen narrow roadways; to fill low places where they were overflowed by flood waters, or which were likely to fail in foundation on account of the nearness of ground water to the surfacing; to build culverts for the quick and safe removal of storm water; to place side drains for the removal of ground water; and to do many other things which increased the cost of building, but which would not appear on the finished roads to the most careful observer.

It has appeared that there are two distinct kinds of work in a first-class road: First, the preparation for the surfacing and the placing of safeguards for its future protection; and second, the surfacing itself. On some of the roads built under the State Aid Act, the surfacing has not constituted a half of the cost, and in the hill or clay districts it is

rarely the case that the surfacing has much exceeded one-half the entire cost.

As the work progresses, it should be done at a lower average cost, and a study of the tables in the reports of other states will show that this is precisely what has taken place there.

There is an almost entire lack of any records as to cost of constructing the roads of the poorer class in all parts of the State. A discussion of the comparative cost between well-constructed roads and those on which less skill has been exercised in the selection and proper arrangement of materials is thus rendered very difficult. Only those localities which are doing the best work as a rule keep such a record as will enable them to know what each part of the work costs.

One of the leading causes of poor work in many places is an entire lack of knowledge of the expense. It would seem that some general provision should be made, looking toward a system of uniform records of the cost incurred in building different kinds of road. There can be no question but that such a scheme would tend to organize a friendly rivalry between different roadmasters in the State, which would be of great advantage to the different municipalities.

There seems to be among our highway authorities a general feeling that with a certain appropriation in hand the only thing to be done is to expend it. It does not occur to most of the roadmasters that there are different ways of planning work, or that they can ever perform good work without larger appropriations. It can clearly be shown that in many cases much is left undone that might well be accomplished without greater expenditures than are incurred.

There prevails a mistaken idea that good work must necessarily be beyond the reach of the average county. Even in first cost, good work need not demand a much greater outlay than poor, while poor work in a term of years will call for a much greater expenditure than good.

METHODS OF ACTUAL CONSTRUCTION UNDER CHAPTER 225, ACTS OF 1904.

Before any action toward the construction of a road under the act can be taken by the Commission, it is necessary that a petition, signed by

the authorities of the county in which the road lies, be filed in the office of the Survey; and for the work to be done in any year, the petition must be on file before the first of March of that year. Once the petition is filed, the further steps toward construction are at the discretion of the county authorities.

After the project has been approved by the Commission, the road is indicated on the ground by placing stakes on each side at intervals of 100 feet and at all points where the direction of the way is changed. Courses and distances are plotted on the plan, cross-sections are taken, and the quantities of the different items of construction are estimated.

Under the provisions of the statute, the Commission cannot assist in the building of a road unless it is regularly petitioned for by the proper authorities. The selection, therefore, is restricted if the number of petitions be not large, and the general scheme of State road distributions must be more or less determined by the lack of petitions. Only the utmost freedom of selection will secure the wisest determination of such a general scheme, and it is greatly desired that petitioning will be more frequent in the future than in the past. There should always be, of course, some reasonable ground on which to base a request that the State should assist in the improvement of a road; but in many counties alternative routes exist, all deserving of consideration, and some one more likely than the others to fit into a general scheme. In such cases the Commission should have the opportunity of choice.

The laws which guide the Commission permit either of two methods whereby arrangement may be made for the construction of State aided roads. In the first, the work may be done directly by the authorities of the county, on a basis afforded by the estimate of the Commission as to the cost of the work; in the other, the contract may be made with private parties, after due advertisement, the conditions of the agreements being previously approved by the Commission.

The main difficulty in carrying on road work by contract is the delay which occurs from the breaking of machinery and from the lack of labor. In the agricultural districts it is often impossible to hire men during the season of harvesting the crops, and consequently all work ceases for

a time. So far as possible, contracts will be let so that the work can be prosecuted at such times as not to interfere with the farm work, but such action is not possible at all times.

Surveys of contemplated roads are made so as to give as much time as possible for the studying of the grades and drainage. Most of the surveys are made in the winter by the inspectors, thus keeping them at work, and making it possible to give them permanent employment and prevent their seeking employment elsewhere, which would be likely to occur if they were dropped even for a short time.

In both the above-described methods, the proceedings after the arrangements for doing the work are completed are the same. The work is done under the immediate supervision of an inspector, employed by the Commission, who is controlled by the Chief Engineer immediately representing the Survey.

Each of the two methods of arrangement for the construction of State Aid roads has been found to have certain advantages. Where the work is done by the county authorities, experience shows that the effect is to inform many citizens concerning the proper method of road-building. In many cases a considerable number of the men of the county have been enabled to acquire some knowledge as to the proper methods of road construction, and they have generally displayed a great desire to inform themselves concerning the work. In some instances, counties, after completing pieces of State Aid work allotted to them, have continued the same methods of construction on roads of a local character. Moreover, in many cases it has been found possible to induce the counties about to undertake the construction of a piece of State Aid road to buy rollers and crushers, which machines, being in possession of the local authorities, are likely to lead to important improvements in the methods of constructing their ways. On the other hand, it has been shown by experience that work done by the counties is often accomplished at greater cost than that which is done by a private contractor.

In certain cases it has been found that the town or city authorities are required by law or custom to pay more than the usual wage to the laborers they employ, and in some cases these authorities have been led

to employ workmen who were not efficient. The result of these conditions is that in certain cases contracts have entailed considerable losses upon the county authorities.

Where the contracts are taken by private bidders, the work is performed by the cheapest labor which the contractor can obtain. These may not be citizens of the county in which the work is being done, but persons imported from the cities. Thus it may come about that not only are the wages of these laborers as well as those of the superintendents given to non-residents, but the information which they obtain does not abide in the community where the work is done.

One of the most difficult problems presented to the Commission is the proper supervision of contracts. The best available men are employed for this purpose, and by far the larger number are graduates of some technical school. They are all industrious and thoroughly honest, and ambitious to secure the best results; but in no class of work is the educated, practical man better qualified to succeed than in road building.

On account of the many separate roads which it was necessary to construct, this office has found some difficulty in obtaining a sufficient number of skilled men to undertake the supervision of the work. The men who have served as inspectors have devoted themselves to their tasks and it is believed that by their aid important mistakes have been avoided.

The cost of the stone used in macadamizing has in many cases been somewhat greater than it will be in further work along the same lines, for the reason that competition will reduce the price. Crushers, the value of which at the time the first contracts were made appeared to be so doubtful that the Survey did not venture to reckon on their use, have since proved to be serviceable. The general use of these machines on the roads where good road-building material can be obtained promises to spare the cost of transporting the broken stone to the nearest railway station and thence to the line of the road, charges which in some instances may be very heavy.

Work on the road should be pushed to completion as early in the season as possible. In some cases it has happened that work, for which

the Geological Survey had made plans and specifications, was begun so late in the season that it was necessary to leave the road in a half-finished state through the winter. As a result the people in the vicinity of the road were obliged to put up with conditions far worse than those it was intended to improve. All road-work requiring grading, or seriously disturbing the existing roadbed should be begun early enough in the season to be finished before the first of November.

INTENTION OF STATE AID AND RESULTS TO BE HOPED FOR.

It seems out of the question to expect by the progress of public opinion to induce the counties of the State to effect any great change in their road conditions through an increase in taxes alone. Any such change, if it is to be brought about, must first be attained by general enactments, or, in other words, by some method of State aid, supplemented, let us hope, by Federal aid and by a more efficient expenditure of the present appropriations.

The unhappy conditions of our public ways in the greater part of the State are not due entirely to lack of interest or of zeal on the part of the roadmasters, but are to be accounted for in part by the want of expert knowledge concerning road construction, and by the insufficiency of money which is at their disposal. If these masters had been called upon for many years past to construct good roads, their native ingenuity would doubtless have led them to good results, as was actually the case in one of the richer districts of Baltimore County. Here an efficient roadmaster was continued in office for over twenty years. His native ingenuity, honesty, and ability, with the experience thus attained finally led him to approximately the very methods used by modern experts. The principal differences between his work and that of the experts was that the latter work was better trimmed up and finished though costing less than under the cruder methods of the roadmaster referred to.

The methods of applying the funds appropriated for highway construction fall into two classes. In the case of bridges and manifestly important improvements at local points, it has been customary in almost

all of the counties to allot relatively large sums for special cases. In the matter of repairing the roadbed it seems to have been the custom in too many counties to so apportion the money that its expenditure will be uniformly distributed over the mileage of the county with little regard to the needs of any particular portion of a given road. In this way it often happens that a sum is assigned to a road to be applied at a uniform rate, mile by mile, instead of locally, in the reduction of a heavy grade or the betterment of the worst portions of the road. This method leaves very much to be desired, as the thin veneering of improvement upon the roads is soon lost and the roads return to their former condition. With the application of the money for specific improvements the result is far different, since in a few years there is a marked advance in the average condition of the highways. The few cases in which this method has been employed emphasize most strongly the general lack of benefit received from the larger portion of the money spent annually on the roads.

It should be remembered that the improvement of the main highways by macadam or other hard surface tends to improve the by-roads of clay and earth by relieving the latter of part of the travel during the season in which frost is going out of the ground, and the surface of the roads saturated with the water, released by the thawing of the soil. The placing of a stone surface on any leading road drains the travel from those that are parallel, or in a measure parallel thereto. The farmer or traveler during the season when the clay road is in bad condition takes the shortest route to the improved road, according to the universal law of least resistance.

This relief of the clay roads during the season when travel works the greatest injury, tends to keep them in better condition for the remainder of the year. This relief is another and potent argument for the expenditure of money in the improvement of the main highways, in that the benefit of the improvement reaches farther than the road improved and is a benefit to every tributary road.

In the opinion of this office, one of the most important features of the bill under which they are acting is found in the system of expending the public money which it provides. It will be observed that this is so

arranged that the counties are, if they choose to do so, permitted, under the supervision of the State Commission, to do this work within their several limits. Only when they waive this right is the work let to individual contractors. In this way it may be confidently expected that the county authorities will acquire in their limited work on State aided roads the skill they need in such construction. It is believed that in this way the expenditure of the public money will have an important educational influence, and through this means the local authorities will be led to deal with highway problems in a more successful manner than they do at present. This office is the more careful of this effect for the reason that the roadmasters of the State are, in general, men of capacity, and earnestly desirous of improving themselves in the art of highway construction. So far they have suffered from two most serious hindrances, insufficient means to maintain the large mileage of ways in their charge, and lack of opportunity to take part in the work of building high-grade roads, by which means alone they can readily acquire the needed skill. Both these evils we may expect to see rapidly diminished under the operation of the provisions of the present law.

Too many people in looking at the question of road improvement, only look at it from the point of view of the improvements made with the money appropriated by the State and seem to forget that it is not that particular piece of county road upon which the State money is, or may be spent, that we look to for all the results or a return for the money invested, but on the contrary, to the roads that have not been improved and perhaps may never enjoy State assistance. These roads are of the most importance for there never has been a time, and it may be very much questioned if there will ever be, in which the aggregate of the money spent by the counties of this State will not exceed by thousands of dollars the money appropriated by the State for road improvement, so that the best work of the State is the educational part of the work in which right methods of road treatment will be practiced, so that money now wasted will be intelligently used.

In by far too many places the disposition, yes, and the practice is evident to use the money over too large a territory in the vain desire to

please everybody, with the general result of pleasing nobody, and instead of one or two miles of good, substantial, well-built road each year there is a continuance of perhaps a hundred miles of brushed-over, poor roads, without ever getting any nearer to an ultimate system of permanently improved roads.

ROAD MACHINERY.

Considerable difficulty in pushing the construction this year has been experienced from the inadequate number of steam rollers which were to be had in the State and in the neighboring localities upon its border for use on the roads which were being improved. In 1901 the records show that the total number of rollers which could be made available for such work was five. At the present time, owing to the demand for their use on State aided highway work and to the enhancement of interest in road construction in general, which has been more or less due to the work of the Survey, there are at least thirty-one rollers which may be reckoned as available, distributed among the counties as follows:

Allegany	3 County and Private.
Baltimore	13 (County 4, Private 9).
Carroll	1 Private.
Cecil	1 County.
Dorchester	1 Hired by County.
Frederick	1 County.
Harford	3 County.
Howard	1 Private.
Montgomery	2 Private.
Prince George's	2 Private.
Washington	2 County and Private.
Worcester	1 County.
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RESULTS OF TESTS OF ROAD METALS.

OBTAINED BY THE HIGHWAY DIVISION, MARYLAND GEOLOGICAL SURVEY.

ALLEGANY COUNTY.

Book	No. of Test	Material	Quarry	Location	Coef. of Wear	Cementation coef.
1	31	Sandstone	.....	nr. Barrelville	15.0	73
	32	Sandstone	.....	nr. Barrelville	9.9	73
	33	Sandstone	.....	nr. Barrelville	11.8	73
	36	Limestone	Aug. Barker's	nr. Narrows	9.8	12
	37	Limestone	Miller's	nr. Cumberland	9.0	72
	37 A	Limestone	Miller's	nr. Cumberland	9.6	72
	38	Limestone	Miller's	nr. Cumberland	9.2	10
	40	Limestone	Mullin's	Cumberland	7.4	7
	41	Sandstone	.....	nr. Barrelville	11.8	7
	42	Limestone	.....	nr. Barrelville	9.7	24
	43	Limestone	.....	nr. Barrelville	11.9	26
	44	Chert	Jos. Dressman's	W. of Wills Creek	4.5	5
	45	Chert	Jos. Dressman's	W. of Wills Creek	3.5	34
	46	Limestone	Corrigan's	nr. Barrelville	7.9	30
	47	Limestone	.....	nr. Barrelville	14.2	7
	48	Limestone	.....	nr. Barrelville	9.5	15
	49	Sandstone	.....	nr. Barrelville	14.9	13
	51	Limestone	Jos. Dressman's	W. of Wills Creek	6.7	32
	52	Limestone	Corrigan's	nr. Barrelville	8.0	12
	54	Sandstone	.....	nr. Barrelville	11.4	7
	55	Sandstone	.....	nr. Barrelville	11.6	7
	58	Sandstone	.....	nr. Barrelville	9.2	...
	59	Sandstone	.....	nr. Barrelville	11.4	...
	62	Limestone	Corrigan's	nr. Barrelville	9.4	...
	64	Limestone	Jos. Dressman's	W. of Wills Creek	7.2	...
	65	Limestone	Jos. Dressman's	W. of Wills Creek	9.5	...
3	216	Argillaceous Limestone	.....	nr. Cumberland	9.6	...
	229	Limestone	.....	nr. Frostburg	6.5	31
	230	Backbone Limestone	Jos. Dressman's	nr. Corriganville	4.5	52
	231	Greenbrier Limestone	.....	between Barrelville and Corriganville	13.0	54
	232	Backbone Limestone	Jos. Dressman's	nr. Corriganville	4.1	118
	236	Limestone	.....	nr. Bedford Road	11.0	68
	241	Limestone	.....	nr. Bedford Road	8.7	...
	247	Limestone	.....	nr. Bedford Road	9.57	98

BALTIMORE COUNTY.

1	10	Serpentine	.....	Bare Hills	5.8	156
	63	Feldspar	Wright's	Jones Falls	5.6	2
	66	Trap	.....	nr. Greenmount and Girard Aves.	5.5	3
	67	Trap	.....	nr. Greenmount and Girard Aves.	6.9	3
	71	Trap	Schwind's	Edmondson Ave.	11.4	4
	72	Trap	Schwind's	Edmondson Ave.	15.5	...
	73	Trap	.....	nr. Windsor Road, Gwynns Falls	15.4	2

BALTIMORE COUNTY.—*Continued.*

Book	No. of Test	Material	Quarry	Location	Coef. of Wear	Cementation coef.
1	74	Trap	Schwind's	Edmondson Ave.	15.4	...
	75	Trap	.....	North and Eager	5.8	6
	76	Trap	.....	North and Eager	7.5	...
	77	Trap	.....	nr. Windsor Road, Gwynns Falls	14.8	...
	78	Serpentine	Zouck's	nr. Reisterstown	7.9	300
	79	Trap	.....	Gwynns Falls	12.6	...
	80	Trap	.....	Gwynns Falls Road	15.2	2
	82	Gneiss	Peddicord's	Jones Falls	15.5	12
	83	Gneiss	Schwind's	Edmondson Ave.	16.1	1
	84	Trap	Hook's	W. Arlington	11.2	1
	86	Trap	Leonard's	Gwynns Falls	20.9	3
	87	Gneiss	Leonard's	Gwynns Falls	11.8	2
	90	Trap	.....	nr. Gwynns Falls	13.9	2
	91	Trap	.....	nr. Gwynns Falls	14.9	...
	92	Granite	.....	nr. Ilchester	9.2	2
	93	Elkridge Granite	Nelson's Farm	nr. Elkridge	16.3	1
	94	Trap	Leonard's	Gwynns Falls	15.9	...
	95	Trap	.....	Dogwood Road	13.6	13
2	112	Granite	Werner's	Gray's	6.3	...
	129	Trap	.....	nr. Windsor Road, Gwynns Falls	14.6	2
	131	Trap	Werner's	Gray's	5.8	5
	142	Serpentine	.....	Roland Park	6.2	66
	143	Sandstone	.....	Falls Road and Belv. Ave.	6.4	1
	147	Trap	.....	nr. Belair	13.9	4
	148	Gneiss	.....	nr. Parksville	9.4	1
	149	Gneiss	.....	Lauraville	5.7	...
	150	Trap	Gatch's	Gardenville	10.2	...
	153	Sandstone	.....	Towson	3.4	...
	154	Trap	.....	Belair Road	11.7	...
	155	Marble	.....	Cockeysville	6.0	...
	156	Trap	.....	nr. Roland Park	6.0	...
	157	Trap	.....	Oella	12.8	...
	161	Trap	.....	Loreley	16.5	...
	162	Trap	.....	nr. Kingsville	20.3	...
	174	Hornblende	Schwind's	Edmondson Ave.	12.3	...
	175	Trap	Leonard's	Powhatan	21.6	...
	176	Gneiss	Leonard's	Falls Road	14.8	...
	177	Gneiss	Schwind's	Falls Road	17.6	...
	178	Gneiss	Peddicord's	Falls Road	16.8	...
	179	Trap	Hook's	Forest Ave.	12.7	...
	180	Limestone	Shoemaker's	Greenspring Valley	9.3	...
	181	Sandstone	Shoemaker's	Greenspring Valley	1.7	...
	182	Sandstone	Shoemaker's	Greenspring Valley	5.2	...
	187	Gneiss	.....	nr. tunnel, Loch Raven	11.0	...
	189	Trap	Peter Link's	Catonsville	13.2	8
	190	Trap	Peter Link's	Catonsville	14.6	8
	192	Trap	Hook's	Jones Falls	20.5	...
	193	Gneiss	Mystic	Phoenix	13.7	...
	196	Marble	.....	Texas	3.6	34
	197	Marble	.....	Texas	7.5	48

BALTIMORE COUNTY.—*Continued.*

Book	No. of Test	Material	Quarry	Location	Coef. of Wear	Cementation coef.
3	207	Gabbro	Martin's	Franklintown	20.1	30
	210	Gabbro	Wm. Meninger's	Putty Hill	16.1	...
	212	Gneiss	Md. & Pa. R. R. Co.	.....	10.8	40
	217	Serpentine	Cross Keys	Roland Park	6.5	...
	218	Quartzite	Woodberry	Druid Hill Park	4.0	6
	228	Gneiss	N. Stump's	Stevenson	7.7	...
	234	Gneiss	N. Stump's	Stevenson	7.7	109
	235	Quartzite	N. Stump's	Stevenson	10.6	...
	237	Gabbro	Sauter's	nr. Franklin Road	8.8	...
	238	Gabbro	Martin's	nr. Franklin Road	12.6	...
	242	Gabbro (dark)	Sauter's	nr. Franklin Road	12.3	51
	243	Gabbro (light)	Sauter's	nr. Franklin Road	12.3	...
	244	Trap	Edw. Hahn's	Catonsville	11.5	...
	245	Gabbro	Hook & Ford's	Gwynns Falls	12.1	49
	246	Gabbro	Sauter's	nr. Dickeyville	14.6	21
	249	Diabase	Edelen's	Catonsville	11.8	15
	251	Ashland Slag	Wm. Duntz'	Ashland	6.7	...
	254	Serpentine	S. P. Johnson's	Mt. Washington	8.6	93
	255	Granite	Peddicord's	Falls Road	10.7	76
	258	Limestone	Md. Granite Co.	Falls Road	6.0	148
	260	Gneiss	J. E. Baker's	Sparks Sta.	10.5	42
	265	Limestone	.....	Ruxton	6.64	47
	268	Gabbro	Hook & Ford's	Catonsville	17.0	37
			CALVERT COUNTY.			
2	151	Sandstone	.....	Patuxent River	5.0	...
			CARROLL COUNTY.			
1	97	Brown Sandstone	.....	nr. Taneytown	7.0	28
2	104	Marble	Mrs. Wagner's	Stone Chapel Road	9.2	...
	105	Marble	Mrs. Wagner's	Stone Chapel Road	10.0	...
	111	Marble	Stauffer's	New Windsor	8.2	4
	119	Crystalline Limestone	Roop's	New Windsor	4.8	1
	136	Sandstone	.....	nr. Taneytown	9.9	2
	139	Sandstone	.....	nr. Taneytown	6.4	...
	159	Sandstone	.....	Taneytown	8.5	...
			CECIL COUNTY.			
1	81	Granite	.....	Port Deposit	13.3	1
2	128	Granite	.....	Rising Sun	10.0	1
	130	Granite	.....	Rising Sun	9.0	...
	164	Limestone	.....	Cowentown	11.8	...
	165	Limestone	.....	Cowentown	11.1	...
	166	Limestone	.....	Cowentown	12.8	...
	167	Limestone	.....	Cowentown	12.75	...
3	252	Trap	Pogue's	nr. Rising Sun	8.0	30
	256	Nigger-head	.....	Perryville	14.1	35

FREDERICK COUNTY.

Book	No. of Test	Material	Quarry	Location	Coef. of Wear	Cementation coef.
1	96	Limestone	Grove Lime Co.	nr. Frederick	16.1	13
	98	Trap	.....	Le Gore	23.7	1
	99	Trap	.....	Le Gore	25.8	...
	100	Emmitsburg Granite	.....	nr. Emmitsburg	9.9	1
2	101	Emmitsburg Granite	.....	nr. Emmitsburg	11.4	...
	103	Shaley Limestone	Doer's Farm	nr. Frederick	5.8	10
	106	Limestone	Rush's Farm	nr. Frederick	9.4	3
	107	Limestone	Rush's Farm	nr. Frederick	8.6	...
	108	Limestone	Grove Lime Co.	nr. Frederick	8.5	4
	110	Shaley Limestone	Doer's Farm	nr. Frederick	7.3	15
	115	Limestone	Grove Lime Co.	nr. Frederick	8.8	6
	116	Diabase	.....	Le Gore	21.6	...
	117	Diabase	.....	Le Gore	22.3	...
	121	Diabase	.....	nr. Emmitsburg	22.4	16
	124	Diabase	.....	Woodsboro	19.4	3
	125	Diabase	.....	Woodsboro	21.6	...
	126	Chlorite Schist	.....	Catoctin	5.8	3
	127	Chlorite Schist	.....	Catoctin	6.0	...
	132	Trap	.....	Woodsboro	19.2	4
	138	Trap	.....	Frederick Junc.	26.1	3
	140	Crystalline Limestone	.....	Le Gore	6.7	11
	141	Shenandoah Limestone	.....	Le Gore	10.1	8
3	221	Limestone	Grove Lime Co.	Lime Kiln	14.2	34
	225	Limestone	Grove Lime Co.	Lime Kiln	13.4	...
	226	Limestone	Grove Lime Co.	Lime Kiln	11.1	22
	263	Limestone	Dan'l Baker's	Frederick	10.7	33

HARFORD COUNTY.

1	21	Trap	.....	nr. Belair	13.2	4
	22	Trap	.....	nr. Carson's Run	12.6	3
2	135	Gneiss	.....	Rocks of Deer Cr.	14.7	1
	144	Quartz	.....	Rocks of Deer Cr.	6.2	2
	145	Micaceous Sandstone	.....	Rocks of Deer Cr.	2.6	6
	152	Trap	.....	nr. Belair	8.7	...
	198	Trap	Livesey's	nr. Belair	8.8	...
	199	Trap	Burns'	nr. Belair	10.8	41
	200	Trap	Livesey's	nr. Belair	7.3	171
3	201	Granite	Livesey's	nr. Belair	10.3	22
	202	Gabbro	Pocock's	nr. Belair	14.9	22
	208	Gabbro	Smallbach's	nr. Belair	15.1	...
	209	Gabbro	Pocock's	nr. Belair	15.3	...
	213	Gabbro	Livesey's	nr. Belair	5.0	...

HARFORD COUNTY.—*Continued.*

Book	No. of Test	Material	Quarry	Location	Coef. of Wear	Cementation coef.
3	214	Gabbro	Livesey's	nr. Belair	10.6	...
	223	Chlorite Schist	Jas. Wilson's	Pylesville	3.6	12
	239	Diabase	Mitchell's	nr. Havre de Grace	13.1	14
	248	Gabbro	C. G. Rogers'	Aldino	10.2	22

HOWARD COUNTY.

1	12	Granite	Vanor-Carroll Estate	Doughoregan	11.1	...
	16	Granite	.....	Dorsey's Run	8.5	3
	28	Granite	Watervale	Guilford	15.2	1
	53	Gneiss	Merryman's Lane	Guilford	9.7	1
	68	Potomac Sandstone	.....	Hanover	6.4	2
	69	Potomac Sandstone	.....	Hanover	6.4	...
	85	Trap	Barker's Farm	nr. Ellicott City	12.1	2
	88	Trap	J. Fuller's	nr. Pine Orchard	14.6	8
	89	Trap	J. Fuller's	nr. Pine Orchard	15.9	...
2	114	Iron Ore	.....	Sykesville	6.8	...
	118	Granite	.....	Sykesville	10.7	10
	122	Trap	Jones' Farm	Ellicott City	19.5	7
	137	Trap	.....	Ellicott City	16.6	11
	146	Slag	.....	Elkridge Furnace	8.8	2
	170	Diabase	.....	nr. Pine Orchard	19.9	...
	183	Ashland Slag	Pope's	Savage	9.4	...
	188	Granite	A. Weber's	nr. Ellicott City	6.7	60
	195	Ashland Slag	Pope's	Savage	7.0	44
3	203	Trap	A. Weber's	Ellicott City	13.5	30
	204	Granite	A. Weber's	Ellicott City	6.8	73
	205	Blue Gneiss	A. Weber's	Ellicott City	12.4	21
	206	Black Gneiss	A. Weber's	Ellicott City	13.1	61
	215	Gabbro	Pope's	Patuxent River	13.2	...
	222	Blue Gneiss	A. Weber's	Ellicott City	8.0	27
	240	Gabbro	A. Weber's	Ellicott City	14.8	16
	267	Gabbro	A. Weber's	Ellicott City	6.85	59
	270	Gabbro	A. Weber's	Ellicott City	7.7	...
	271	Gabbro	A. Weber's	Ellicott City	5.4	...
	272	Gabbro	A. Weber's	Ellicott City	10.30	46
	273	Gneiss	.....	Sykesville	6.67	16
	274	Trap	A. Weber's	Ellicott City	10.46	36
	276	Trap	A. Weber's	Ellicott City	17.40	45
	278	Trap	Pope's	Savage	14.4	...

GARRETT COUNTY.

1	35	Sandstone	.....	nr. Oakland	8.0	...
	39	Sandstone	.....	nr. Oakland	6.7	10

MONTGOMERY COUNTY.

Book	No. of Test	Material	Quarry	Location	Coef. of Wear	Cementation coef.
1	9	Red Sandstone	.....	West of Seneca Quarries	10.4	13
	18	Gneiss	Quarry on B. & O. R. R.	.....	4.8	3
2	109	Potomac Marble	.....	Point of Rocks	11.7	23
	113	Trap	.....	Cabin John Bridge	9.3	9
	133	Serpentine	.....	Hunting Hill	21.2	10
3	250	Serpentine	.....	Washington Grove	11.8	155
	266	Trap	Dan'l Baker's	Dickerson	28.5	30
	277	Trap	J. F. Killeen's	.....	10.62	46

WASHINGTON COUNTY.

1	5	Limestone	Dietrick's	Hagerstown	16.0	18
	6	Limestone	.....	Leitersburg	9.0	17
	8	Limestone	.....	nr. Funkstown	16.8	7
	11	Quartzite	.....	nr. Pen Mar	13.8	4
	13	Limestone	.....	nr. Funkstown	14.9	6
	14	Limestone	.....	nr. Leitersburg	8.3	7
	17	Sandstone	.....	nr. Harpers Ferry	11.7	1
	19	Brown Sandstone	Sideling Hill	6 miles west of Hancock	13.0	15
	20	Brown Sandstone	Mrs. Vaugh's	nr. Millstone	11.7	20
	23	Sandstone	.....	Tonoloway Hill	6.5	1
	25	Sandstone	.....	nr. Hancock	9.3	1
	27	Limestone	Byer's	Hagerstown	10.0	10
	29	Sandstone	Sideling Hill	.....	10.5	3
	30	Limestone	Yost's	nr. Hagerstown	7.5	14
	50	Limestone	.....	Harpers Ferry	6.9	61
	56	Weverton Sandstone	.....	Harpers Ferry	9.4	...
	57	Weverton Sandstone	.....	Harpers Ferry	9.8	...
	60	Limestone	.....	nr. Harpers Ferry	7.8	20
	61	Limestone	.....	nr. Harpers Ferry	7.4	20
	70	Limestone	.....	nr. Leitersburg	9.7	13
2	102	Limestone	Murray's Lime Kiln	nr. Hancock	8.3	27
	184	Limestone	.....	Pinesburg	11.5	...

MISCELLANEOUS.

2	158	Oyster shells	.....	Chesapeake Bay	1.1	100
	160	Dolomite	.....	Milwaukee, Wis.	12.8	2
	163	Basalt	.....	The Rhine, Germany	19.2	...
	185	Limestone	Chas. Werner Co.	Wilmington, Del.	11.2	...
	186	Limestone	Chas. Werner Co.	Wilmington, Del.	10.8	...

MISCELLANEOUS.—*Continued.*

Book	No. of Test	Material	Quarry	Location	Coef. of Wear	Cementation coef.
3	211	Granite	.....	From North Carolina	11.2	...
	224	Gabbro	Del. Granite & Mining Co.	Berkeley Springs, W. Va., crushing tests	19.8	46
	233	Limestone	.....	Wilmington, Del.	9.1	...
	257	Limestone	.....	Waynesboro, Pa.	8.4	59
	259	Limestone	Potomac Lime & Stone Co.	Harpers Ferry, W. Va.	10.71	108
	261	Limestone	J. E. Baker Co.	Mt. Wolf, Pa.	9.51	59
	262	Limestone	Standard Lime & Stone Co.	Kearneysville, W. Va.	14.27	71
	264	Limestone	Standard Lime & Stone Co.	Kearneysville, W. Va.	12.0	...
	269	Limestone	.....	Bainbridge, Pa.	8.15	40
	275	Limestone	J. E. Baker Co.	York Co., Pa.	10.20	99

SUMMARY OF WORK DONE UNDER THE STATE AID ROAD LAW DURING 1905.

County.	Applied for Miles.	Surveyed Miles.	Estimates Furnished.		Contracts Let.		Built 1905 Miles.	To be Built 1906 Miles.
			Miles.	Amount.	Miles.	Amount.		
Allegany	4.50	4.76	4.60	$26,157.57	4.60	$24,774.89	1.67	2.93
Anne Arundel	10.00	5.70	3.10	16,223.01	....	....	....	....
Baltimore	51.00	22.82	16.33	112,599.89	7.83	44,327.79	4.74	3.09
Caroline	4.00	2.00	2.00	7,544.90	1.00	2,623.20	1.00	....
Carroll	4.00	2.53	2.50	17,582.05	1.70	11,605.50	0.60	1.10
Cecil	5.00	5.34	2.10	11,185.07	2.10	10,862.07	2.10	....
Charles	1.00	1.05	.95	8,476.05	....	....	....	....
Dorchester	2.00	2.20	2.10	15,469.30	1.50	4,064.60	1.00	.50
Frederick	1.50	1.52	1.40	9,326.63	1.40	9,326.63	1.00	.40
Harford	13.50	11.20	7.40	34,493.35	7.40	34,493.35	5.00	2.40
Howard	3.00	2.07	2.00	13,158.34	1.06	7,324.90	0.50	.56
Montgomery	8.00	8.02	7.00	45,777.13	5.00	27,566.76	1.50	3.50
Prince George's	6.00	6.28	4.75	28,462.00	3.75	25,500.00	3.25	.50
Queen Anne's	22.00	13.22	6.02	42,741.82	....	....	....	....
St. Mary's	7.50	7.50	1.00	2,986.17	...	...	....	....
Talbot	3.00	1.12	1.12	4,913.37	1.12	3,751.77	0.50	.62
Washington	4.00	5.85	3.60	19,566.89	2.00	6,371.17	0.40	1.60
Worcester	5.00	5.33	5.12	41,111.51	....	....	....	....
Total	155.00	108.51	73.09	457,775.05	40.46	212,592.63	23.26	17.20

TABLE OF ROAD EXPENDITURES—FISCAL YEARS 1903-1905.

County.		Total amount spent on Roads and Bridges.	Amount spent for repairs on Bridges.	Amount spent for new Bridges.	Amount spent for permanent improvement of Roads.	Amount spent for repairs on Roads.
Allegany,	1903	$50,619.39	$5,000.00	$5,000.00	$15,000.00	$23,619.39
	1904	30,564.59	*	*	12,000.00	*
	1905	59,819.26	*	*	7,500.00†	*
Anne Arundel,	1903	42,000.00‡	*	*	*	*
	1904	40,652.53	*	4,910.78	*	*
	1905	40,000.00‡	*	*	*	*
Baltimore,	1903	179,897.32	30,000.00	10,000.00	60,000.00	79,897.32
	1904	206,416.68	32,000.00	8,338.05	83,150.00	111,728.63
	1905	208,747.48	50,000.00	21,800.00	90,000.00	91,947.48
Calvert,	1903	5,600.00	*	*	*	*
	1904	5,000.00	*	*	*	*
	1905	4,808.34	*	*	*	*
Caroline,	1903	10,057.85	1,141.16	*	*	*
	1904	14,311.41	1,119.87	405.71	2,152.05	4,927.87
	1905	10,961.36§	1,553.17§	314.90§	3,000.04§	4,950.63§
Carroll,	1903	22,543.74	*	1,408.95	3,000.00	*
	1904	32,137.92	*	9,844.13	5,000.00	*
	1905	34,214.58	*	11,013.11	5,800.00†	*
Cecil,	1903	45,949.75	*	3,290.00	7,346.27	*
	1904	47,184.51	*	9,769.50	3,653.73	*
	1905	52,732.60	*	*	5,500.00†	*

* Not reported. †State Highway work. ‡ Estimated by this office. § Fiscal year not yet completed.

TABLE OF ROAD EXPENDITURES—FISCAL YEARS 1903-1905.—*Continued.*

County.		Total amount spent on Roads and Bridges.	Amount spent for repairs on Bridges.	Amount spent for new Bridges.	Amount spent for permanent improvement of Roads.	Amount spent for repairs on Roads.
Charles,	1903	$10,000.00‡	*	*	*	*
	1904	11,000.00	*	*	*	*
	1905	11,200.00	*	*	*	*
Dorchester,	1903	23,000.00	*	*	*	*
	1904	25,434.70	*	*	*	*
	1905	18,976.30	*	*	2,000.00†	*
Frederick,	1903	56,498.43	$6,000.00	21,865.00	3,500.00	25,133.43
	1904	42,473.68	5,000.00	11,230.83	5,000.00	21,242.85
	1905	41,600 00	5,000.00	13,780.00	7,000.00	19,720.00
Garrett,	1903	21,030.63	3,760.01	2,804.00	*	14,466.62
	1904	19,468.25	1,673.24	2,826.76	*	14,968.28
	1905	16,290.21	1,500.00	*	*	14,790.21
Harford,	1903	41,000.00‡	*	*	14,068.00	*
	1904	43,200.00	*	6,000.00	10,000.00‡	*
	1905	42,500.00	*	*	14,000.00	*
Howard,	1903	22,640.19	5,555.46	2,809.12	7,408.20	6,867.41
	1904	20,776.19	4,503.88	2,934.73	6,460.40	6,877.18
	1905	22,455.57	3,000.00††	1,000.00††	8,000.00††	6,600.00††
Kent,	1903	20,000.00‡	*	*	*	*
	1904	20,000.00‡	*	*	*	*
	1905	20,000.00‡	*	*	*	*

* Not reported. † State Highway work. †† Amount levied. ‡ Estimated by this office.

TABLE OF ROAD EXPENDITURES—FISCAL YEARS 1903-1905.—*Continued.*

County.		Total amount spent on Roads and Bridges.	Amount spent for repairs on Bridges.	Amount spent for new Bridges.	Amount spent for permanent improvement of Roads.	Amount spent for repairs on Roads.
Montgomery,	1903	$30,260.85	$ 4,292 77	4,930.24	6,814.70	$14,223.14
	1904	32,048.19	6,523.14	3,333.52	6,310.76	15,880.77
	1905	44,799.64††	5,000.00††	5,000.00††	20,349.64††	14,450.00††
Prince George's,	1903	29,320.26	3,980.00	3,350.00	7,250.12	14,740.14
	1904	23,596.36	1,723.70	860.00	5,400.50	15 612.16
	1905	37,401.59	3,047.83	3,425.50	19,808.75	11,119.51
Queen Anne's,	1903	18,340.00	5,100.00	*	4,000.00	9,240.00
	1904	38,480.00	6,005.00	19,000.00	3,000.00	10 475.00
	1905	16,000.00**	5.000.00**	*	3,200.00**	7,800.00**
St. Mary's,	1903	6,500.00	400.00	*	*	5,950.00
	1904	5,668.35	668.35	*	*	5,000.00
	1905	6,000.00	*	*	*	*
Somerset,	1903	8,092.36	1,982.09	*	1,970.33	4,439.94
	1904	8,774.57††	*	*	*	*
	1905	9.000.00‡	*	*	*	*
Talbot,	1903	11,598.62	*	*	*	*
	1904	15,545.28	3,249.65	*	3,765.30	*
	1905	14,000.00‡	*	*	2,500.00‡	*
Washington,	1903	20,063.41	2,856.75	2,000.00	10,000.00	10,063.41
	1904	27,408.01	5,703.66	3,775.54	8,954.00	8.954.00
	1905	25,479.12	3,781.07	2,180.95	10,000.00	9,517.00

* Not reported. ** Estimated by County Officials. †† Amount levied. ‡ Estimated by this office.

TABLE OF ROAD EXPENDITURES—FISCAL YEARS 1903-1905.—*Continued.*

County.		Total amount spent on Roads and Bridges.	Amount spent for repairs on Bridges.	Amount spent for new Bridges.	Amount spent for permanent improvement of Roads.	Amount spent for repairs on Roads.
Wicomico,	1903	2,332.60	*	*	*	*
	1904	11,329.28	*	*	*	*
	1905	15,000.00**	*	*	*	*
Worcester,	1903	15,000.00	*	*	*	*
	1904	12,500.00	*	*	*	*
	1905	12,000.00**	*	*	*	*
State,	1903	699,345.40	***	***	***	***
	1904	739,970.50	***	***	***	***
	1905	765,886.05	***	***	***	***

* Not reported. ** Estimated by County Officials. *** Not estimated as reports were too incomplete.

TABLE SHOWING RESULTS OF TESTS OF PAVING BRICK OBTAINED AT THE LABORATORY OF THE HIGHWAY DIVISION OF THE MARYLAND GEOLOGICAL SURVEY DURING 1905.

Number.	Name.	Color.	Percentage lost in Rattler 1800 revolutions. Percentage lost by each brick in a test. No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	Average.	Date of Test.	Made at the request of	Sample selected by
294	Reynolds Brick & Tile Co	Shale.	16	17	17	18	18	19	20	22	22	..	19	Jan. 11.	City Eng., Balto.	Maker.
295	"Montello Block"	Red.	21	21	23	23	26	27	28	29	32	36	27	Jan. 23.	"	"
296	"Montello"	Brown.	22	24	27	28	31	34	37	37	38	43	32	Jan. 23.	"	"
297	Savage Fire Brick Co	Buff.	30	33	38	38	41	44	48	51	59	..	42	Jan. 24.	"	"
298	"Maxwell Repressed Block"	Red.	21	22	23	24	26	27	27	28	29	..	25	Jan. 30.	"	City Eng.
299	Salisbury, Md	Red.	29	31	31	33	40	46	46	49	..	..	38	Mar. 17.	A. J. Benjamin.	A. J. Benj.
300	"Maxwell Block"	Red.	17	20	21	21	22	23	23	25	29	..	22	Mar. 22.	City Eng., Balto.	Maker.
301	"Maxwell Block"	Red.	17	17	18	21	22	26	26	35	35	..	24	April 5.	"	"
302	"Maxwell Block"	Red.	16	17	19	24	25	25	25	28	44	..	25	April 5.	"	"
303	"Maxwell Block"	Red.	22	24	26	26	27	28	33	35	39	..	29	April 21.	"	"
304	"Maxwell Block"	Red.	24	26	28	29	31	33	34	37	46	..	32	April 21.	"	"
305	"Maxwell Block"	Red.	22	24	29	30	31	31	35	38	40	..	31	April 25.	Manufacturer.	"
306	"Porter Block"	Buff.	16	17	18	18	18	20	23	24	24	..	20	May 3.	County Eng., Frederick.	J. T. P.
307	Clearfield Clay Working Co	Buff.	18	18	22	25	28	32	32	34	34	36	28	May 6.	W. W. Crosby.	H. Div.
309	"Fairmont" Brick	Buff.	17	18	19	24	27	31	33	35	36	..	27	May 17.	Hammond Fire Brick Co.	Maker.
311	"Porter Block"	Buff.	17	19	20	23	23	23	24	24	39	..	23	May 18.	Roads Eng., Balto. Co.	"
312	"Maxwell Block"	Red.	22	22	22	23	23	25	25	25	27	..	24	May 20.	Roads Eng., Balto. Co.	"
313	"Maxwell Block"	Red.	24	26	26	26	28	30	31	33	35	..	29	May 30.	City Eng., Balto.	"
314	"Fairmont" Brick	Dk. Buff.	16	18	18	19	19	19	20	22	30	..	20	May 30.	Consulting Eng., Fred'k.	"
315	Standard Fire Brick Co	Lt. Buff.	18	19	19	20	21	21	25	27	28	..	22	May 30.	"	"
316	"Metropolitan Block" O	Dk. Red.	15	16	18	19	20	22	23	23	25	..	20	June 3.	"	"
317	"Mack Block" Pa	Buff.	16	17	17	19	19	21	..	..	..	..	18	June 6.	"	"
318	"Guise Block" Pa	Dk. Red.	22	26	26	29	29	30	31	32	36	..	29	June 7.	"	"
319	"Maxwell Block"	Dk. Red.	20	24	24	25	28	28	28	31	39	..	28	June 10.	City Eng., Balto.	"
320	"Maxwell Block"	Dk. Red.	19	20	20	20	21	21	21	21	23	..	21	June 14.	"	"

TABLE SHOWING RESULTS OF TESTS OF PAVING BRICK OBTAINED AT THE LABORATORY OF THE HIGHWAY DIVISION OF THE MARYLAND GEOLOGICAL SURVEY DURING 1905.—Continued.

Number.	Name.	Color.	Percentage lost in Rattler 1800 revolutions.											Date of Test.	Made at the request of	Sample selected by
			Percentage lost by each brick in a test.										Average.			
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 1				
321	"Maxwell Block"	Dk. Red.	23	24	24	26	26	26	26	29	35	..	27	June 17.	City Eng., Balto.	Maker.
322	"Porter Block"	Buff.	23	25	26	27	27	28	29	33	38	..	28	June 21.	"	"
323	"Porter Block"	Buff.	24	24	25	26	27	28	28	32	47	..	29	June 21.	"	"
324	"Porter Block"	Buff.	24	26	31	32	32	33	34	36	50	..	34	June 21.	"	"
325	"Porter Block"	Buff.	23	24	27	29	32	36	37	38	39	..	32	June 21.	"	"
326	"Porter Block"	Buff.	23	25	26	27	29	30	37	38	55	..	32	June 21.	"	"
327	"Maxwell Block"	Red.	18	19	20	24	29	33	34	36	40	..	28	June 26.	"	"
328	"Maxwell Block"	Red.	17	19	19	23	24	27	27	27	28	..	24	June 29.	"	"
329	"Windber" Brick	Lt. Buff.	34	35	39	44	50	50	62	62	65	..	49	June 29.	"	"
330	Savage Fire Brick Co	Buff.	22	23	31	34	34	35	35	41	53	..	34	June 30.	"	"
331	"Maxwell Block"	Red.	19	19	24	25	25	27	28	28	34	..	26	July 8.	"	City Eng.
332	Harris Brick Co	Dk. Red.	17	21	22	24	25	26	28	34	34	..	25	July 13.	"	Maker.
333	"Windber" Brick	Buff.	33	36	36	36	38	42	..	..	..	..	37	July 14.	"	"
334	"Maxwell Block"	Red.	17	18	19	19	20	22	25	26	56	..	25	July 22.	"	Inspector.
335	"Maxwell Block"	Red.	18	19	22	23	25	26	31	31	35	..	25	July 22.	"	"
336	"Porter Block"	Buff.	25	25	27	27	29	30	33	34	38	..	30	July 22.	Roads Eng., Balto. Co.	Supervis'r
337	"Maxwell Block"	Red.	18	19	20	22	23	24	24	24	29	..	23	July 22.	City Eng., Balto.	Maker.
338	"Maxwell Block"	Red.	18	18	20	21	23	25	25	27	29	..	23	July 24.	"	"
339	"Fairmont Block"	Buff.	22	24	25	26	30	31	32	33	33	..	28	July 24.	Con. Eng., Fred'r'k Co.	"
340	"Maxwell Block"	Red.	21	23	24	25	33	39	47	54	..	..	33	July 26.	City Eng., Balto.	"
341	"Maxwell Block"	Red.	23	24	25	25	28	31	31	33	35	..	28	July 26.	"	"
342	"Maxwell Block"	Red.	20	23	24	25	26	27	28	31	31	..	26	July 28.	"	Wright.
343	"Maxwell Block"	Red.	19	19	19	20	21	21	22	31	32	..	22	July 28.	"	"
344	"Maxwell Block"	Red.	20	20	21	21	23	25	26	26	40	..	25	July 27.	"	Maker.
345	"Maxwell Block"	Red.	20	20	22	23	24	26	31	32	33	..	25	July 27.	"	"

TABLE SHOWING RESULTS OF TESTS OF PAVING BRICK OBTAINED AT THE LABORATORY OF THE HIGHWAY DIVISION OF THE MARYLAND GEOLOGICAL SURVEY DURING 1905.—Continued.

Number.	Name.	Color.	Percentage lost in Rattler 1800 revolutions.											Date of Test.	Made at the request of	Sample selected by
			Percentage lost by each brick in a test.										Average.			
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10				
346	"Porter Block"	Buff.	21	23	26	26	26	27	37	37	39	..	29	July 27.	Roads Eng., Balto. Co.	Inspector.
347	"Porter Block"	Buff.	19	22	23	25	27	28	31	33	34	..	27	July 31.	"	"
348	"Porter Block"	Buff.	22	24	25	25	25	26	28	31	40	..	27	July 31.	"	"
349	"Porter Block"	Buff.	23	25	27	28	28	29	33	33	35	..	29	July 31.	"	"
350	"Fairmont Block"	Buff.	21	23	23	25	28	28	29	29	35	..	27	Aug. 1.	"	"
351	"Porter Block"	Buff.	20	22	24	24	24	24	29	29	29	..	25	Aug. 2.	"	"
352	"Porter Block"	Buff.	23	24	28	29	29	30	43	47	54	..	34	Aug. 3.	"	"
353	Thornton Fire Brick Co	Buff.	21	21	22	22	24	24	25	25	30	..	24	Aug. 3.	"	Maker.
354	"Porter Block"	Buff.	22	22	25	26	27	29	30	36	39	..	28	Aug. 7.	"	Inspector.
355	"Maxwell Block"	Dk. Red.	19	21	21	21	22	22	23	24	24	..	22	Aug. 9.	City Eng., Balto.	"
356	"Fairmont Block"	Buff.	25	25	26	29	29	33	35	40	54	..	33	Aug. 9.	Con. Eng., Fred'k Co.	"
357	"Maxwell Block"	Red.	17	19	20	21	21	23	23	25	39	..	23	Aug. 11.	City Eng., of Balto.	Clarke.
358	"Maxwell Block"	Red.	19	19	20	20	21	24	24	25	33	..	24	Aug. 15.	"	Hare.
359	Thornton Fire Brick Co	Buff.	20	22	22	24	24	25	25	27	31	..	24	Aug. 15.	"	Maker.
360	"Fairmont Block"	Buff.	18	18	19	22	23	23	23	24	36	..	23	Aug. 19.	Con. Eng., Fred'k. Co.	Engineer.
361	Federal Clay Products Co	Ven. Red.	30	33	36	38	39	41	42	47	53	..	38	Aug. 24.	City Eng., Balto.	Maker.
362	Federal Clay Products Co	Ven. Red.	..	..	..	..	..	..	..	..	..	..	73	Aug. 24.	"	"
363	"Maxwell Block"	Red.	18	18	19	21	21	22	22	24	32	..	22	Aug. 28.	"	"
364	"Fairmont Block"	Buff.	16	17	20	20	21	21	22	23	23	..	20	Aug. 30.	"	"
365	"Maxwell Block"	Dk. Buff.	..	..	..	..	..	..	..	..	..	..	37	Aug. 30.	Welsh, Glain. & Max.	"
366	"Maxwell Block"	Lt. Buff.	..	..	..	..	..	..	..	..	..	..	39	Aug. 30.	"	"
367	"Porter Block"	Buff.	16	21	22	24	24	25	26	27	28	..	24	Sept. 6.	Roads Eng., Balto. Co.	Inspector.
368	"Fairmont Block"	Buff.	18	20	22	22	25	27	29	32	36	..	26	Sept. 6.	Con. Eng., Fred'k Co.	Engineer.
369	"Maxwell Block"	Red.	19	21	23	24	24	26	26	28	28	..	24	Sept. 6.	City Eng., Balto.	Inspector.
370	"Maxwell Block"	Red.	18	18	19	21	21	22	23	24	26	..	21	Sept. 7.	"	"

TABLE SHOWING RESULTS OF TESTS OF PAVING BRICK OBTAINED AT THE LABORATORY OF THE HIGHWAY DIVISION OF THE MARYLAND GEOLOGICAL SURVEY DURING 1905.—Continued.

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			Percentage lost by each brick in a test.										Average.			
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10				
371	"Maxwell Block"	Red.	15	17	19	20	21	24	25	26	31	..	22	Sept. 14.	City Eng., Balto.	Inspector.
372	"Maxwell Block"	Red.	15	15	18	19	21	23	23	25	33	..	21	Sept. 14.	"	"
373	"Porter Block".	Buff.	21	21	25	27	27	29	30	32	36	..	27	Sept. 14.	Roads Eng., Balto. Co.	"
374	"Maxwell Block"	Red.	20	21	21	23	24	24	25	27	28	..	24	Sept. 18.	City Eng., Balto.	"
375	"Kushequa Block"	Dk. Red.	25	26	28	32	34	37	37	43	51	..	35	Sept. 25.	Manufacturer.	Maker.
376	"Maxwell Block"	Red.	20	21	22	24	24	24	27	29	29	..	26	Oct. 6.	City Eng., Balto.	Inspector.
377	"Maxwell Block"	Red.	18	21	24	26	30	30	33	34	36	..	28	Oct. 9.	"	"
378	"Maxwell Block"	Red.	17	18	20	26	31	38	40	44	45	..	31	Oct. 19.	"	"
379	"Maxwell Block"	Red.	21	24	24	25	25	26	27	29	35	..	26	Oct. 26.	"	Contrac'r.
380	"Maxwell Block"	Red.	19	20	21	21	21	22	22	22	23	..	21	Oct. 27.	"	"
381	"Maxwell Block"	Red.	17	20	24	26	26	38	38	47	51	..	32	Oct. 27.	"	"
382	"Maxwell Block"	Red.	20	20	20	21	22	24	24	25	27	..	22	Oct. 27.	"	"
383	"Maxwell Block"	Red.	20	20	20	22	22	23	23	24	27	..	25	Oct. 27.	"	"
384	"Maxwell Block"	Red.	20	22	25	25	26	26	26	30	32	..	26	Oct. 27.	"	"
385	"Maxwell Block"	Red.	26	30	30	31	31	33	37	38	48	..	34	Oct. 27.	"	"
386	"Maxwell Block"	Red.	20	22	24	27	35	36	37	40	51	..	32	Oct. 28.	"	"
387	"Maxwell Block"	Red.	20	21	21	22	22	23	23	24	28	..	23	Oct. 28.	"	"
388	"Maxwell Block"	Red.	23	26	29	29	30	32	35	40	50	..	32	Oct. 28.	"	"
389	"Maxwell Block"	Red.	20	20	22	22	25	25	27	28	29	..	24	Oct. 28.	"	Inspector.
390	"Johnsonburg" Paving Block	Red.	19	20	20	21	23	23	24	25	27	..	22	Oct. 31.	F. H. Snyder.	Maker.
391	"Maxwell Block"	Red.	21	21	23	24	24	26	27	27	29	..	25	Nov. 1.	City Eng., Balto.	Contrac'r.
392	"Maxwell Block"	Red.	18	20	22	22	24	26	26	27	30	..	24	Nov. 2.	"	Inspector.
393	"Metropolitan Block"	Dk. Red.	16	16	16	18	19	20	20	21	22	..	19	Nov. 3.	"	"
394	"Metropolitan Block"	Dk. Red.	15	17	18	18	20	20	21	22	22	..	19	Nov. 3.	"	"
395	"Metropolitan Block"	Dk. Red.	15	16	18	18	21	22	23	23	23	..	20	Nov. 3.	"	"

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			Percentage lost by each brick in a test.										Average.			
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10				
396	"Metropolitan Block"	Dk. Red.	13	16	17	17	18	18	20	23	24	..	18	Nov. 4.	City Eng., Balto.	Inspector.
397	"Metropolitan Block"	Dk. Red.	13	16	16	17	17	17	20	24	25	..	19	Nov. 4.	"	"
398	"Metropolitan Block"	Dk. Red.	13	17	17	19	19	20	22	22	23	..	19	Nov. 4.	"	"
399	"Metropolitan Block"	Dk. Red.	11	15	16	19	19	20	22	23	24	..	19	Nov. 4.	"	"
400	"Maxwell Block"	Red.	20	22	22	22	23	24	24	28	31	.	24	Nov. 6.	"	"
401	"Maxwell Block"	Red.	20	21	23	26	27	27	28	30	39	..	27	Nov. 8.	"	"
402	"Maxwell Block"	Red.	24	24	24	27	27	28	31	34	39	..	29	Nov. 9.	"	"
403	"Maxwell Block"	Red.	16	17	19	20	21	21	21	23	29	..	21	Nov. 15.	"	"
404	"Maxwell Block"	Red.	14	19	21	21	21	25	26	26	30	..	22	Nov. 20.	"	"
405	"Maxwell Block"	Red.	15	18	21	21	21	22	23	24	28	..	21	Nov. 20.	"	"
406	"Maxwell Block"	Red.	25	26	27	28	28	31	31	37	39	..	30	Nov. 21.	"	"
407	"Maxwell Block"	Red.	23	25	25	25	28	29	30	30	32	..	27	Nov. 21.	"	"
408	"Maxwell Block"	Red.	18	19	19	21	21	23	27	38	38	..	25	Nov. 21.	"	"
409	"Maxwell Block".	Red.	17	17	18	19	19	19	20	26	26	..	20	Nov. 22.	"	"
410	"Clinton M. Johnson Block"	Lt. Red.	28	28	29	30	30	32	33	34	39	41	32	Nov. 24.	Clinton M. Johnson.	Johnson.
411	"Maxwell Block"	Dk. Red.	19	19	20	22	22	24	25	26	26	..	22	Dec. 6.	City Eng., Balto.	Maker.
412	"Maxwell Block"	Dk. Red.	19	19	25	26	28	30	31	37	46	..	29	Dec. 6.	"	"
413	"Montello Block"	Red.	16	17	19	19	19	19	20	20	23	..	19	Dec. 11.	"	"
414	"Montello Block"	Dk. Red.	10	11	12	13	13	16	16	25	26	..	16	Dec. 11.	"	"
415	"Maxwell Block"	Dk. Red.	20	21	21	21	22	24	24	25	25	..	23	Dec. 12.	"	Eng.

PART V

THE COUNTIES OF MARYLAND
Their Origin, Boundaries, and Election Districts

BY

EDWARD B. MATHEWS

THE COUNTIES OF MARYLAND, THEIR ORIGIN, BOUNDARIES, AND ELECTION DISTRICTS

BY

EDWARD B. MATHEWS

INTRODUCTORY.

The counties in Maryland occupy a far more important position than do similar political divisions in many other states of the Union. This prominence of the county is due primarily to the fact that in Maryland it serves as the unit of division of the territory of the State and is not formed by the combination of smaller integral units, as is the case in the North and West, where townships with their own local political organization are the units of political division. Where townships exist they are united to form a county and the county organization is accordingly more general and less complete than is the case in this State. Maryland possesses incorporated towns and villages analogous to those of other parts of the United States but the nearest analogue to a township—the election district—is not a political unit with its own individual government, but is rather a precinct serving for election and other purposes within the county. In Virginia the counties are often composed of several Hundreds or Parishes which become the local units in popular consideration if not in political government.

A second reason why the county is of unusual importance in Maryland and one or two other states arises from the agricultural occupations of the people and the widely scattered settlement of individuals of culture and cosmopolitan interests. These are wont to refer to their residences as in a given county rather than near some insignificant town or cross-roads which serves as a post office address. Large towns, as a rule, are unavailable for such close location of residence.

This importance of a county is not of recent development for it may be detected among the earlier records of the first settlers along the Potomac. Yet, in spite of the prominent place which the counties occupy in the popular parlance, there are few subjects regarding the origin of which there is more uncertain knowledge on the part of the local inhabitant. The date of erection of the home county and the manner in which it was set apart are alike but vaguely known. This ignorance is doubtless due in great measure to the age of the counties and the many modes of incorporating or erecting them which have been employed. These have varied from the personal announcement of the Proprietor, as in the case of old Worcester County, to formal legislative enactment or the insertion of new sections in the constitution of the State by the delegates at constitutional conventions. The original limits of the counties are often vaguely known or actually undeterminable, while in several instances, such as Baltimore County, there exist no extant records indicating exactly the manner or time of their erection. The nearest it is possible to come to the date of the formation of some is based upon the finding of the name or the reference to some county official in the contemporaneous legal records.

The preparation of large scale maps of the counties of the State by the Maryland Geological Survey has necessitated the exact delimitation of the counties and this in turn has called for the careful study of the legal records relating to them and their boundaries from the settlement of the State in April, 1634, to the present day. The results of these investigations are summarized in the following pages.

TIME OF ERECTING COUNTIES.

Among the first impressions received from a study of the records dealing with the origin of the individual county is the fact that there has been apparent no single well established mode of procedure by which the counties have come into being and that the great majority of the twenty-three counties, with Baltimore City, which now constitute the State of Maryland, were already erected prior to the Revolution and

the larger part of them prior to the beginning of the eighteenth century.

It has been customary in enumerating the counties of the State to arrange them according to the dates of their erection and this arrangement is the one most familiar on account of its constant use in legislative roll calls. The origin of the names of the counties together with the dates of their formation and their areas are given in the following table:

Counties.	Origin of Name.	Date of formation.	Area in square miles.
St. Mary's	In honor of the Virgin Mary, the landing having been made on the Feast of the Annunciation	1637	269.1
Kent	After the English county	1642	281.0
Anne Arundel	After the Lady Anne Arundel, wife of Cecilius, second Lord Baltimore	1650	430.4
Calvert	After the family name of the Proprietary.	1650	216.8
Charles	After Charles, Lord Baltimore	1658	462.0
Baltimore	From the Proprietary's Irish Barony (Celtic bilte mor; i. e. the large town).	1659	646.8
Talbot	After Grace Talbot, daughter of George, first Lord Baltimore	1662	267.1
Somerset	After Mary Somerset, sister of Lord Baltimore	1666	328.6
Dorchester	After Earl Dorset, a family friend of the Calverts	1668	573.2
Cecil	After the forename of the second Lord Baltimore	1674	374.6
Prince George's	After Prince George of Denmark	1695	479.6
Queen Anne's	After Queen Anne of England	1706	363.4
Worcester	After the Earl of Worcester	1742	491.5
Frederick	After Frederick, heir apparent	1748	660.0
Caroline	After Lady Calvert, sister of the last Lord Baltimore	1773	317.4
Harford	After Henry Harford, last Proprietary	1773	439.8
Washington	After General Washington	1776	457.3
Montgomery	After General Montgomery	1776	517.6
Allegany	From Oolikhanna; i. e. beautiful stream	1789	440.5
Carroll	After Charles Carroll of Carrollton	1836	445.3
Howard	After Col. John Eager Howard, the elder.	1851	249.1
Wicomico	After the river of that name, from wicko, house, and mekee, building; i. e. referring to an Indian town on the banks.	1867	368.9
Garrett	After John W. Garrett	1872	681.0

The arrangement in the table brings out in broad lines the general order of settlement within the State. First there comes St. Mary's County, representing the lonely settlement on the Potomac, then that of Kent, indicating the division of the State into an eastern and a western shore. Following this the western shore is divided into units suitable to local government, Anne Arundel representing the Puritans on the Severn, Calvert that on the Patuxent, and Charles that on the Potomac above St. Mary's. Baltimore County with its wide extent at the time of its formation, included portions of the eastern and western shores and represented the settlements at the head of the Chesapeake. Following its establishment came the preliminary division of the eastern shore, the settlements here being grouped by the necks of land between the dominant rivers rather than by the contiguity of the opposite sides of a single river as was the case on the western shore. Subsequent to the erection of Prince George's County at the close of the seventeenth century, the erection of new counties has been in the nature of the subdivision of the territory assigned to some earlier-formed county, the subdivision being required by increase in population and knowledge regarding the given territory.

METHOD OF ERECTING COUNTIES.

The following lists arranged according to the methods employed in erecting the several counties serve as an interesting indication of the irregularities of method pursued. The Governor, usually with the assent of the Council and frequently at the instigation of the Proprietary, apparently ordered the erection of the following counties:

St. Mary's.[1]
Kent.
Charles (old).
Calvert.
Charles.
Somerset.
Durham.
Worcester (old).

In the foregoing cases notice of the erection of the various counties

[1] The first evidence of these several counties is as follows:
St. Mary's..... Commission issued to sheriff June 29, 1637. Md. Arch., 3: 61.
Temporarily called Potomac 1654-1658.

may have been promulgated by proclamation of the Governor, but only one instance, that of Cecil County, is now to be found. In this case two proclamations were issued,[2] the first proclamation erecting the county, the second modifying the limits first assigned. In both cases the proclamation was issued in the name of the Captain General.

The most frequently observed method in the formation of the counties was by Act of Assembly although the dominant participations of the popular branch of the government, except in the case of Anne Arundel County and the acts of the Cromwellian government, are later than those of the Governor and Council. The following counties were erected through the action of the General Assembly:

Kent .....Commission issued to Commander August 2, 1642. Md. Arch., 3: 105.
There had been a sheriff for the Isle of Kent, as a Hundred of St. Mary's County, since Feb. 9, 1637-1638.

Charles (old)....Order in Council Oct. 3, 1650. Issued at the direct instigation of Lord Baltimore. This county was on the south side of Patuxent River and included parts of what are now St. Mary's, Charles, and Prince George's counties. Md. Arch., 3: 259.

Calvert .....Order in Council July 3, 1654. Md. Arch., 3: 308.
Temporarily called Patuxent County 1654-1658. Md. Arch., 1: 341.

Charles .....Order in Council April 13, 1658. Md. Arch., 3: 341.
Not the same territory as the earlier Charles County.

Somerset .....Order in Council August 22, 1666. Md. Arch., 3: 553.

Durham .....Order in Council October 22, 1669. Md. Arch., 5: 108.
Intended to include the northern part of what is now the State of Delaware.

Worcester (old). (Unnamed) Order in Council October 22, 1669. Md. Arch., 5: 57.
Also (by name) Order in Council July 19, 1672. Md. Arch., 5: 108.
The limits assigned to these two Worcester counties were different and neither Worcester nor Durham County was ever fully organized or represented in the Maryland Assembly. Their erection was proposed by Lord Baltimore to offset the aggressions of the representatives of the Duke of York on the Delaware which was claimed under the Maryland charter.

[2] June 6, 1674, Md. Arch., 15: 39; June 19, 1674, Md. Arch., 15: 41.

Anne Arundel	(1650)	Acts of Assembly,	1650,	Ch.	8.
Providence	(1654)	" "	1654,	"	17.
Patuxent	(1654)	" "	1654,	"	17.
Potomac	(1654)	" "	1654,	"	17.
Prince George's	(1695)	" "	1695,	"	13.
Queen Anne's	(1706)	" "	1706,	"	3.
Worcester	(1742)	" "	1742,	"	14.
Frederick	(1748)	" "	1748,	"	15.
Caroline	(1773)	" "	(Nov. sess.), 1773,	Ch.	6.
Harford	(1773)	" "	" 1773,	"	10.
Allegany	(1789)	" "	" 1789,	"	29.
Carroll	(1836)	" "	" 1836,	"	19.
Garrett	(1872)	" "	" 1872,	"	212.

Four counties have been erected by constitutional conventions, two of them being made by the constitutional convention of 1776, one by the second constitutional convention, 1850, and one by the fourth, 1867. The counties thus erected are as follows:

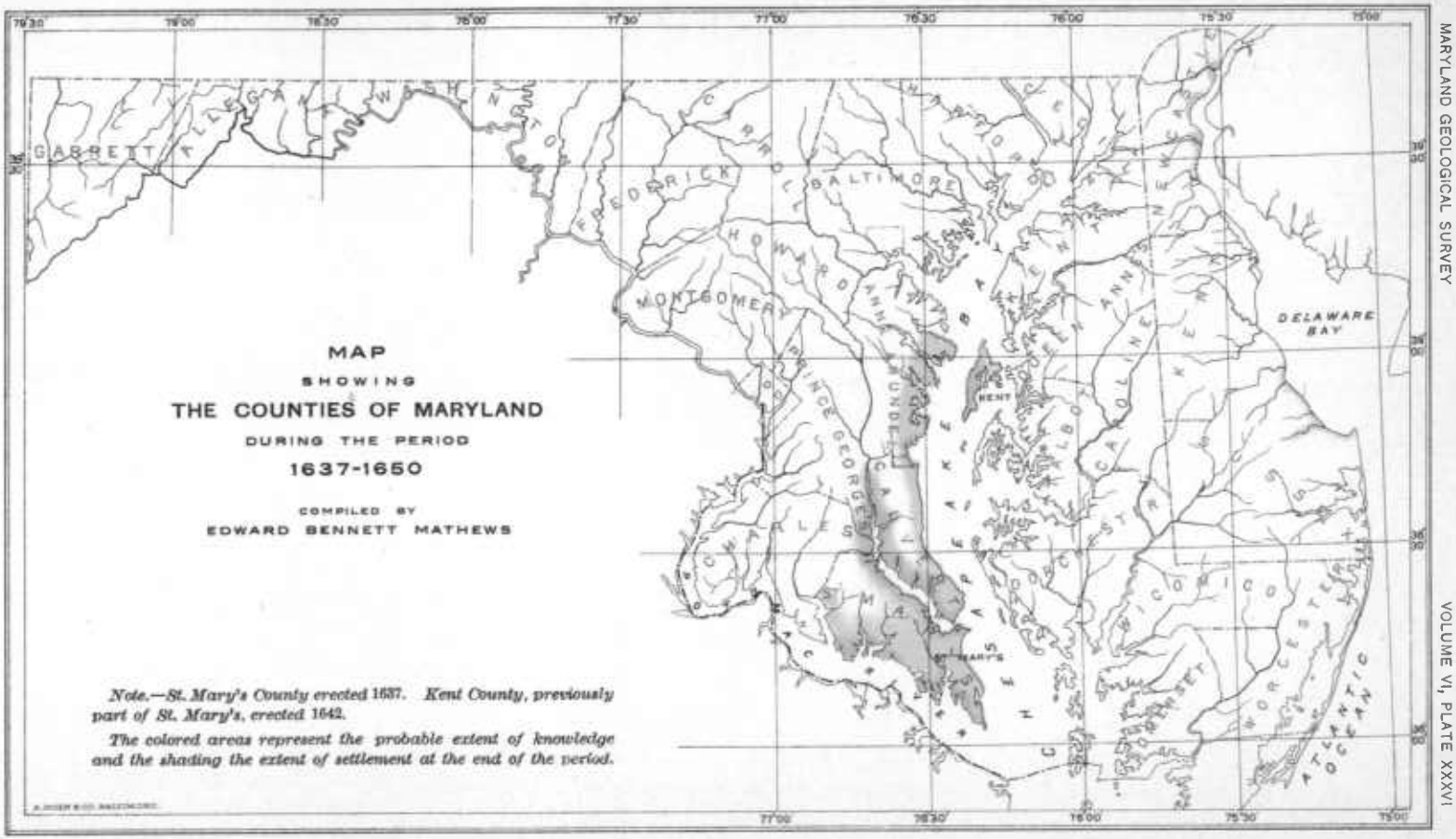
Washington	(1776)	Howard	(1850)
Montgomery	(1776)	Wicomico	(1867)

Washington and Montgomery were erected prior to the completion of the first constitution out of previously recognized "districts" of Frederick County. Howard and Wicomico were erected by the adoption of sections in the respective constitutions.

The records regarding the erection of three of the counties are entirely lacking or so incomplete that nothing can be told as to the way they were erected, but from the dates it is probable that the form pursued was that of an order of the Governor in Council. The evidence of their existence is first shown in each instance by the record of the issuance of writs to the sheriffs of the several counties, the names of the new counties appearing for the first time in the lists. Baltimore, Talbot, and Dorchester counties are the three with incomplete records. One may gain some conception of the limits originally decreed by subsequent incidents, but in no one of the cases are the bounds specified by the original Act known.[8]

[8] The first evidence of the existence of these counties is in writs issued to the sheriff on the following dates:

Baltimore, Jan. 12, 1659/60, Md. Arch., 1: 381.
Talbot, Feb. 18, 1661/62, Md. Arch., 1: 425.
Dorchester, Feb. 16, 1668/69, Md. Arch., 3: 448.


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1637-1650
COMPILED BY
EDWARD BENNETT MATHEWS
Note.—St. Mary's County erected 1637. Kent County, previously part of St. Mary's, erected 1642.
The colored areas represent the probable extent of knowledge and the shading the extent of settlement at the end of the period.
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
HOWARD
ANNE ARUNDEL
MONTGOMERY
PRINCE GEORGES
CALVERT
CHARLES
ST. MARY'S
KENT
QUEEN ANNES
CAROLINE
TALBOT
DORCHESTER
WICOMICO
SOMERSET
WORCESTER
DELAWARE BAY
ATLANTIC OCEAN
79°30
79°00
78°30
78°00
77°30
77°00
76°30
76°00
75°30
75°00
39°30
39°00
38°30
38°00

The methods governing the erection of counties subsequent to the American Revolution have been determined by the various constitutions.

The Constitution of 1776 contains no provision for the erection of new counties, it apparently being the consensus of the Convention that the work which they had already done in dividing Frederick County into three parts by the erection of Washington and Montgomery counties met all the requirements at that time. This first Constitution of the State remained in force until the adoption of the second Constitution in 1850. It was, however, very much modified by the Acts of 1836, Chapter 197, which changed in great measure the organic law of the State with respect to the election of governor and other matters. Although the Act grouped the counties into three gubernatorial districts and changed the representation of the towns, by including them in certain instances within the county, no change was made in the limits of the counties then existing and no general law was laid down as to the manner of erecting new counties.

The Constitution of 1850 devotes a special article to new counties in which it erects Howard District, which up to this time had been a part of Anne Arundel County, into Howard County, and provides for the erection of a new county with the limits now possessed by Garrett County whenever the territory so described should include a population of 10,000, and the majority of the electors should desire to separate and form such a new county. There is, however, no provision made for the formation of new counties in the future.

The Constitution of 1864 provided for the organization of new counties by vesting the power in the General Assembly. They were also empowered to move the county seat or change the county boundaries under certain limitations. At this time it was provided that no new county should contain less than 400 square miles or less than 10,000 white inhabitants, a provision which still remains in our Constitution of 1867. The second section of Article 10 in the Constitution of 1864 states: "The General Assembly shall provide by general law for dividing the counties into townships or permanent municipal corporations in place of the existing election districts, prescribing their limits and con-

fiding to them all powers necessary for the management of their public local concerns." This apparently mandatory provision of the Constitution does not appear to have been carried out as the election districts still exist.

The Constitution of 1867, which is still in force, provided for the erection of Wicomico County and repeated the general provision for the organization of new counties, the localization and removal of county seats, and the changing of county lines; vesting the power as before in the General Assembly. The same provisions were also made to the effect that no new county should contain less than 400 square miles and that no existing county should have its territory reduced to less than the same amount. This limiting clause practically forbids the General Assembly to erect any new county in the State of Maryland without a readjustment of several of the now existing counties. The largest counties at the present time are Garrett (681 sq. m.), Frederick (660), Baltimore (647), Dorchester (573), Montgomery (518), and Worcester (492). The division of Garrett into two counties with the addition of a small amount of Allegany is not possible since Allegany County has only 40 square miles to spare. Even if it in turn encroached upon Washington County the total area of these three contiguous counties is not sufficient to make an additional county of the size required without the reduction of existing counties below the limit provided.

A new county might be organized out of a portion of Frederick County but to do so it would be necessary to reduce Montgomery and either Washington or Carroll counties.

The rapid increase in population in the vicinity of Baltimore and the present large territory of Baltimore County might develop the necessity for the organization of an additional county in this part of the State, but according to the laws as they now exist this would be quite difficult since if Carroll, Harford, and Anne Arundel counties gave up their surplus, above the prescribed minimum, there would still be less area than is required for a new county.

Dorchester County, with its 573 square miles extends over a much wider territory on account of its estuaries and islands, yet from it no new

county could be easily erected in accordance with the present law. Talbot, Caroline, and Wicomico, the counties contiguous to Dorchester are all less than 400 square miles in extent and could therefore yield nothing for a new county.

From these facts it would appear that if occasion demands additional counties—a somewhat remote possibility—it would be necessary to amend the Constitution as it now exists.

ELECTION DISTRICTS.

Each of the counties is divided into a series of election districts which in turn may be further subdivided into election precincts for the convenience of the voters. Prior to 1800 the entire population of the State was scarcely more than a quarter of a million and the voting population was much smaller. Moreover, the government of the State was such that voters had fewer questions presented to them than at present. There was apparently inconvenience for many voters in the exercise of their suffrage but the county was regarded a sufficiently small unit for electoral purposes. In 1798 a law[4] was passed dividing the nineteen counties as they existed into election districts. Before this law could become effective it was necessary to pass an act of confirmation[5] and subsequently commissions[6] to subdivide the various counties were authorized. The counties and Baltimore City were divided as follows:

	1798.	1906.	
	Election districts.	Election districts.	Precincts
Allegany	6	28	42
Anne Arundel	5	7	16
Baltimore City*	8	24	317
Baltimore County	7	15	49
Calvert	3	3	4
Caroline	3	8	9
Carroll	—[7]	13	21
Cecil	4	9	12
Charles	4	9	9
Dorchester	3	17	22
Frederick	7	26	38

[4] Acts of 1798, Ch. 115. [5] Acts of 1799, Ch. 48. [6] Acts of 1799, Ch. 50.
[7] Not created until 1836, included in Frederick and Baltimore counties.
* Separated from Baltimore county by Convention of 1850.

	1798.	1906.	
	Election districts.	Election districts.	Precincts.
Garrett	—[8]	14	14
Harford	5	6	16
Howard	—[9]	6	7
Kent	3	7	11
Montgomery	5	13	16
Prince George's	5	17	18
Queen Anne's	3	7	9
St. Mary's	3	9	10
Somerset	3	15	17
Talbot	4	5	14
Washington	5	25	31
Wicomico	—[10]	14	14
Worcester	5	9	9
Total	91	306	725

The total number of election districts including the wards of Baltimore City numbered 91 while the corresponding units to-day number 306 and many of them are divided into election precincts of which there are 317 in Baltimore City alone. The facilities for voting have been increased nearly eight times while the population has increased scarcely three and the area has remained constant. Since at the same time the means of communication have greatly improved it is evident that the voter of to-day demands more in the way of ease in voting to induce participation in public affairs.

The methods employed in increasing the election districts and precincts have varied somewhat but not as widely as in the case of the erection of counties. Prior to 1836 the change in the election districts of a county was equivalent to a constitutional amendment and required a confirmatory act by a subsequent General Assembly. Since that date this has not been necessary and the usual rule has been to increase the number of election districts by specific acts of the General Assembly which have not received confirmation by subsequent legislation. In a few cases general laws have been introduced vesting the power to change

[8] Not erected until 1872, included in Allegany County.
[9] Not erected until 1850, included in Anne Arundel County.
[10] Not erected until 1867, included in Somerset and Worcester counties.

the election districts in the Board of County Commissioners. Thus Washington County in 1860 authorized its County Commissioners to erect new election districts whenever necessary. In Charles County the Commissioners have been authorized to change the lines on petition since 1870 but apparently do not have the power to erect new districts. The County Commissioners in Calvert and Talbot counties are authorized to divide the present election districts into precincts to meet the requirements, while this power is conferred upon the election supervisors in Harford County.

The fact that the election district is frequently modified by increasing the number of election precincts within it and also the fact that the number of election districts has little or nothing to do with the delegated powers of representation, except as a general means of designating units of territory, would seem to indicate that it is losing its significance as a political subdivision since it possesses no organic political life within itself as in the case of townships which occupy analogous positions in other states.

DEVELOPMENT OF THE COUNTIES.

ALLEGANY COUNTY.

Few counties in the State have a less varied history regarding their boundaries and none were erected with simpler phraseology. According to the Acts of the Assembly passed in 1789:

> All that part of Washington County which lies to the westward of Sideling Hill creek, shall be and is hereby erected into a new county by the name of Allegany County.

That brief statement indicates the early settlements of Allegany County as constituting a part of its eastern neighbors. Prior to 1776, when Washington County was erected, the rapidly increasing number of inhabitants in the vicinity of Fort Cumberland had been residents of Frederick County with the county seat at Frederick. Subsequent to its formation, until the erection of Garrett County in 1872, the Allegany County courts exercised jurisdiction over all the western section of the State, including Garrett County. The boundary line between Garrett

and Allegany counties, first stated in the Constitution of 1850, is defined by the Acts of Assembly of 1872 as a straight line beginning at the summit of Big Backbone or Savage Mountain, where that mountain is crossed by the Mason and Dixon line, to the middle of Savage River where it empties into the Potomac. Various attempts have been made to run the line which should fit these conditions. The County Surveyor of Allegany County began such a line at the mouth of Savage River but intersected the Mason and Dixon line on Little Savage Mountain more than three-quarters of a mile west of where the law indicates. This is known as the Chisholm line. Somewhat later in 1878 the County Surveyor of Garrett County began a line at the northern terminus, or the intersection of the crest of Big Savage Mountain and the Mason and Dixon line, and ran southward toward the mouth of Savage River. It came out in the vicinity of Westernport, something less than a mile east of the desired point. In 1898 a line was marked which was not only a straight line but connected the two points specified in the original law erecting Garrett County. Because of certain technicalities this line was repudiated by the Allegany County Court and an attempt was made in the Legislature of 1906 to validate this line if the voters of Garrett County saw fit to do so. Since this Act did not specify the place of voting for such as might be transferred from Allegany to Garrett County it has recently been held that the line run in 1898 in accordance with the original Act is still invalid.

The northern boundary of Allegany County is formed by a portion of the famous Mason and Dixon line which was run prior to the American Revolution to settle the dispute between the proprietaries of Pennsylvania and Maryland. The original line was marked by stone monuments east of Allegany County, but from Sideling Hill on, the difficulties of transporting the stones which had been brought from England became too great. Within the last few years this historic line has been resurveyed and stone monuments have been placed to mark its position.

The southern boundary of Allegany County, which is at the same time the boundary between Maryland and West Virginia, follows the right bank of the Potomac River, whose waters are a part of Allegany County.

ALLEGANY COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 6 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 6 election districts.

1801 Ch. 59. Commission appointed to make changes who report to County Clerk.

1805 Ch. 97. Polling place of 2d election district changed from Simpkins to Selbysport.

1814 Ch. 34. Polling place of 4th election district changed.

1816 Ch. 32. Increases election districts from 6 to 8.

1817 Ch. 14. Confirms Acts of 1816 Ch. 32.

1817 Ch. 15. Commission appointed to divide into 8 election districts and to report to County Clerk.

1821 Ch. 133. Line between 1st and 4th election districts changed to be as follows:

"Commencing at some point on Savage River above the present settlement; thence crossing the back bone, above the mouth of Crabb Tree Run; thence crossing the state road about a mile above George Smar's, and to the north branch of Potomac, at or near the mouth of Laurel Run."

1824 Ch. 67. County divided into 9 districts the additional district coming off the 7th and 8th. No change in 1, 2, 3, 4, 5, 6. The new election places to be Oldtown, Isaac Osmun's near Fifteen Mile Creek and Walter Slicer's Tavern.

1825 Ch. 16. Confirms Acts of 1824 Ch. 67.

1832 Ch. 252. Commission appointed to review districts, to make alterations and to report to County Court.

1833 Ch. 8. Confirms Acts of 1832 Ch. 252.

1835 Ch. 44. Commission appointed to subdivide district No. 1 and to erect new district.

1836 Ch. 160. Supplementary act authorizing the commission to select a place of election in district No. 10 and to report to County Clerk.

1837 Ch. 39. Line between 4th and 5th election districts changed to

"run from the head of Jackson's Run, near the top of Dan's Mountain to the mouth thereof, thence with George's Creek to the mouth of Ayer's Run, thence with said last mentioned run to the head thereof, on Savage Mountain.

1837 Ch. 183. Commission appointed to revise and alter the divisional lines between election districts No. 1 and No. 10, to change the place of holding the elections, and to report to Allegany County Court. Repealed by Acts of 1839 Ch. 1. Re-enacted by Acts of 1840 Ch. 102.

1839 Ch. 1. Repeals Acts of 1837 Ch. 183 and revives Acts of 1835 Ch. 44.

1840 Ch. 102. Repeals Acts of 1839 Ch. 1 reviving Acts of 1837 Ch. 183.

1841 Ch. 82. Line between the 1st and 4th election district changed as follows:

"Commencing at the present place where the said line crosses the State road, west of George Smarrs farm, and running with the said State road to the fording of Folly Run, and from thence down with the meanderings of said run to its junction at the north branch of the Potomac river, near where William McRobee now lives."

1849 Ch. 4. Polling place of the 1st election district changed to Myrray Thayer's house.

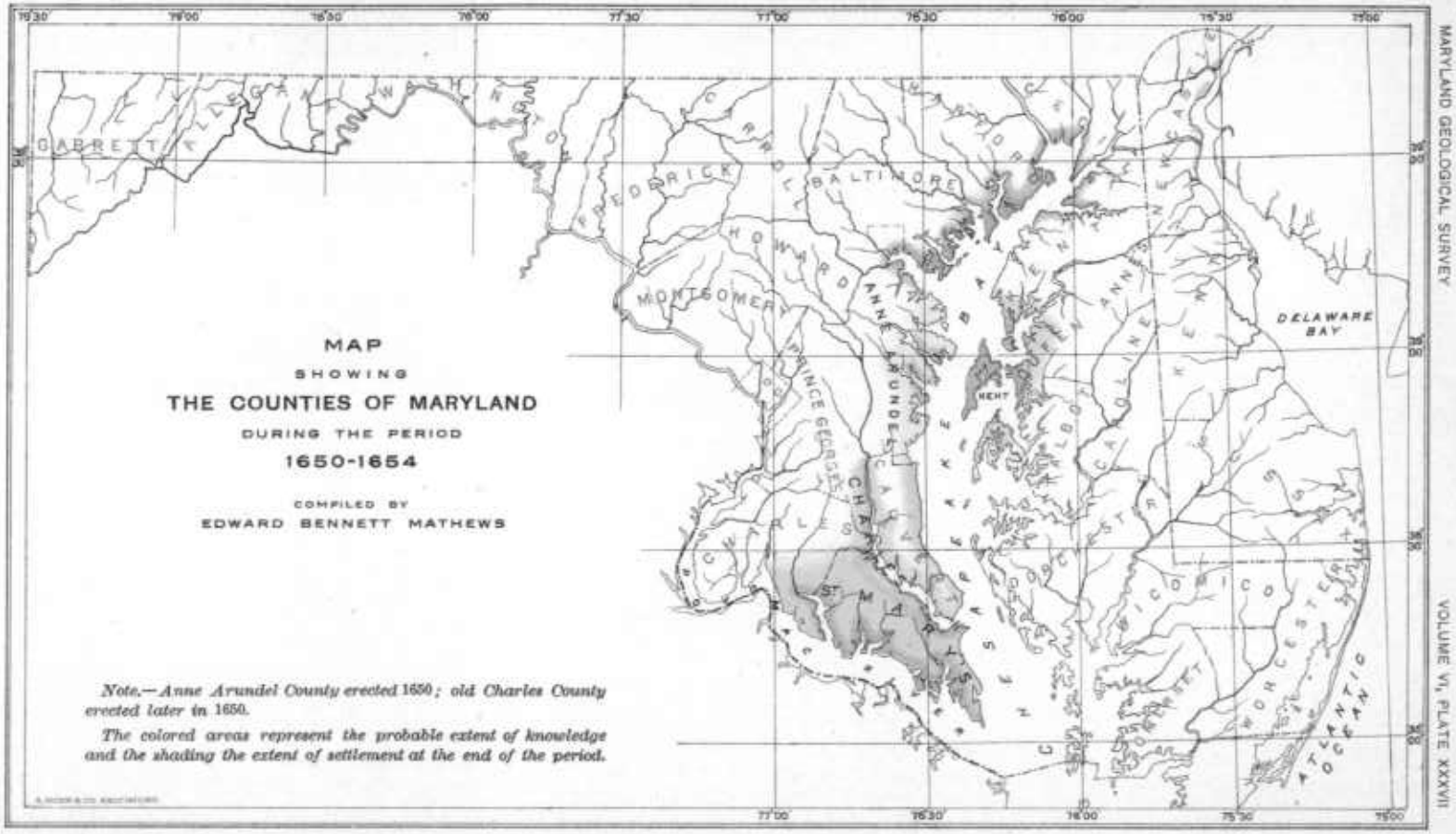
1849 Ch. 282. Line of the Flintstone Election District, being No. 8, changed to run as follows:

"Commencing on the top of Nicholson's Mt., at the western end of the line that separates the 8th and 9th districts in said county, and running thence in a northwestern direction to the Baltimore and Cumberland turnpike road, where the Murley's Branch road intersects said pike, thence down said pike to a lane known as Smith Lane, thence up Pleasant Valley, at the base of Evitt's Mt., to the Pennsylvania line so as to include Pleasant Valley in said Flintstone District."

1849 Ch. 394. Commission appointed to establish an additional election district out of No. 2 Report to Allegany County Court. See Garrett County.

1849 Ch. 394. That the beginning for the same be at the Pennsylvania line, at the old improvement made by Valentine Shocky, and now belonging to Harney Bane, with a straight line from the beginning so as to intersect the Morgantown road at the National road, then with said road to the top of Cove hill, then leaving said road and running on the south east side of Winding ridge to Bear Creek, then with a straight line crossing Bear Creek to an old house standing in the woods, erected by Joseph Friend of G., then with a straight course crossing the east branch of Bear Creek, then continuing with a straight line to a spring in the road leading from the Senging ground to Selbysport, on Winding ridge, at Thomas Casteel of Thomas, then with a straight line to the Yoh river at Rock lick run, then up said river to Gap run, at the division line between districts number one and number two, then with said line as it now is to the division line between number two and number three, and running with said line between number two and number three to the Pennsylvania line, then with the Pennsylvania line to the beginning. Polling place Accident.

1849 Ch. 463. Polling place for 3d election district changed from Little Crossings to the school house at Grantsville.


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1650-1654
COMPILED BY
EDWARD BENNETT MATHEWS
Note.—Anne Arundel County erected 1650; old Charles County erected later in 1650.
The colored areas represent the probable extent of knowledge and the shading the extent of settlement at the end of the period.
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
BALTIMORE
HOWARD
MONTGOMERY
PRINCE GEORGES
ANNE ARUNDEL
CALVERT
CHARLES
ST MARYS
KENT
QUEEN ANNES
CAROLINE
DORCHESTER
TALBOT
WICOMICO
SOMERSET
WORCESTER
DELAWARE BAY
ATLANTIC OCEAN
79°30
79°00
78°30
78°00
77°30
77°00
76°30
76°00
75°30
75°00
39°30
39°00
38°30
38°00

1852 Ch. 29. Erects new district with the following bounds:

"Commencing at the point of intersection of the dividing line between the said [9th] district and district number seven in said county with tbe eastern line of district number six, in said county, and from thence in a westerly direction by a straigbt line, to tbe southern end of Smith's lane, at the turnpike road, leading from Flintstone to Cumberland, and on the farm now owned by Henry A. Jamison, and heretofore owned by Henry Smith, now deceased; from thence in a northerly direction along said lane to a point from which two lanes diverge; thence along the lane leading in a northwesterly direction to the base of Evitt's mountain; tbence along the base of said mountain to the Pennsylvania line, so as to include Pleasant Valley."

1852 Ch. 121. Committee appointed to create two new election districts by the alteration and division of election districts 5 and 6. The new district known as Mt. Savage No. 12.

1852 Ch. 218. Erects an additional election district out of No. 1 with tbe following boundaries:

"Beginning . . . at a point on the road leading from the National road, from Piney Grove, where the line of district number one and district number three crosses said road, thence with said road to the top of Hooppole Ridge, at the old burnt school house, thence with the Hooppole road to the Little Yougb Bridge, at the old Armstrong farm; said new district to be called district number fourteen or Sangin ground district.

1853 Ch. 289. Commission appointed to run and mark the line between the 1st and 4th election districts.

1854 Cb. 76. Surveyor authorized to run out, mark and establisb the division line between district 11 and 14.

1856 Ch. 156. Commission appointed to run out the lines between election districts 3 and 5

"commencing at some point on Savage River, tbence by a straight line near Mr. Recknor's tavern, ou the National road, to a point on the Pennsylvania State line."

1856 Ch. 221. Commission appointed to run out the liue between 1st and 4th election districts.

1860 Ch. 167. Commission appointed to erect election district No. 15 from 1st, 10th, and 14th districts and to report to the Clerk of Circuit Court. Elections to be held in Oakland.

1860 Ch. 310. Commission appointed to create election district No. 16 out of 4th and 5th districts and the southern line of the new district shall not be south of William Shaw's mill and the place of elections shall be Lonaconing.

1862 Ch. 4. Polling place of the 10th district changed to the house of Wm. Waltz on the Northwestern Turpike.

1872 Ch. 79. Commission appointed and authorized to review election district No. 4 and to make such alterations and division and to create an additional election district, but said commission shall not locate the northern line of said new district north of Laurel Run and said new election district shall be known as district No. 17 and the place for holding the election shall be Barton and the Commission shall report to the Clerk of the Circuit Court of Allegany County.

1872 Ch. 150. Divides Cumberland into two election wards to be known as the first ward and the second ward; the first ward shall embrace all that portion of the city lying north and east of the National or Turnpike road leading from Baltimore through said city to Wheeling; and the election polls in said ward shall be held in the Market-house and shall be called the "first ward polls"; the second ward shall embrace all that portion of said city not included in the 1st ward, and the election polls therein shall be held at the court house, and shall be called the "second ward polls."

1872 Ch. 221. Separates western part into Garrett County.

1872 Ch. 256. County divided into 16 election districts according to the present bounds and limits, but the County Commissioners of Allegany County shall have power and authority to create new election districts in addition to those already established in said County, whenever, in their judgment, the convenience of the voters of the county, or any part thereof, would thereby be promoted, and not otherwise; and shall have powers to abridge or enlarge any districts heretofore established by the Legislature in said County, or which may hereafter be established by the said County Commissioners and said commissioners shall have the further power of designating the place of holding the election polls in all election districts hereafter to be established in said county.

1898 Ch. 304. Provides for the survey of the Allegany-Garrett boundary line.

1898 Ch. 415. Erects the 26th election district with the following bounds: "Beginning at the intersection of Bowery street and the Legislative road, in the town of Frostburg, and running thence with the centre of Bowery street to the National turnpike, then with the centre of said National turnpike westerly to its intersection with the Garrett county line, and then with said Garrett county line southerly to the line of district number nineteen, and with the lines of district number nineteen, reversed to the Legislative road aforesaid, and then with said Legislative road to the point of beginning."

1900 Ch. 513. Divides the 18th election district into two election precincts.

1900 Ch. 652. Bounds of the 21st election district changed to he as follows: "Beginning at Zion Church, on Bedford Road, and running thence down Peavine Run to Mrs. Hardman's; then with the County Road to Frantz Bridge; thence across hy the Southern Church to the bridge on the turnpike at Moses Wilson's; thence west hy the National Pike to the road at Hamilton's hlacksmith shop; thence with a straight line to the Southern Church, on the top of the mountain, near Evan Rice's; thence hy a straight line to the Twiggtown School House; thence with the top of Martin's Mountain to the Pennsylvania line; thence with Pennsylvania line west to the centre of Bedford Road; thence with the centre of Bedford Road to the place of heginning."

1904 Ch. 66. 27th election district to be erected hy Supervisors out of parts of districts 10, 15, and 18.

1904 Ch. 383. Makes Precinct 1 of the 26th election district the 26th election district and Precinct 2 a new district to be numbered the 28th district.

1906 Ch. 730. An Act to provide for the definite and final establishment of the boundary line hetween Allegany and Garrett counties, in order to bring under the assessment law certain untaxed lands in said counties.

1906 Ch. 770. Boundary so changed as to transfer Clarysville from 17th to 24th election district.

ANNE ARUNDEL COUNTY.

The original settlement of Anne Arundel County centers about the migration of ten Puritan families from the shores of Nansemond River, Virginia, to the shores lying south of Annapolis. In gratitude for their relief from oppression they called their new settlement Providence, and within ten years had established at least five centers of development, about Herring Creek, West River, South River, Middle Neck, and Broad or Town Neck. At first they objected to taking the oath of allegiance to their Catholic landlord, but on April 6, 1650, they were represented by delegates at the opening of the General Assembly. One of their number was even elected to office. On the 23d of the month (Md. Arch., 1:280) a bill was introduced to erect their settlement into a county. The order was engrossed four days later (Md. Arch., 1:283) and passed on April 29, becoming

An Act for the erecting of Providence into a County by the name of Annarundell.

Be it Enacted by the Lord Propry hy and with the assent & approbacō of

the Vpper and Lower House of this Assembly That that part of the Province of Maryland on the west side of the Bay of Chessopeack over against the Isle of Kent formerly called by the name of Providence, by the Inhabitants there resideing and inhabiting this yeare shall from henceforth bee erected into a Shire or County, by the name of Annarundell County, And by that name hereafter to bee ever called.

This act is Chapter 7, Acts of Assembly for 1650, and may be found in Maryland Archives, volume i, p. 292. It is of particular interest in relation to the subject of this present paper since as Bozman[11] says "this is the first act of assembly, and indeed almost the only legislative provision, for the erecting of any county within the province." The latter part of his statement is hardly correct.

The territory of the present Calvert County was laid off the same year, and at a later time disputes arose owing to the position of the counties on the roll call referring to the dates of their erection as to the relative positions of Calvert and Anne Arundel counties. By a vote of the House of Delegates in 1671 it was decided that Anne Arundel County was older than Calvert which had come into existence originally as (old) Charles County, through the initiative of the Lord Proprietary.

Anne Arundel County, bearing as it did, the names of Lady Anne Arundel, wife of Cecilius, Lord Baltimore, a strict Catholic, was not unaffected by the Puritan revolution in Maryland. In October, 1654,[12] by an ordinance of the Puritan Commissioners the southern boundary of the County was made at "Mr. Maishes Creek Commonly called oyster Creek" shown by old land records, in the contest of 1824, to be the same as Fishing Creek and the name was changed to Providence. In 1656, by the quieting of the Province this act was revoked and all laws were supposed to stand as they did in 1654. The name of Anne Arundel was restored, but the inhabitants seemed to retain the definition of the boundary line of October, 1654, for the limits of Anne Arundel and Calvert counties.

The next modification of the territorial limits of Anne Arundel County arose from the erection of Baltimore County, probably in the year 1659,

[11] Bozman, vol. ii, p. 393, cf. *ante* p. 424.
[12] Chapter 5, Acts of 1654.

when all of that territory lying to the north and east of the Patapsco River was set aside for the new county. The exact limits between the two jurisdictions were not evident in the records until 1674 when a proclamation[13] was issued stating that the southern bounds of Baltimore County should be "the south side of Patapsco river, and from the highest plantations on that side of the river, due south two miles into the woods."

The settlements along the Patapsco River prospered and the inhabitants finding it inconvenient to transact their business at old Baltimore on Bush River petitioned that the territory on the south side of the Patapsco River be added to Anne Arundel County, but their petition on October 3 was disallowed by the Assembly. The record of this transaction is as follows:

"Post Meridiem. Petition of the Inhabitants of the South Side of Patapscoe River being Returned to this Board with the vote of the house thereon, the Board doe Concurr therewith, The said Vote Runes in these words, Vizt. By the Assembly October 3d 1694. The within petition Read & Considered. Voted whether the South Side of potapscoe River be added to the County of Ann Arrundell or Remaine still as it is, Carried by the Majority of Votes to remaine still as it is. Cleborne Lomax Clk Assembly. (Assembly Proceedings, Sept. 20-Oct. 18, 1694. Md. Arch., 19: 69.)

In 1696 commissioners, however, were appointed to establish the boundary between the two counties. They presented their report to the succeeding legislature which, on April 3d of that year, passed Chapter 13 of the Acts of 1698, adopting a line described as follows:

"beginning att three marked Trees, viz. a white Oak, a red Oak, and a chesnutt tree, standing about a mile and a quarter to the Southward of Bodkin Creek on the West side of Chesapeak bay; the marked red Oak on the right hand for Baltemore County, the Chesnutt tree on the left hand for Ann Arundel, the white Oak in the middle they standing near a Marsh and a pond and running thence West until it Cross the Road from the Mountains of the mouth of Magatty River, to Richd Beards Mill; then Continueing Westward, with the said Road to William Hawkins Path, to two marked Trees the one for Ann Arundell County the other for Baltemore County, thence Continueing along the said road to Jon Locketts path to Two Trees for the end and purpose aforesaid then leaving the road by a Line drawn west to William Slades path, to two marked Trees as aforesd; thence continuing West between the

[13] Proclamation of June 6, 1674.

draught of Magaty and Potapsco Rivers untill it come to a Mountain of White Stone rock still Continuing West to a road going to Potapsco, to Peter Bonds to two marked Trees as afd for the end and purpose as aforesaid thence Continuing West to the main Road to Potapsco fferry to two Marked Pines, standing near the ready Branch written att large on the North side of the said Trees (Baltemore County) on the South side (Ann Arundell County) from thence with a Line Drawn west to Elk Ridge Road, to two Marked Trees for the end and purposes aforesaid thence Continuing the same Course of W.N.W. to Putuxent river and so up the said River to the Extent thereof for the bounds of Baltemore county. . . . . All that Tract of Land lying on the North side of the said Division lines &c to be in Baltemore County and all the Land, &c. on the South side thereof to the ancient Extent of Ann Arundell County to be in Ann Arundell County &c."

According to this line, few points of which can now be located exactly, this Act seems to have added somewhat to the territory of Baltimore County at the expense of its neighbor. The notable points on this boundary cannot now be determined with accuracy, but from the knowledge available of the different settlements at the time of the passage of the act it seems probable that the intention was to place the boundary along the divide between the Magothy and the Patapsco rivers as far as Elk Ridge, and thence westerly to the Patuxent in such a way as to include all of the settlements then made. This would make the line indefinite and would extend at that time just north of the present location of the Baltimore and Ohio Railroad. Grants had just been given to large tracts in the vicinity of Savage and Guilford, and along Warfield's Ridge. The settlements along the Patapsco, which reached at this time to the vicinity of Hollofields, were apparently included within Baltimore County. This boundary, such as it was, apparently remained the northern limit of the county until 1726 when the General Assembly acted upon a petition similar to that of 1694, and passed on July 25 "An Act for uniting part of Baltimore County to Anne Arundel County," which runs as follows:

Whereas the several Inhabitants on the *South* Side of *Patapsco* River in Baltemore County, have, by their humble Petition to this present General Assembly set forth, That for many Years past, they have suffered great Inconveniences by the Distance of their Residence from the Court-house of their County, which is so scituate that even moderate Rains render it inaccessible; as thereby many Falls, as well as several Runs, which must be past, are utterly unfordable, which constantly subjects such of them as are obliged to attend the County-courts, to the Censure of such Court, and very often to grievous Fines:

And for as much as it is evidently made to appear to this present General Assembly, that the Petitioners, or such of them as then resided on the *South* Side *Patapsco* River as aforesaid, were formerly Part of *Anne Arundel* County; and that they, when *Baltemore* County was in its Infancy, were lopt off from *Anne Arundel* County and with no other intent than to bear a Part of the necessary Charge of the said *Baltemore* County, with the few Inhabitants that were then therein, which, though their Taxes were much increased thereby, they bore with Patience:

And forasmuch as great Part of the Land in *Anne Arundel* County is so far worn out, that several of the former Inhabitants thereof have of late Years removed into *Baltemore* County, for the Sake of the fresh Lands there: As also, that on Inspection 'tis found that when the now Inhabitants on the *South* Side of Patapsco River in Baltemore County aforesaid, are taken from that County, and made Part of *Anne Arundel* County, there will still remain 1791 Taxables as appears by the List of Taxables now returned from the County, which is a Number that far exceeds Those in four or five other counties. . . . . Be it Enacted . . . . That From and after the last Day of May which shall be in the year of our Lord January 7, 1727, the Land lying on the *South* Side of *Patapsco* River aforesaid, and contained within the Bounds following, *viz.* From the Head thereof, and from thence, bounding on the *south* side of the main Falls, being the Southernmost great Branch of the said River, and running as the said Branch runs, to the first main Fork of the said Falls, and other boundaries on the *South* Side of the said *Southernmost* Fork, Till a South course will intercept the Head of *Snowden's* River, and so down the said *Snowden's* River, 'till it meet with the now Extent of Anne-Arundel County, shall be, and for ever hereafter deemed as Part of Anne-Arundel County; . . . .

The question of the boundary between Anne Arundel and Calvert counties again became a subject of controversy in 1777 when the eligibility of a Delegate was questioned on account of his place of residence. Fishing Creek at the time was accepted as the boundary by vote of the Delegates and an Act of Assembly was passed (1777, Chapter 7) appointing commissioners to ascertain and establish the division line and to report their proceedings to the next General Assembly. A quarter of a century later, in 1809, the question once more arose but the final controversy did not become settled until the second decade of the last century. In 1822 the Assembly passed the following:

"An Act to Ascertain and establish a divisional line between Anne Arundel and Calvert Counties.

Whereas the line of division between Anne Arundel and Calvert Counties is not well ascertained, by means whereof inconveniences have arisen, and in particular, divers persons, living near the borders of those counties, have not contributed anything toward the public expenses;

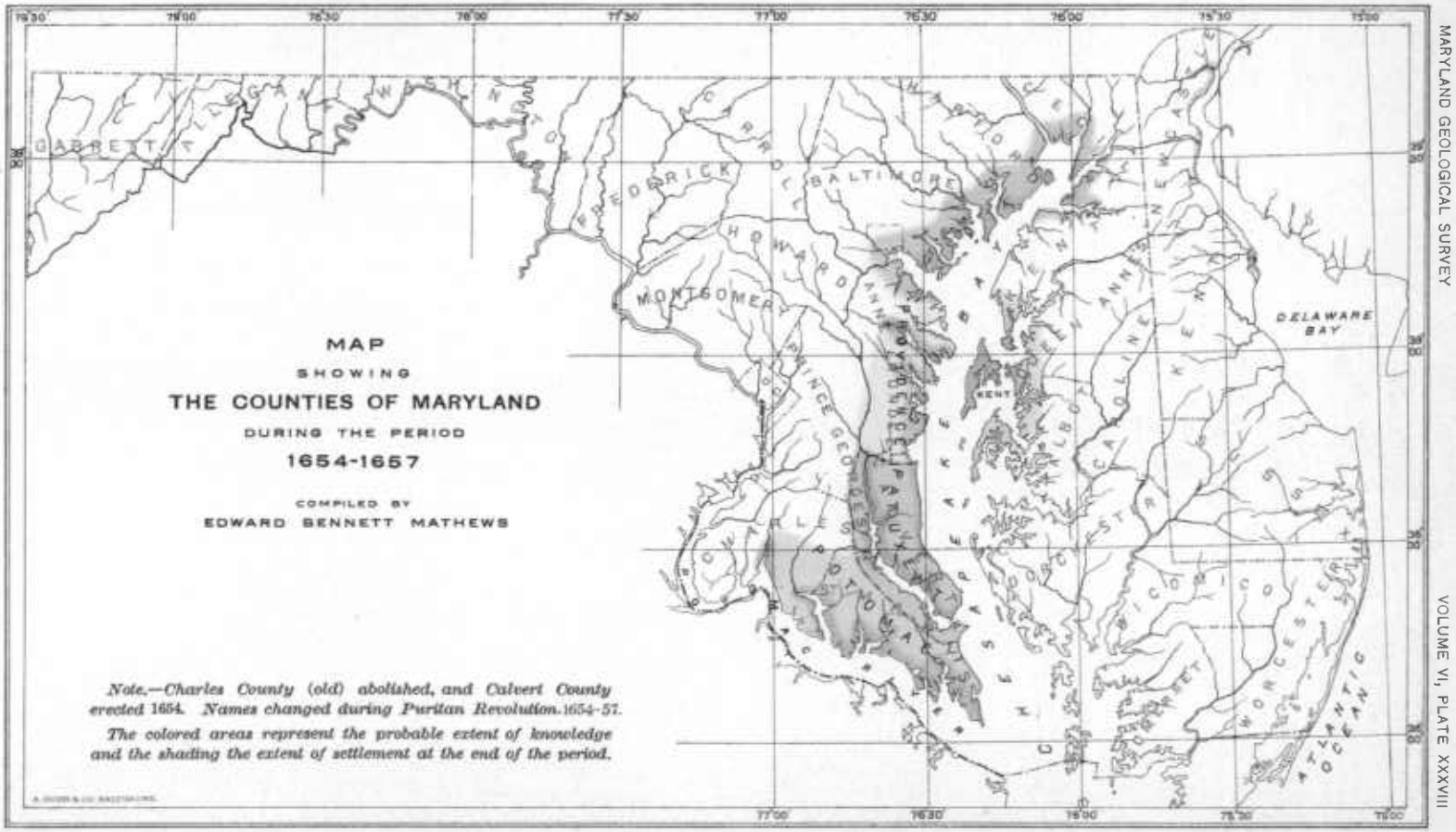
II. Be it therefore enacted, that for fixing and ascertaining the said divisional line, the following persons be and are empowered to act as commissioners, viz . . . . which said commissioners or the major part of them, shall and are hereby authorized and required to meet at some place near the borders of said counties, and call before them, by summons to be issued by them, and directed to the sheriff of the County, all persons who may be deemed proper to give testimony concerning the ancient and reputed divisions of said counties; and the said commissioners, or the major part of them, are also hereby empowered to search the records of the general court, or any county court, for testimonials, to ascertain the division line aforesaid, ... and the said commissioners, or the major part of them shall and they are hereby required to return their proceedings, together with the proofs whereon the same may be founded, to the next general assembly for their approbation, and that the same division, if found reasonable, may be there ratified and confirmed.

The commission appointed by this Act reported to the succeeding Legislature and were by it appointed commissioners to establish the divisional lines between the said counties. At this time they were instructed to begin

"at the mouth of the creek on the western side of the Chesapeake Bay, called and known by the name of Muddy Creek, lying and being on the south side of the land now owned and occupied by Samuel Owings, thence by and with the said creek to the head thereof, thence in a straight line to a chestnut tree on the south edge of Hall's Creek branch, marked with a black letter P. on the plain black line shaded yellow and green on the Plats laid down by the said commissioners under the authority of an act of the last session, thence to Q. at the south end of the line forming the eastern limit of the tract called Maidstone, thence with said line of Maidstone to the end thereof, and thence in the same direction until it strikes Lyons Creek, thence down the said creek to the river Patuxent."

This act was passed February 24, 1824, and constitutes Chapter 183 of the Laws of 1823. By it the commissioners were ordered to make out two plats with explanations which should plainly set forth and describe the beginning and end of each and every course, and show every boundary stone established. A copy of the plat and explanations was to be filed among the land records of each county.

Even these explicit directions seem to have given occasion for question regarding their construction so that during the December session of 1824 a supplemental act was introduced to explain that the terms Muddy or Red Lyon's Creek of 1823 meant the same as South or Muddy Creek


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1654-1657
COMPILED BY
EDWARD BENNETT MATHEWS
Note.—Charles County (old) abolished, and Calvert County erected 1654. Names changed during Puritan Revolution. 1654-57.
The colored areas represent the probable extent of knowledge and the shading the extent of settlement at the end of the period.
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
CECIL
HOWARD
MONTGOMERY
PRINCE GEORGES
ANNE ARUNDEL
CALVERT
CHARLES
ST MARYS
KENT
QUEEN ANNES
TALBOT
CAROLINE
DORCHESTER
WICOMICO
SOMERSET
WORCESTER
DELAWARE BAY
ATLANTIC OCEAN
POTOMAC R.
PATUXENT R.
PATAPSCO R.
CHESAPEAKE BAY
79°30
79°00
78°30
78°00
77°30
77°00
76°30
76°00
75°30
75°00
39°30
39°00
38°30
38°00

mentioned in the report of the commissioners to the Legislature of 1824. This act passed the Assembly on February 18, 1825.

One further change was made in the boundaries of Anne Arundel County by the Convention of 1851, which separated the already established Howard district, constituting it Howard County. The limits of this district were established by an Act of Assembly 1838, Chapter 22, which defines the boundary as follows:

"Beginning . . . . at the intersection of the west shore of Deep Run with the southern shore of the Patapsco River, at or near Ellicott Furnace, and running southerly with Deep Run, until it reaches the Baltimore and Washington Rail Road [now the Metropolitan Branch of the Baltimore and Ohio Railroad]; and thence with the said Rail Road and including the same until it reaches the southwestern line of Anne Arundel County on the Big Patuxent River."

ANNE ARUNDEL COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 5 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to lay off county in 5 election districts.

1809 Ch. 38. Excludes inhabitants of Annapolis from voting for Anne Arundel county delegates.

1810 Ch. 49. Confirms Acts of 1809 Ch. 38.

1816 Ch. 252. Annapolis taken from 2d election district to form 6th district.

1820 Ch. 168. Line between 4th and 5th election districts changed as follows:

"It shall begin at the bridge across the Patapsco Falls, near Ellicott's Mills, and run with and bind on the Cumberland turnpike road from said bridge to the 2d turnpike gate on said road, now erected in Howard's lane and from said turnpike gate in Howard's lane with the lane as heretofore established by law to the line of Prince George's County."

1821 Ch. 123. Repeals Acts of 1817 Ch. 149 in so far as related to "the electors of the Senate of this State."

1822 Ch. 16. Confirms Acts of 1821 Ch. 123.

1822 Ch. 116. Commission appointed to divide 4th and 5th or only the 5th election districts into not exceeding 3 districts [making in all 6 districts].

1822 Ch. 156. Polling place of the 2d district changed to Black Horse Tavern.

1823 Ch. 58. Confirms Acts of 1822 Ch. 116.

1824 Ch. 13. Polling place of 2d district changed to the Free school.

1832 Ch. 63. Confirms Acts of 1831 Ch. 232.

1834 Ch. 186. Part of the 5th election district added to the 6th as follows: "Beginning at the first beginning line of the fifth and sixth election districts, at the river which divided Anne Arundel and Montgomery counties, near Triadelphia Factory, and running down with and binding on said river below Benjamin Scrivenor's farm, and then running up and binding on said big Branch, until it reaches a farm on which Samuel Straughan now lives, and thence with a straight line until it strikes a Branch on the west side of the said house and then up said Branch until it intersects the Roxbury Mill Road, leading to Porter's tavern where it will intersect the divisional line between the fifth and sixth election districts."

1836 Ch. 16. Division line between 3d and 4th election districts changed to run from Poulton's old tavern along public road to Donaldson's bridge on Patapsco and not to the lower ferry.

1838 Ch. 22. Erection of Howard District as a municipal jurisdiction.

1839 Ch. 49. Confirms Acts of 1838 Ch. 22.

1839 Ch. 104. Commission appointed to divide 1st district into 1st and 8th.

1840 Ch. 247. Polling place of 4th election district changed from Owen Cecil's to Joshua Watts'.

1843 Ch. 35. Polling place of 1st election district fixed at Owensville.

1843 Ch. 220. Polling place of 1st election district changed to "at or near the wind-mill, on the land of Bushrod W. Marriott."

1843 Ch. 298. Commissioners authorized to fix polling place for 2d election district.

1846 Ch. 326. Polling place of 1st election district changed to be "at or near store of Jacob W. Bird."

1849 Ch. 1. Polling place of 2d election district changed to Primary school house near Eli Lusby's.

1849 Ch. 73. Polling place of 4th election district changed to a place near Pumphrey's mill.

1853 Ch. 78. Commission appointed to erect an additional election district out the 3d and 4th election district.

1872 Ch. 163. County Commissioners authorized to divide election districts into election precincts.

BALTIMORE COUNTY.

The documents recording the original erection of Baltimore County have never been found among the archives of the State, and no evidence exists indicating whether its erection was due to a proclamation of the Lord Proprietary or his representative, or to some action on the part of the General Assembly. It has commonly been accepted that the county came into being in 1659. There are no evidences of its existence prior

to this date, and subsequent to it references are frequent. At this time there were St. Mary's, Calvert, and Anne Arundel and Charles counties on the Western Shore, and Kent County on the Eastern. The scattered inhabitants on either side of the bay from the Patapsco and Sassafras rivers had no nearby county seat in which to transact their business.

The earliest settlements within the territory of the original Baltimore County were probably those on Palmer's Island at the mouth of the Susquehanna River where Claiborne and his followers had established trading settlements as early as 1627-28. In 1652 in the treaty between the Susquehanna Indians and the Marylanders the right of settlement had been granted as far north as this point. Settlements subsequent to that of Claiborne were few and scattered until after the conclusion of this treaty, but in the decades between 1660 and 1680 the development of the territory around the shores of the head of the Bay was rapid, much of it taking place under the leadership of Augustine Herrman, who became the leading man of the region. Herrman was granted a letter of denization as early as 1660 and during succeeding years was a justice of Baltimore County. Settlements were formed at this time along the shores of Northeast creek and the estuaries off of Elk River and occasionally tracts were taken up along the shores of what is now Harford County. The center of population for the new county of Baltimore lay about the head of the Bay outside of the territory now included within the present county of the same name.

As early as 1661 the court of Baltimore County was held at Captain Howell's, near Howell's Point, below the mouth of the Sassafras River. A few years later, in 1664, Baltimore County court met at Carpenter's Point on the Northeast River and from 1674 to 1768 the county seat of Baltimore was within the present confines of Harford County. It was not until after the election of 1768 that the county seat was situated within the territory of the present Baltimore County.

Such widely scattered sites for the holding of the county court naturally leads to the question as to what were the original limits of Baltimore County. No terms are given in the records prior to the proclamation of 1674 erecting Cecil County. It is therefore necessary to

examine the casual references and early records of land grants, etc., to determine the original limits. From these it appears now well established that Baltimore County was at first intended to include all the northern portion of Maryland, situated on either side of Chesapeake Bay from the Patapsco on the west to the Chester River on the east, and northward as far as the northern bounds of the province. This broad region was at the time almost entirely covered with forests and the few settlements, limited almost exclusively to the waterways, were not as widely separated as they would now appear to be. The unexplored forests at their backs and the easily traversed waterways in their midst tended to give a feeling of compactness and relative security to these otherwise isolated settlements. The jurisdiction of Baltimore County apparently covered the south shore of the Sassafras and the eastern part of the Chester River from a point near the eastern limits of Talbot at that time. It thus included the present site of Chestertown and the major portion of Kent County. It apparently did not include the few settlements along Eastern Neck which were under the jurisdiction of Kent County.

During the decade and a half from the establishment of Baltimore County to the separation of Cecil County there gradually arose a feeling of distinction between the territory on the eastern and western sides of the Bay, the former being called East Baltimore County from time to time. This feeling, stimulated no doubt by the influence of Augustine Herrman, resulted in June, 1674, in a proclamation by Charles Calvert, Captain-General of the province, announcing that all the territory

> "from the mouth of the Susquehanna River and so downe the easterne side of Chesapeake Bay to Swan point and from thence to Hell point and so up Chester River to the head thereof is hereby erected into a County and called by the name Cecill County."

A few days later, on the 19th of June, a second proclamation was issued stating that

> "upon further consideration . . . . it is thought most necessary that so much of the Easterne side as was formerly added to Kent County doe still remaine and belong to the said County as afore."

No record has been found to explain either the time or the territory

of the enlargement of Kent County here mentioned, but it seems probable that the area was only that about the settlements between Swan's Point and Langford Bay.

After the separation of Cecil County in 1674 the county seat of Baltimore County was established on Bush River at old Baltimore Town, where it remained until 1712, when it was removed to Joppa, whence it was again removed in 1768 to the present Baltimore City. The gradual change to the westward of the county seat was the result of the increasing population along the Patapsco River, and northward from the Bay shore until at the last date given the populations of the upper and lower portions of Baltimore County were approximately equal. The removal of the county seat occasioned considerable feeling between the two portions of the county. The inhabitants of the upper or eastern portion soon expressed a desire for a separation from their successful rivals on the west. Accordingly in 1773 the General Assembly passed an Act decreeing

"that after the second of March next all that part of Baltimore county which is included within the bounds following, to wit: Beginning at the mouth of the little falls of the Gunpowder river, and running with the said falls to the fountain head, and from thence north to the temporary line of this province, and thence with the temporary line to the Susequehanna river, thence with Susquehanna to Chesapeake bay, and thence with the said bay, including Spesitic and Pool's islands, to the mouth of Gunpowder river to the beginning aforesaid shall be and is hereby erected into a new county, by the name of Harford county."

The introduction of the "temporary line" as a term in the boundary of the newly erected county is a curious anachronism. The "temporary line" was a line run *ex parte* by the Pennsylvanians in 1739, and was the only boundary recognized between Maryland and Pennsylvania on the west side of the Susquehanna from the date of its location until the work of Mason and Dixon. At the time when the law erecting Harford County was enacted, however, the work of Mason and Dixon had been completed, the present boundary line run and the well-known stones set in position, the surveyors having completed their allotted work five years before. Moreover, their work had been accepted by the proprietors of Pennsylvania and Maryland and approved by the Lord High Chan-

cellor of England, under whose supervision it had been done. The northern boundary of the province was as well determined in 1773 as it is to-day, but the inhabitants who had inherited for generations the dispute between the adjoining territories seemed unable to give up the contest. The "temporary line" was 15¼ miles south of the latitude of Philadelphia or in other words, a little north of the present boundary of the State.

The western limits of Baltimore County were probably determined at the time of its erection with respect to the older Anne Arundel County, from which it was separated, but the first statement on record is contained in the proclamation of 1674 which states that the boundary should be "the south side of Patapsco River, and from the highest plantations on that side of the river, due south two miles into the woods." Somewhat later the settlements of Baltimore County are known to be as far up the Patapsco River as Hollofields, and it was probably intended that the county should include the inhabitants on both sides of the river to its mouth. In 1674 there was a practically unsettled region between the Magothy and the Patapsco. As the population increased and the intervening lands were taken up the inhabitants on the land between these two rivers came closer together and in 1698 it became necessary to more sharply define the boundary. This was done by the passage of Chapter 13 of the Acts of 1698, which is given in some detail in the discussion of Anne Arundel County. According to the terms there laid down the boundary appears to have followed the divide between the Magothy and the Patapsco but the local points cannot now be recognized. The act may have added a trifle to Baltimore County territory but the underlying thought seems to have been the same as that implied in the proclamation of 1674, viz., that the inhabitants along the Patapsco (who were more closely allied with the original settlers of Maryland) should be separated from the frontiersmen of the Severn River settlement. In 1726 a law was, however, passed restoring to Anne Arundel County after

"January 7, 1727, the Land lying on the *South* side of *Patapsco* River and contained within the bounds following, *viz.* From the mouth of the said

Patapsco river, with said river to the head thereof, and from thence, bounding on the *south* side of the main falls, being the Southernmost great branch of the said river, and running as the said branch runs to the first main fork of the said falls, and then bounding on the *South* Side of the said *Southernmost* Fork, Till a South course will intercept the Head of *Snowden's* River, and so down the said *Snowden's* River, 'till it meet with the now Extent of Anne-Arundel County."

The next change in the western limits of Baltimore County was due to the erection of Frederick County in 1748. According to the terms of this act[14] Frederick County was to embrace all of the territory to the west of Baltimore, Anne Arundel, and Prince George's counties. Settlers had gradually worked their way westward along the Patapsco and Potomac rivers and northward along the Monocacy into the fertile Frederick valley. The intermediate area of the more mountainous Parr's Ridge was settled more slowly. The actual position of the line between Frederick and Baltimore counties was not determined until a few years later, when the General Assembly passed an act[15] defining the boundaries as follows:

"" Beginning at a spring called Parr's spring, and running from thence N 35° E to a bounded white oak standing on the west side of a waggon road called John Digges's road, about a mile above the place called the Burnt-house Woods; and running thence up the said road to a bounded white oak, standing on the east side thereof, at the head of a draught of Sam's creek; thence N. 55° E. to a Spanish oak standing on a ridge near William Robert's, and opposite to the head of a branch called the Beaver-Dam; and running thence N. 20° E. to the temporary line between the provinces of Maryland and Pennsylvania, being near the head of a draught called Conewago, at a rocky hill called Rattle Snake Hill."

A few of these points may be recognized at present but some of them are in doubt. Early maps like that of Alexander in 1840 and the less perfect B. & O. R. R. survey maps of an earlier date show the boundary to pass along the divide between the Monocacy and Patapsco to Westminster, and thence northeasterly to the limits of the State. This line remained in force from 1750 until 1836, when the boundaries of Carroll County were defined. A comparison of the terms of chapter 13 of the laws of 1750 and chapter 22 of the laws of 1838 are of interest in that the latter calls for a line running N 17° E which would be parallel to a

[14] Acts of 1748, Chapter 15. [15] Acts of 1750, Chapter 13.

line defined in the former as N 20° E. The discrepancy between the two descriptions may be explained by a difference in variation of the needle between the two dates, or more exactly by the fact that the earlier line was doubtless run by magnetic variation of 2° 55′ west, which would have made the line very nearly 17° E of the true meridian.

The erection of Carroll County took from Baltimore County a portion of its northwestern territory including all of the land north of the Patapsco River lying west of the following boundary, which was defined as the eastern boundary of Carroll County:

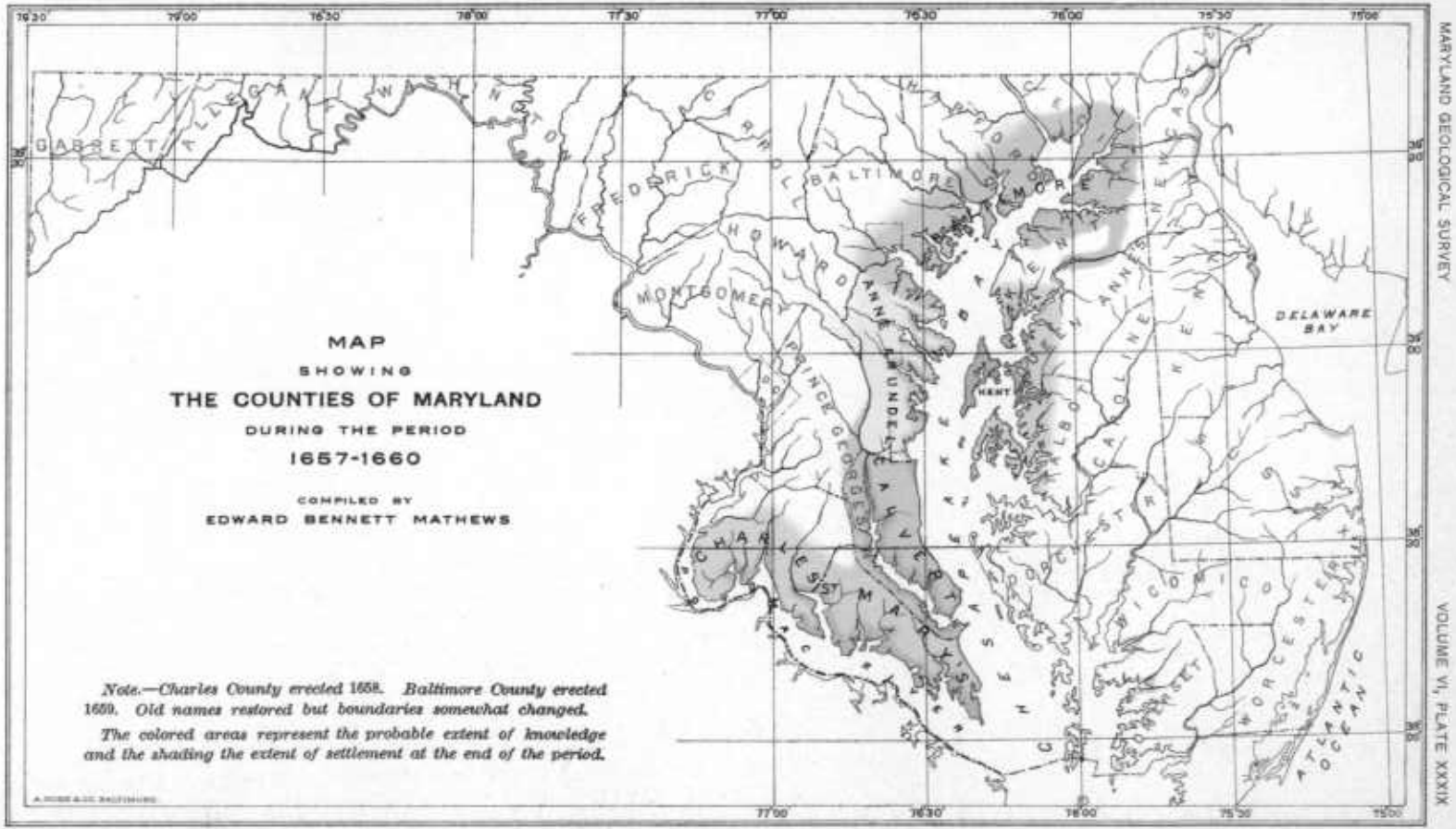
"from thence [the intersection of the north and main branches of the Patapsco River] running up with the said North branch of said river, but excluding the same, until it reaches the stone bridge where the Baltimore and Reisterstown turnpike road crosses said branch of said river, generally known as the Falls bridge, and thence running north, seventeen degrees east, parallel with the last line, dividing Baltimore and Frederick counties, to the Pennsylvania line,"

The only other modifications of the territory of Baltimore County have arisen from the erection of Baltimore City into a separate political unit and the subsequent additions to it.

BALTIMORE COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 7 election districts.
1799 Ch. 48. Confirms Acts of 1798 Ch. 115.
1799 Ch. 50. Commission appointed to divide county into 7 election districts.
1811 Ch. 6. Polling place of 5th election district changed from old tavern of N. Merryman to new tavern of N. Merryman.
1821 Ch. 38. County divided into 12 districts exclusive of Baltimore City.
1822 Ch. 14. Confirms Acts of 1821 Ch. 38.
1823 Ch. 65. Lines of 4th election district changed to be as follows:

"beginning at Cockey's mill and running with the public road to the Deer Park road, then down the Deer Park road to the top of the Fall's hill, then with the road through Edmund H. Stockdale's meadow by the widow Beasmans to Morgan's Run, at Thomas Beasman's, then up said run to Jordan's mill, thence with said run to the head of Banhart's meadow, then up Hawkin's branch to captain Gorsuch's meadow, then up John Murray's spring branch to its source, then with a straight line to the Frederick County line, near Symon Kylers, to intersect the present line of the fourth election district, thence with the present location of the said district to the beginning."



MARYLAND GEOLOGICAL SURVEY
VOLUME VI, PLATE XXXIX

1823 Ch. 153. Commission appointed to look over 9th and 10th election districts and to change the same if thought desirable.

1824 Ch. 165. New commission appointed with suggestions as to their work.

1824 Ch. 170. Commission appointed to select a new polling place for the 4th election district.

1825 Ch. 139. Lines of 11th election district to be as follows:

"Beginning at the Rockford near Archibald Gittings' farm and running up and binding on the Little Falls of the Gunpowder, to Culloms' ford, near the widow Jarretts. thence with the road to Samuel Webb's tavern, thence with the road down the Great Falls of Gunpowder to Cromwell's bridge, thence with the old Harford road, until it intersects the Baltimore and Harford turnpike road, thence with the said turnpike road to the place of beginning."

1826 Ch. 133. Assembly, not Constitution, to determine number of election districts from time to time.

1831 Ch. 232. Erects an additional election district out of parts of 6th and 9th districts.

1832 Ch. 63. Confirms Acts of 1831 Ch. 232.

1834 Ch. 121. Changes line of 8th election district adding to the 7th that part:

"beginning at E. Rider's Mill, on the present divisional line of said district, running North to the ninth milestone on the York turnpike, thence to Ridgeley's furnace road; where it will intersect the said divisional line."

1835 Ch. 125. Changes polling place of 1st election district to tavern near 7th milestone on Frederick turnpike.

1835 Ch. 209. Commission appointed to review 6th election district and to lay out a 14th election district. Returned to Baltimore County Court. Manchester polling place for the sixth district. Cox's Town polling place for 14th.

1835 Ch. 256. An act for the division of Baltimore and Frederick Counties, and for the erecting of a new one by the name of Carroll, etc. See Carroll County.

1836 Ch. 19. Confirms Acts of 1835 Ch. 256.

1836 Ch. 77. An Act to provide for taking the sense of the People of Baltimore County on the propriety of separating [sic] said county from the city of Baltimore.

1836 Ch. 162. All left of the 6th election district beginning at intersection of north line and line of 5th district, and running with said road until it intersects . . . . the black horse road, and running with said road until it intersects the north line of the fifth election district, and that all the remainder of the sixth election district [not in Carroll] be part of the 13th.

1838 Ch. 9. Additional election districts to be laid off by the commissioners from 1st, 2d, 5th and 7th.

1st Ellicott Mills, 2d Randalls Town, 3d Pikesville, 4th Reisterstown, 5th White House, 6th Middletown, 7th Wiseburg, 8th Cockey's, 9th Govans, 10th Slade, 11th King's, 12th Neck.

1838 Ch. 33. Commissioners authorized to locate polling place for 11th election district.

1840 Ch. 10. Commissioners appointed to survey and mark the boundary of the Carroll County line established by Acts of 1835 Ch. 256.

1840 Ch. 137. Enlarges the 5th election district by extending southwest line as follows:

"Commencing at the premises of Elizabeth Ambursee's, running to the Dover school house; thence to the Baptist Church, by the county road; thence to Evan Davis' house, and from thence to Richard Stansbury's, making the county road the line.

1842 Ch. 158. Commissioners authorized to fix polling place of 5th election district.

1844 Ch. 148. Voters to decide on polling place for 11th election district.

1852 Ch. 107. Line between 3d and 9th election district changed to run as follows:

"Baltimore and Susquehanna railroad shall form the division line between the third and ninth election districts, from the city limits to the first intersection of the above railroad, with the Falls turnpike road, and that all residents east of said rail road from the city limits northward to said intersection, shall be considered as belonging to the ninth election district of Baltimore county, instead of the third as heretofore."

1852 Ch. 368. County Commissioners authorized to divide county into sixteen election districts before January 1, 1853.

1853 Ch. 430. County Commissioners authorized and required to create an additional election district out of the first district.

1856 Ch. 301. Changes line between 1st and 2d election districts to run as follows:

"Beginning at the Powhatan Factory, running to the Franklin Turnpike road and then on the south side of Dogwood road to Ben's Run, and then following the said run to Patapsco Falls."

1860 Ch. 337. Baltimore County divided into 13 election districts according to the lines then in vogue.

1860 Ch. 337. Electors to choose polling place for the 11th district.

1862 Ch. 51. Polling place of the 5th election district changed to house of David Wilhelm on Falls Road.

1864 Ch. 47. Poiiing piace of 3d election district changed to the Six Mile House on the Hookerstown road.

1868 Ch. 28. Changes dividing line between 3d and 4th election districts of Baltimore County.

"Whereas said Oid Church Road having been vacated and closed and a new road opened in iieu thereof, therefore, Be it enacted . . . . that so much of the dividing line between said districts as run with said Old Church Road, beginning at a point where said road crosses the Western Maryiand Railroad, near Wiiliam Owings's Lower Mill (now Painter's Miil) and running to the Garrison Church, be and the same is hereby changed, and the north side of the said new road made the dividing line between said districts, to wit: Beginning at the point where the north side of said old road crosses said Western Maryland Raiiroad, and running thence with the north side of said new road to the Reisterstown Turnpike Road; thence down said turnpike road to Sbelley's Carpenter Shop, on the corner of said turnpike and a new road leading to the Garrison Church; running tbence bounding on the north side of said new road to the intersection of another road by said Garrison Church."

1868 Ch. 433. Divides election districts into precincts as follows:
1st election district into 2 election precincts.
3d election district into 3 election precincts.
9th election district into 3 election precincts.
11th eiection district into 2 eiection precincts.
12th election district into 3 election precincts.

1870 Ch. 138. Divides 7th election district into 2 precincts.

1870 Ch. 429. Repeals and re-enacts 1868 Ch. 433.

1876 Cb. 311. 3d election district divided into 3 eiection precincts with bounds different from those of Acts of 1870 Cb. 429.

1878 Ch. 317. Divides the 8th election district into two precincts.

1880 Ch. 405. Changes line of 7th election district to run as foiiows:

"all that part of tbe sixth election district of Baltimore county, lying easteriy and north-easterly of the Northern Centrai Railroad, and between said raiiroad and the present line of said sixth election district and the seventh eiection district of said county, shaii be, and is hereby made a part of said seventh election district, and that said Northern Centrai Railroad, from the point where it crosses the Maryland and Pennsylvania line to the point at which it crosses Bee Tree Run, nearest the point at which said Bee Tree Run empties into a branch of the Great Gunpowder Falls or river, south of Bently Springs station on said Northern Central railroad, shall be, and is hereby made the dividing line between said sixth and seventh election district."

1898 Ch. 189. Divides 12th election district into 3 election districts to be known as 12th, 14th, and 15th. Bounds almost the same as in Acts of 1906 Ch. 251 except that line was placed on *south* side of Philadelphia road.

1900 Ch. 53. Divides 2d precinct of 9th election district into 2 precincts to be known as the 2d and 5th election precincts.

1900 Ch. 244. Divides 1st precinct of 14th election district into 2 precincts called the 1st and 3d election precincts.

1902 Ch. 550. Changes lines between 4th precinct of 9th election district and 2d precinct of 8th election district to run as follows:

"Beginning at the intersection of the Roland run and the Joppa road, and running easterly to the intersection of the county road running from Sherwood to Lutherville, and following the bed of said county road to the branch or stream crossing said road near Lutherville, and following the course of said stream southwesterly to the place of beginning."

1904 Ch. 182. Changes boundary lines between the 1st and 3d election districts to run as follows:

"Beginning for the same at the intersection of the westernmost boundary of the City of Baltimore with the centre of Gwynn's Falls and running thence northerly with said westernmost line of the City of Baltimore to the centre of the Baltimore and Liberty Turnpike, thence with the centre of said turnpike to the intersection of said turnpike with Gwynn Oak avenue, thence with the centre of Gwynn Oak avenue to the centre of Gwynn's Falls, and running thence with the centre of Gwynn's Falls as said boundary line now runs to the easternmost boundary line of the Second Election District of Baltimore County."

1906 Ch. 106. Line between 1st and 13th election districts changed to run as follows:

"Beginning for the same at the intersection of the southern boundary line of Baltimore city with the south side of Wilkens avenue, as now laid out and existing, and running thence westerly with the south side of Wilkens avenue to the point at which the present boundary line, going southwest, leaves said Wilkens avenue, and thence following said line, as it now exists, to the Patapsco river."

1906 Ch. 547. Establishes the boundary line between Baltimore and Harford counties as follows:

"Beginning at a point in the present boundary line between said counties at the mouth of the Gunpowder river, and running thence up said river along the present boundary line to the south end of the gut or channel between Edel's Island No. 1 and Edel's Island No. 2, as described in the two several patents from the State of Maryland to Samuel T. Edel, Jr., and others, both bearing the date the

2d day of October, 1903; thence up said gut or channel to the north end thereof, and leaving the same, up the Gunpowder river to the place of beginning, as defined in Section 2 of Chapter 6 of the Acts of 1773, entitled an Act for the division of Baltimore county and for erecting a new one by the name of Harford.

1906 Ch. 251. Divides 12th election district into 12th, 14th, and 15th election districts as follows:

"Beginning for the same at the intersection of the eastern limits of Baltimore city, at the north side of the Philadelphia road, and running thence in a northeasterly direction along the north side of said Philadelphia road to the corner formed by the intersection of the north side of the Philadelphia road and the east side of the North Point road, if extended across said Philadelphia road; thence along the east side of said North Point road, in a southeasterly direction, to the private right of way leading into Keller's pavilion and park, near what is known as Long's battle ground house; thence in a line due south to the nearest point at the head of Bear creek; thence in a southerly direction along the center of said creek to the Patapsco river; thence along the northern shores of said river to the eastern limits of Baltimore city, and thence northerly along the eastern limits of Baltimore city to the place of beginuing; and that all that portion of Baltimore county included within the lines and boundaries hereinbefore mentioned in this section shall be known and designated as the Twelfth Election District of Baltimore county. . . . .

"beginning for the same at the eastern limit of Baltimore city in the center of Baltimore and Harford Turnpike road, and running thence along the center of said turnpike road to the White Marsh run, thence along the center of said White Marsh run to north side of the Philadelphia road; thence in a southwesterly direction along the north side of the Philadelphia road to the intersection of the Black River Neck road and said Philadelphia road; thence in a southerly direction across said Philadelphia road to the south side thereof; thence in a southwesterly direction along the south side of said Philadelphia road to the intersection of said Philadelphia road and the North Point road; thence in a northerly direction across said Philadelphia road to the north side thereof; thence in a southwesterly direction binding on the north side Philadelphia road to the eastern limits of Baltimore city; thence northerly along the eastern limits of Baltimore city to the place of beginning and that all that portion of Baltimore county included within the lines and boundaries hereinbefore mentioned in this section shall be

known and designated as the Fourteenth Election District of Baltimore county.

. . . . "beginning for the same at the intersection of the north side of the Philadelphia road and the center of White Marsh run, and running thence along the center of White Marsh run to Bird river; thence along the shores and inlets of Bird river to the Gunpowder river; thence along the shores and inlets of the Gunpowder river and along the shores and inlets of Salt Peter creek and Chesapeake bay to Middle river; thence along the shores and inlets of Middle river to Chesapeake bay and Back river; thence along the shores and inlets of Back river to Chesapeake bay and to the Patapsco river; thence along the shores and inlets of the Patapsco river to the center of Bear creek; thence along the center of Bear creek and along one of the headings of said creek to a point nearest the point of intersection of the North Point road and a private right of way leading to Keller's pavilion and park, and near what is known as Long's Battle Ground House; thence along the east side of said North Point road, in a northerly direction, to the south side of the Philadelphia road; thence along the south side of the Philadelphia road to the intersection of the south side of the Philadelphia road and the Back River Neck road to the north side thereof; thence along the north side of Philadelphia road to the place of beginning; and that all that portion of Baltimore county in this section described, being all that portion of the Twelfth Election District of Baltimore county, as formerly constituted, which is not included within the Twelfth and Fourteenth Election Districts of Baltimore county as hereby constituted, shall be known and designated as the Fifteenth Election District of Baltimore county."

CALVERT COUNTY.

The first mention of Calvert County occurred in July, 1654, when the Council decided, in accordance with the instructions received from the Lord Proprietor to

"Erect make and appoint both sides of Patuxent River into one County by the name Calvert County Bounded on the South Side with Pynehill River or Creeke to the head thereof and from thence through the woods to the head of Patuxent River being the Northerly bounds of S*t* Maries County, and bounded on the North Side with the Creeke upon the Westerne Side of Chesepeacke Bay called the herring Creeke and from thence through the woods to the head of Putuxent River being the Southerly bound of Annarundell County."

Prior to this time the territory included within the Calvert County thus outlined had been embraced within the limits of St. Mary's, old Charles, and Patuxent counties, and part of that then included is now within the jurisdiction of St. Mary's, Charles, Prince George's, and Anne Arundel counties. The fact that part of old Charles County, which had been erected the same year as Anne Arundel County, constitutes part of Calvert County, led to discussion years later as to the relative place of Anne Arundel and Calvert counties on the roll call of the House of Delegates. It was shown that Anne Arundel County was erected by a law passed April 29, 1650 while old Charles County was erected by order of the Governor on the 21st of November following. It was therefore decided in 1671 that Anne Arundel County should have precedence. During the summer of 1654 old Charles County was changed to Calvert County without change of boundaries. In October following, as a result of the Protestant revolution it was decided to eliminate the name of Calvert and accordingly the Assembly enacted

"that Patuxent be Erected into a County the bounds thereof to be from the South Side of Mr Maishes Creek Commonly called oyster Creek Extending downe the Bay including all the familyes and Lands on the South Side of the said Creeke includeing all the Clifts with the North and South Side of Patuxent River with all the Creekes thereunto belonging and shall be Called as it is Patuxent County."

The terms of this temporary boundary became very important in the contest of 1824 when the boundary line between Anne Arundel and Calvert counties was in dispute. The name of Calvert County was restored in 1658 when the government of the Province became again established in the hands of Calvert's representatives.

It was apparently about this time, when the present Charles County was erected, that Calvert County lost control of the land on the south and west shores of the Patuxent. The exact limits of Charles County when first established by Governor Fendall are not known, the first clear statement being found in "an act for the Division for the Regulating Severall Countys" passed May 22, 1695. At this time Calvert County was not regarded as including part of the southern shore.

The northern boundary of Calvert County separating it from Anne

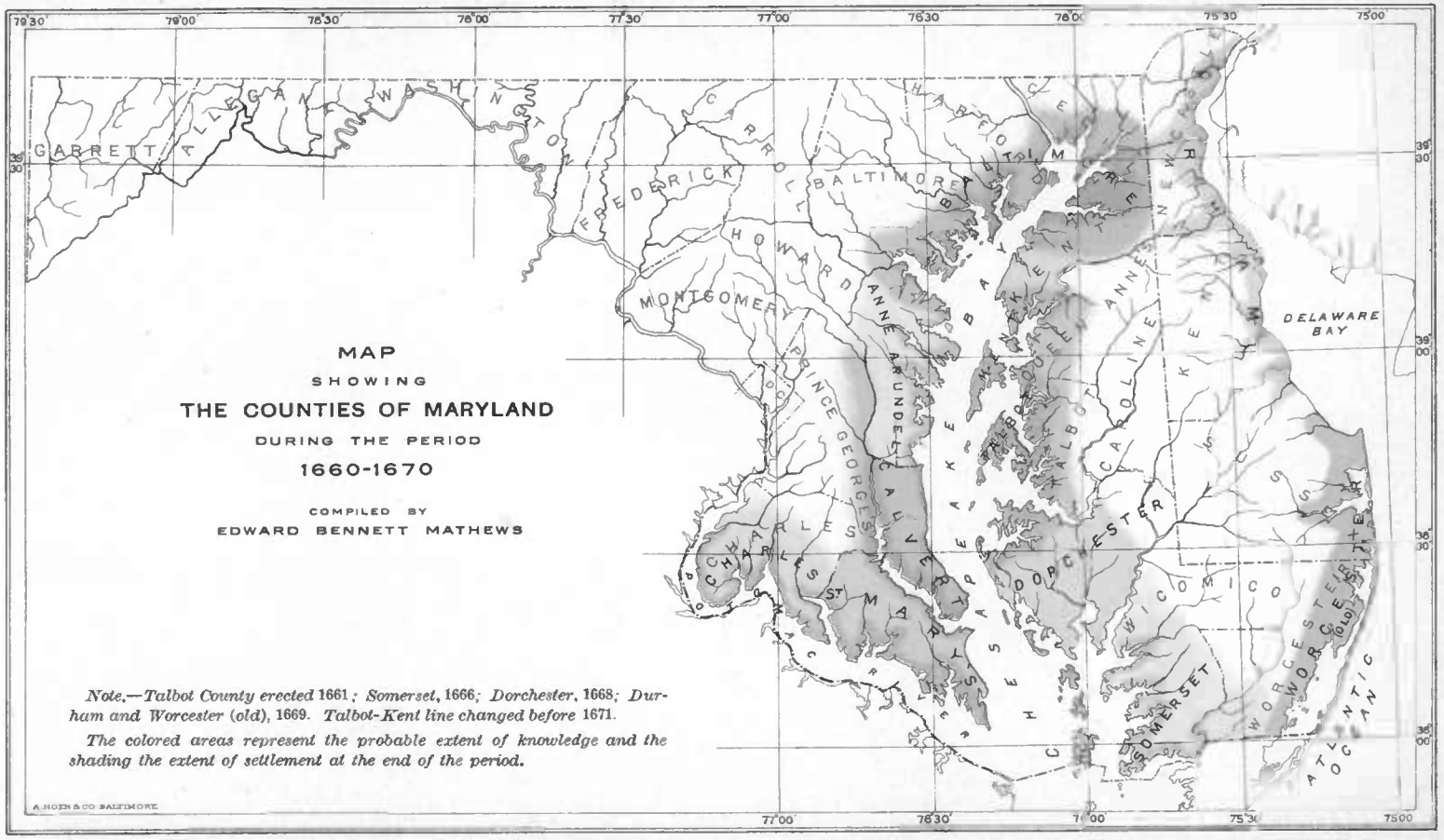
Arundel County became the subject of serious controversy during the years 1820 to 1826 as persons living along the border failed to contribute to the expenses of either county on the plea that the boundary was not known. To overcome this difficulty an act was passed in 1822 (Acts of 1822, Ch. 109) to ascertain and establish a division line between the two counties. Commissioners were appointed to examine the inhabitants along the line and their views regarding its location, and also to search the records of the general and county courts to ascertain if possible what had been the original divisional line. Their report, which was returned to the General Assembly of the following year, led to the passage of a law authorizing them to plant large and sufficient boundary stones at the beginning and termination of every course or line between the said counties

"beginning for the same at the mouth of a creek on the western side of the Chesapeake bay, called and known by the name of Muddy Creek or Red Lyon's Creek, lying and being on the south side of the land now owned and occupied by Samuel Owings, thence by and with the said creek to the head thereof, thence in a straight line to a chesnut tree on the south edge of Hall's Creek branch, marked with the black letter P. on the plain black line shaded yellow and green on the Plats laid down by the said commissioners under the authority of an act of the last session, thence to Q. at the south end of the line forming the eastern limit of the tract of land called Maidstone, thence with said line of Maidstone to the end thereof, and thence in the same direction until it strikes Lyons Creek, thence down the said creek to the river Patuxent."

Plats of the territory showing the location of every boundary stone were to be filed among the land records of the respective counties. A year later on account of certain doubts regarding the construction of this law a supplemental law was passed to the effect

"That the said divisional lines between Anne Arundel and Calvert counties, shall begin on the south side of Samuel Owing's house, at the mouth of a creek called in the act to which this is a supplement, Muddy creek or Red Lyon's creek, which said creek shall be taken and understood to mean the same creek stated by the commissioners appointed by the act of the last session to ascertain the divisional lines between the said counties in their report to the legislature at its present session, to be known by the name of South creek or Muddy creek, and running by and with said creek to the head thereof, thence as directed by the act to which this is a supplement."

Calvert County, like Charles County, has suffered less change and cur-


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1660-1670
COMPILED BY
EDWARD BENNETT MATHEWS
Note.—Talbot County erected 1661; Somerset, 1666; Dorchester, 1668; Durham and Worcester (old), 1669. Talbot-Kent line changed before 1671.
The colored areas represent the probable extent of knowledge and the shading the extent of settlement at the end of the period.
A. HOEN & CO. BALTIMORE
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
CECIL
HOWARD
MONTGOMERY
PRINCE GEORGES
ANNE ARUNDEL
CALVERT
CHARLES
ST MARYS
BALTIMORE
KENT
QUEEN ANNES
TALBOT
CAROLINE
DORCHESTER
WICOMICO
SOMERSET
WORCESTER
DELAWARE BAY
CHESAPEAKE BAY
ATLANTIC OCEAN
79 30
79 00
78 30
78 00
77 30
77 00
76 30
76 00
75 30
75 00
39 30
39 00
38 30
38 00

tailment in its territorial limits than any county erected during the seventeenth century.

CALVERT COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 3 election districts.
1799 Ch. 48. Confirms Acts of 1798 Ch. 115.
1799 Ch. 50. Commissioners appointed for laying out districts.
1872 Ch. 77. County Commissioners authorized to redistrict the county or increase the election precincts.

CAROLINE COUNTY.

Caroline County, although erected prior to the Revolutionary War, was one of the later counties on the Eastern Shore in its settlement. Early pioneers had worked their way up the shores of the Choptank and Tuckahoe Creek many years before it was deemed necessary to have a new county. The uncertainty as to the eastern boundary of the Province, and the consequent doubt of the validity of titles granted, restrained the inhabitants from devoting themselves to the clearing and improving of tracts within the disputed territory. By 1750, however, the boundary line between the province of Maryland and the Three Lower Counties on Delaware had been settled at least on paper, and attempts had been made to start the southern transpeninsular line which should ultimately determine the boundary. Ten years later a broad vista was cut through the forests along the probable location of the boundary and settlements were encouraged by the increased security felt in the titles to the grants which were offered by the Maryland proprietary.

During the session of 1773 the question of erecting a new county for facilitating the transaction of business in this newly-opened country was considered and the General Assembly on November 16 of that year passed the following Act:

"Whereas a considerable body of the inhabitants of Dorchester and Queen Anne's counties, by their petition to this general assembly, have prayed, that an act may be passed for a division of the said counties, and for erecting a new one out of parts thereof: And whereas it appears to this general assembly, that the erecting of a new county out of such parts of Dorchester and Queen-Anne's counties will conduce greatly to the ease and convenience of the people thereof;

II *Be it therefore enacted, by the right honourable the Lord Proprictary, by and with the advice and consent of his Governor, and the Upper and Lower Houses of Assembly, and the authority of the same,* That after the Monday after the second Tuesday in March next such parts of the aforesaid two counties of Dorchester and Queen Anne's as are contained within the bounds and limits following, to wit: Beginning at a point on the north side of the mouth of Hunting creek, in Dorchester county, and from thence running up and with the said creek to the main road at James Murray's mill, thence with that road by Saint-Mary's White Chapel parish church to the north-west fork bridge, thence with the main road (that leads to Cannon's ferry) to Nanticoke river, thence with the said river to and with the exterior limits of the aforesaid county of Dorchester to the exterior limits of Queen Anne's county thence with the limits of Queen Anne's county to intersect the main road that leads from the Beaver-dam causeway to Dovertown, in Kent county, upon Delaware, thence with the said road to the Long marsh, thence with the said marsh and stream of the branch of Tuckahoe creek to Tuckahoe bridge thence with the said creek to Great Choptank river, and with the said river to the first beginning at the mouth of Hunting creek, shall be and is hereby erected into a new county by the name of Caroline county."

According to the boundaries laid down by this law that portion of Caroline County east of the Choptank River had always been in Dorchester County from the date of its settlement. On the other hand, the tract of land between the Choptank and Tuckahoe which was taken from Queen Anne's County, had formerly, in part at least, been a portion of Talbot County, although prior to 1706 when it was transferred from Talbot to Queen Anne's, few settlements had been made.

CAROLINE COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 3 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 3 election districts.

1805 Ch. 97. Polling place of 3d election district at "The Walnut Trees."

1816 Ch. 11. Polling place of 3d election district changed to "Upper Hunting Creek where the elections were formerly held in said district."

1825 Ch. 47. Line between 1st and 2d election districts changed to run as follows:

"Beginning on the east side of Choptank river, at the mouth of Frampton's mill branch, thence running up said branch, and binding therewith, until it comes to a notable place on said branch, commonly called and known by the name of Rackoon Trapp, thence by a straight line to a methodist meeting house commonly called Lee's meeting

house, which stands on or near the main road leading from Denton to Whiteleysburgh, then with said road to the state line which divides the states of Maryland and Delaware."

1852 Ch. 222. Polling place of 3d election district changed to Harmony at a cross road leading to Gilpin's Point.

1854 Ch. 211. Election district No. 4 erected with the following boundaries:

"Beginning at Newhope on the road from Federalsburg, to Upper Hunting creek, from Newhope to run with the road known as the Walnut Tree Road, by Friendship church to Hubbard's cross roads, from thence with the public road by Concord church towards the Bloomery mills until it intersects the public road beginning near said Concord church and running in an easterly direction through Bennett Todds' farm and over the camp ground branch to the Delaware State line, thence with said State line, until it intersects the dividing lines between Dorchester and Caroline counties, thence with said dividing line to the place of beginning."

1861 Ch. 45. Election district No. 1 divided into two precincts as follows:

"starting for the first precinct, at the County line dividing Queen Anne's and Caroline counties, at a point on said line known, as the Nine Bridges, thence with the county road to Bridgetown and including said town; thence with the county road to Hollingsworth Corner; thence by the county road to Genns' Shop, thence with the couuty road to Old Town Branch; thence with the country road leading to Greensborough, until it reaches the road leading to Kuglur's Mill; thence with said road to said Mill; and thence with the branch leading from said Mill to Choptank River; thence with said river, until it reaches the State line dividing Maryland and Delaware; thence with said line, until it reaches the line dividing Queen Anne's and Caroline counties; thence with said line to the starting point at Nine Bridges; and the second precinct to include all the residue of said election district, number one, not contained within the above named lines."

1862 Ch. 31. Repeals Acts of 1861 Ch. 45.

1870 Ch. 54. County divided into 5 election districts, as follows:

"to begin for the boundaries thereof at the crossing by the public road of Long Marsh Branch, the dividing line between Caroline and Queen Anne's Counties, and thence with said public road to Hollingsworth's corner, thence with the public road to Gen's shop, thence with the public road to Old Town Branch, thence with the public road to Anthony's Mill, thence with the shortest line to Choptank River, thence with the river to the Delaware line, and thence with the boundaries of Caroline County to the place of beginning. District No. two, or Greensbor-

ough district, shall consist of the remaining portion of what has been heretofore known as District No. 1, or the upper District of Caroline County. District No. three, or Denton District, shall consist of what has heretofore been known as District No. two, of Caroline County. District No. four, or Harmony District, of what has heretofore been known as District No. three, and District No. five, or Federalsburg District of what has heretofore been known as District No. four. All elections for public officers shall be held in District No. one, as constituted by this Section, at Henderson in District No. two, at Greensborough; in District No. three, at Denton in District No. four, at Harmony, and in District No. five, at Federalsburg.

1880 Ch. 107. Creates election district No. 6 as follows:

"Beginning at Hillsborough, at the intersection of the counties of Caroline, Talbot and Queen Anne's, and running with the division line between Caroline and Talbot counties down Tuckahoe Creek to the mouth thereof, thence in a northerly direction up the Choptank river to the Brick Mill, thence with the county road to Boonsborough district to Wilson's Mill, there sometimes called the head of Tuckahoe Creek, and thence with the lines dividing the counties of Caroline and Queen Anne's, in a southerly direction to the place of beginning."

1880 Ch. 208. Changes boundary line and transfers certain territory from Dorchester to Caroline County.

1884 Ch. 17. Divides the 4th election district into two election precincts as follows:

". . . . the dividing line between said precincts shall be as follows: Beginning at Choptank river at the mouth of Hog creek, and running up and with said creek until said stream is crossed by the public road leading from Bethlehem to Harmony, near R. M. Messick's steam mill, then with the public road to Friendship M. E. Church, passing near Union Grove. The remaining lines of said precinct to remain as the lines of said election district already laid down.

That all of said election district north of said dividing line as laid down in section two, shall be called and known as Harmony precinct, or precinct number one . . . . and that all of said election district south of said line shall be called and known as Preston precinct, or precinct number two."

1894 Ch. 499. Erects election districts 7 and 8 and changes the line between 2d and 3d election districts as follows:

"the boundary lines for the new district number seven or Ridgely district, shall read as follows: Beginning at point on Choptank river north of Denton Bridge opposite end of Park and Dunning public road; then up said river

by and with the same to mouth of Deep Branch (also known as Mill Creek); then with said Deep Branch to Forge Branch till it intersects Meadow Bridge county road at Marhle Head farm; and thence with Meadow Bridge road to public road leading from Oakland to Greensborough; thence with said road to new public road leading from Ridgely to Bridgetown; thence with said road to a stream (on the north side of a farm known as J. A. Roe farm) called Spring Valley Branch; thence with said Spring Valley Branch to Queen Anne line; thence in a westerly and southerly direction with Queen Anne and present boundary line between second and sixth districts as now defined, till it reaches the mouth of the Ridgely and Long's school house road; thence with said road to the entrance to the Thomas Sparkling farm; thence by and with the said entrance till it intersects the division lines between the said Sparkiing farm and what is known as the Liden or Thomas F. Garey farm; thence with said division iine till it reaches the southeast corner of said Sparkling farm; and thence in a straight line to the point on the Denton and Ridgely road where the Park and Dunning road intersects the Denton and Ridgely road; and thence with said Park and Dunning road till it intersects the Denton and Brick Miil river road; and from thence in a straight line to Choptank river to place of beginning. The boundary lines for new district number eight or American Corners district shall read as follows: Beginning at the mouth of Mill creek on east side of Choptank river near Williston, following said creek to road leading across Todd's Mill Dam; thence with said road to new road starting at Lacy Stevens' farm, and with new road to cross roads at William Stevens' farm; and from thence with said new road to Smithville and Hickmantown road; thence to Woodenhawk Anderstown road and with said road to Delaware line south till it strikes Woodenhawk stream, and with said stream to the new road by way of Chitman's iane to Chestnut Grove; then to road leading from American Corners to Federalsburg; thence with said road to the Isaac Lehman road; thence to three hridge Federalsburg road by the way of Bayard Nichols road to Nichols Post Office; thence to Friendship Church by way of Greer farm; thence by direct public roads to Grove, Fowling creek and Ganey's on Choptank river, and with said river to place of heginning. The boundary on the east side of Choptank river between the second and third election districts shall read as follows: Beginning at the mouth of Chapel Branch on Choptank river and running with said branch till it intersects the Delaware State line."

CARROLL COUNTY.

The erection of Carroll County occasioned one of the liveliest political controversies within the annals of the State and finally became one of the influences leading up to the constitutional amendment[16] which introduced marked changes in the manner of selecting the delegates and Governor. As early as 1830 the number of inhabitants in what is now Carroll County is said to have been over 20,000. These people found difficulty in transacting their business at the County Courts and the more progressive citizens in the vicinity of Westminster and Taneytown began to agitate the question of the establishment of a new county. The aroused public interest sought satisfaction in three different ways. It was suggested that Baltimore and vicinity be separated from the rest of Baltimore County and that a new county seat more centrally located be chosen. A second suggestion was that a portion of Frederick County be erected into a new county, and the third suggestion involved the taking of portions of Baltimore and Frederick counties for the formation of a new division. This last suggestion gradually gained the ascendancy until a Memorial was presented to the Legislature by sundry citizens of Frederick and Baltimore counties, praying for an alteration in the formation of said counties. This was published in the Maryland Public Documents for the December session of 1831 and issued in pamphlet form. According to Scarff the boundaries of the new county desired were to run as follows:

> Beginning at Parr's Spring, at the head of the western branch of the Patapsco River, and running with said branch, binding on Anne Arundel County, to the north branch of said river; thence running up said branch, excluding the same, to the old mill on Dr. Moore Fall's land, including said mill; thence north seventeen degrees east to the Pennsylvania line; thence, binding on said line westerly to Rock Creek, one of the head-waters of the Monocacy River; thence with said creek and river, excluding the same, to Double Pipe Creek; thence with said creek and Little Pipe Creek and Sam's Creek, including their waters, to Maurois' mill, excluding said mill, and thence with a straight line to Parr's Spring, the beginning.

This memorial was referred by the Legislature to a special committee who ultimately introduced a bill which was passed by the General Assembly. The boundaries there defined were almost exactly those

[16] Acts of 1836, Ch. 197.

requested, but the phraseology in describing the various points differs somewhat. The intent of the memorialists was also somewhat changed by the insertion of the name Carroll County, and by the provision that the majority of the inhabitants in the parts of each of the counties included should confirm the Act. The first modification seemed to be entirely popular, but the second was the occasion of much agitation. There was an exciting campaign of education prior to the fall election when the question was decided adversely to the erection of a new county by a narrow margin in Baltimore County. The method of procedure called for by the original Act was also open to criticism. A report of the Committee on Grievances and Courts of Justice reviewing the constitutional question respecting Carroll County[17] appeared in the Maryland Public Documents of the December session. According to the majority report the law was held to be unconstitutional since it deviated from the methods authorized for amending the State constitution by specifying that the same should be confirmed by a popular vote rather than by a subsequent Legislature. During the legislative session of 1835-6 a new bill was introduced which was finally passed on March 25, 1836, and confirmed January 19, 1837,[18] erecting Carroll County. It had been conclusively shown by the vote taken in 1833 that such portions of Liberty and Newmarket districts of Frederick County as had been included in the original bill were opposed to separation from Frederick County. The new law accordingly excluded these and the boundary was determined as follows:

"Beginning at the Pennsylvania line, where Rock Creek crosses said line, thence with the course of said creek until it merges in the Monocacy river, thence with the Monocacy to the point where Double Pipe Creek empties into Monocacy, thence with the course of Pipe Creek to the point of junction of Little Pipe Creek and Big Pipe Creek, thence with the course of Little Pipe Creek, to the point where Sam's Creek empties into Little Pipe Creek, thence with Sam's Creek to Warfield's Mill, thence with the road called Buffaloe Road, and to a point called Par's Spring, thence with the Western Branch of the Patapsco Falls to the point of its junction with the Northern Branch of Patapsco Falls, thence with the North Branch of the said Falls to the bridge erected over said Falls on the Turnpike Road, leading from Reisters-

[17] I am indebted to the courtesy of Mr. Louis H. Dielman for calling my attention to this elusive little pamphlet.

[18] Acts of 1835, Ch. 256; 1836, Ch. 77.

town to Westminster, thence with a straight course to the Pennsylvania line, running North seventeen degrees East, thence with the Pennsylvania line to the place of beginning."

The election districts of the county were laid off in the early part of 1837, but it was not until 1838 that the government of the county became perfected. Commissioners to survey and mark the line between Baltimore and Carroll counties were authorized by Acts of 1840, Ch. 10.

The settlement of Carroll County is discussed under Frederick and Baltimore counties. It is of interest in this connection to note that for a short time when the lands were first being taken up in the vicinity of New Windsor and Union Bridge that this region was a part of Prince George's County. The inhabitants came from the Scotch-Irish in the vicinity of Gettysburg, and the Germans of York County as well as from the English stock who worked their way inland from the settlements along the tidewater. As early as 1740 the Monocacy road had become in part a wagon road, a development from an earlier line of pack-horse travel from Hanover westward to the Potomac. This became the line of settlement during the early stages of development. Important localities also sprang up along Little Pipe Creek and its tributaries in the vicinity of Union Bridge.

Although established long after the boundaries of the State had been finally settled the territory of Carroll County was the scene of bitter controversy, often accompanied by bloodshed, regarding the territorial limits of Pennsylvania and Maryland about the middle of the eighteenth century. Most of these difficulties centered about Digg's Choice, the tract of land southwest of Hanover claimed under Maryland and Pennsylvania grants.

CARROLL COUNTY ELECTION DISTRICTS.

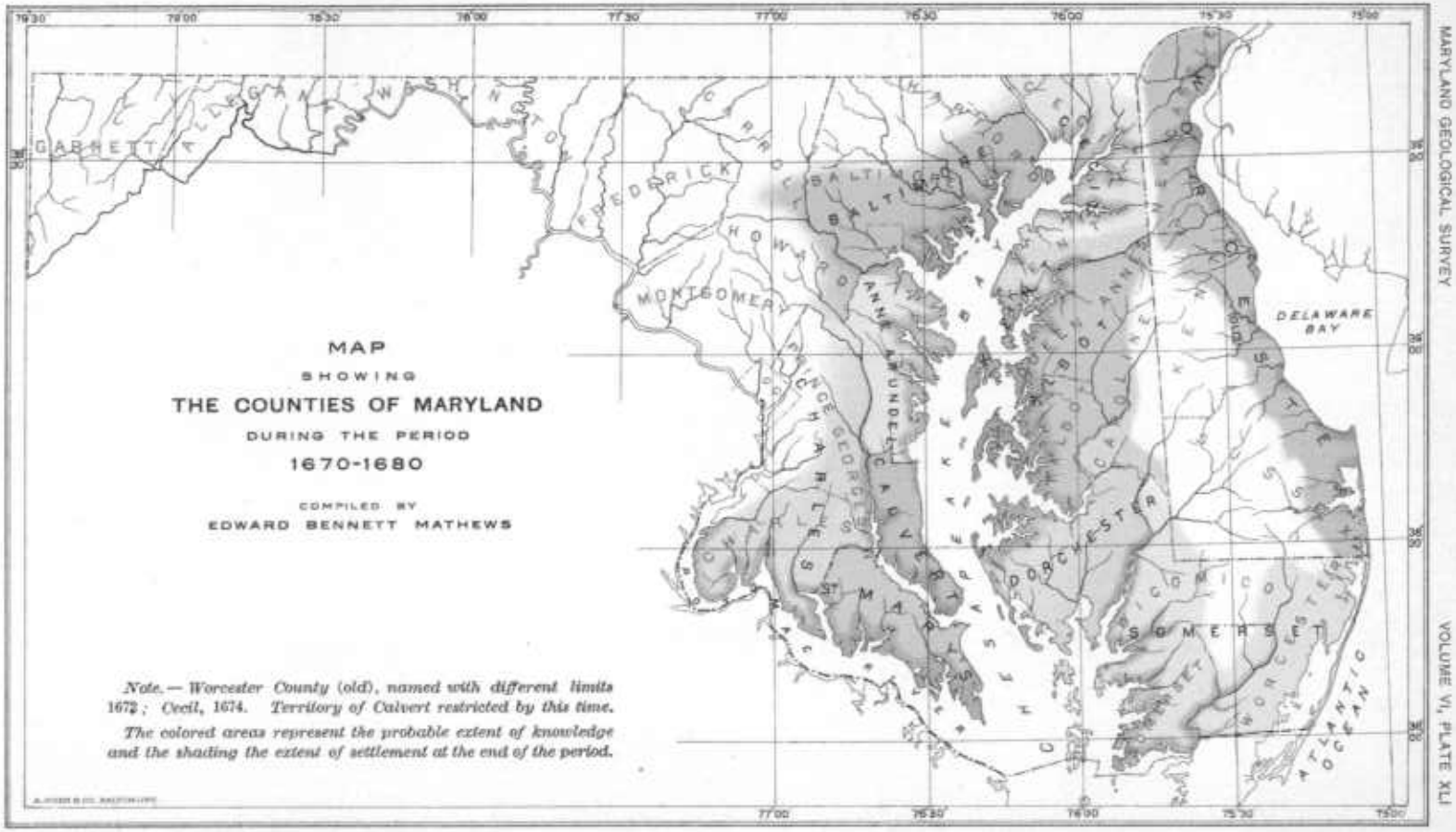
1798 Ch. 115. Included in Frederick and Baltimore counties until 1836. See Baltimore county 1821 Ch. 38; 1822 Ch. 14; 1823 Ch. 65; 1824 Ch. 170; 1835 Ch. 125; Ch. 209; 1831 Ch. 232.

1835 Ch. 256. Erects Carroll County out of parts of Frederick and Baltimore counties.

1836 Ch. 19. Confirms Acts of 1835 Ch. 256.

1836 Ch. 32. Commission appointed to lay off 9 separate election districts.

1836 Ch. 37. Supplemental bill substituting one Commissioner.


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1670-1680
COMPILED BY
EDWARD BENNETT MATHEWS
Note.— Worcester County (old), named with different limits 1672; Cecil, 1674. Territory of Calvert restricted by this time.
The colored areas represent the probable extent of knowledge and the shading the extent of settlement at the end of the period.
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
CECIL
KENT
QUEEN ANNE'S
TALBOT
CAROLINE
DORCHESTER
WICOMICO
SOMERSET
WORCESTER
MONTGOMERY
HOWARD
ANNE ARUNDEL
PRINCE GEORGE'S
CHARLES
ST MARYS
CALVERT
DELAWARE BAY
ATLANTIC OCEAN

1837 Ch. 177. Line between the 1st and 3d election districts changed to run as follows:

"Beginning at the intersection of Grover's and Mause's mill, leaving Jacob Mause in the third district; thence along said road to where it crosses Piney creek, at Peter's tavern; thence up said creek to the Pennsylvania line, and with said creek to the Pennsylvania line, and with said line to where it intersects the line of the third district."

1837 Ch. 331. Changes lines of 9th election district to run as follows:

"Beginning at Parr's Spring, and running with the original lines to Morgan's Run; thence with Morgan's Run to Richard Frizzell's Branch; thence with said branch to a road leading from Philip Nicodemus' Mill to the Calico House; thence with the original lines to the place of beginning."

1840 Ch. 10. Commission appointed to survey and mark Baltimore County line.

1841 Ch. 17. Line between 3d and 7th election districts changed to run as follows:

"Beginning on the natural boundary, at the intersection of Big Pipe Creek, in Peter Bister's meadow and running thence by a direct line to Jacob Frock's dwelling house, leaving the same in the seventh election district, thence by a direct line to Adam and William Bisher's dwelling house, leaving the same in the seventh election district, and thence to the Westminster and Little'stown, which is now the boundary line between the third and seventh election districts."

1842 Ch. 46. Commissioners appointed to fix polling place of 4th election district.

1843 Ch. 295. Polling place for 3d election district changed to Peter Lippy's tavern.

1845 Ch. 15. Changes the line of the 7th election district to run as follows:

"Extending along the county road, called the Nicodemus road, to Morgan's run, then up said run to the centre of a county road leading from the stone meeting house to the Washington road, then bounding on the centre of said road, to the centre of the county road leading from Westminster to Warfieldsburgh."

1845 Ch. 49. Repeals above.

1845 Ch. 160. Same as Ch. 15 except last course is to Washington road.

1845 Ch. 309. Repeals Act of 1843 Ch. 295 and makes polling place at tavern of Peter E. Myers.

1852 Ch. 101. Commission appointed to lay off election district No. 10, or Middleburg district.

1853 Ch. 254. Changes northwest line of 4th election district to Washington road

Changes line between 5th and 9th election districts to run as follows:

"To commence at a point where the present division line crosses the new Liberty road, and running thence with a straight line to the dwelling house now occupied by James McQuay, leaving said McQuay's in district number nine, thence with a straight line to the dwelling house now occupied by John Hess, leaving said Hess in district number nine, thence to the Washington road, then with said road to Morgan's run, and up said run to the original division line."

1856 Ch. 240. Election district No. 11 established out of parts of 2d, 7th and 9th.

"Beginning at the intersection of the county line with the Buffalo road at Sam's Creek, and running up a branch of said creek to a spring near the dwelling of Abraham Albaugh, Esquire, thence by a straight line to a point on the road leading from Mount Airy to Westminster, directly opposite the dwelling of Major Benjamin Gorsuch; thence with said road to the Nicodemus road, thence with the said Nicodemus road westwardly to the house of A. Brown (colored) thence by a straight line to the Stone Chapel, thence by a straight line to Cassell's mill, on Little Pipe Creek, thence down said creek to the Melville mills, thence by a straight line to Upton Roop's saw mill, and down the branch thence to said Pipe Creek, and with it to the bridge over Sam's Creek, near Rinehart's marble quarries, thence up said creek, the county line, to the place of beginning."

1864 Ch. 297. Changes polling place in the Myersville district.

1870 Ch. 302. Divides 7th election district into 2 voting precincts as follows:

"Precinct number one of Seventh Election District, beginning at a point on the Baltimore and Reisterstown Turnpike Road, at the dividing line between Woolert's District (number four), and Westminster (number seven) as now located, and running northwest with the centre of said turnpike road through Westminster District (number seven), to a point in the city of Westminster, at the junction of the Littlestown Turnpike Roads with the Uniontown Turnpike Road, thence with the centre of the said Uniontown Turnpike Road to the junction of the said Uniontown Turnpike Road with the road leading to Taneytown, thence with the centre of the said Taneytown Road to the division line between said District (number seven), and Uniontown District (number two), and all that part of said District (number seven), lying and being on the north and east of the said division line shall be known

as Precinct number one, and the voting piace shall be the Courthouse; and all that part of said District (number seven), iying and being south and west of said division line, shaii be known as Precinct number two, and the voting place shall be some suitable piace seiected by the County Commissioners within the limits of the corporation of said city of Westminster."

1872 Ch. 66. 12th eiection district from 2d, 10th, and 11th.

"Beginning at Sam's Creek, the boundary line between Carroii and Frederick counties, and at the point in said Sam's Creek where the tail race from McKinstry's mills empties therein, and running thence by a straight line to intersect the middie of the public road opposite the storehouse now occupied by D. F. Albaugh and Brother; thence by and with the centre of said pubiic road to the bridge over Littie Pipe Creek near Linwood, being a corner of Eiection District number two; thence through said district, by a straight line, to Reuben Haines' dweliing-house, exciuding said premises; thence by a straight line to intersect the public county road from Union Bridge to Union Town, at a point in said road opposite the centre of a iane ieading off therefrom towards the public schoolhouse, being between the house and the premises of Abraham Harris, and the premises of Abraham Stoner; thence by a straight iine to the spring at the head of Log Cabin Branch, being at a corner of Eiection District number two; thence down Log Cabin Branch to the centre of the road ieading from Union Town to Middieburg; thence aiong the middie of said pubiic road towards Middieburg, untii opposite a iane known as Hann's iane, being now between the lands of Abraham Shirk and Joseph Roop; thence down said lane to the south end thereof; thence by a straight line running by Lewis Haines' dweiiing-house, and including said premises, to Pipe Creek, the boundary iine between Carroii and Frederick counties; thence up said creek and Sam's Creek to the piace of beginning."

1874 Ch. 175. Repeais 1870 Ch. 302 and re-enacts to establish voting precincts in Westminster district, number seven, with amendments:

"Beginning on the Western Maryiand Raiiroad, at the point where said raiiroad iutersects the line of division between Westminster district number seven, and New Windsor district number eleven, and running with said raiiroad to the Cranberry Station on said railroad, thence by a straight line to John W. Lucabaugh's Mill, thence east to Cranberry Run, then running with the said stream to where it crosses the line of division between Westminster

district number seven and Manchester district number six; and all that part of said Westminster district number seven, lying south and east of said division line as above indicated."

1888 Ch. 337. 13th election district established.

"Commencing at Parr's spring and running northeast in the middle of the Patapsco river to the point of the entrance of Gillis falls in said river; thence with said falls to where the Cabbage spring branch enters said falls; thence west with said branch to the Roop road; thence with a straight line to the plank bridge on the Buffalo road, opposite Albert Jones' gate; thence in a southwestern direction, along the line between Frederick and Carroll counties, to the place of beginning, Parr's spring."

CECIL COUNTY.

Cecil County includes one of the oldest, if not the oldest, settlements made within the present limits of Maryland, although no habitation marks its site at the present time. It appears probable that as early as 1627-28 the followers of William Claiborne established a trading post on Palmer's Island (now known as Garrett Island and formerly called Watson Island, at the mouth of the Susquehanna River). No further settlements of importance were made in Cecil County until after the treaty with the Susquehanna Indians concluded in 1652. The more settled conditions resulting from the treaty caused a movement of the population toward the head of the Chesapeake from the settled portions of Maryland and from the Delaware River. In 1658 the first settlement was made on Carpenter Point near the mouth of Principio Creek. A year or so later Augustine Herrman settled on Bohemia Manor and soon the estuaries of the Elk and Sassafras rivers were marked by numerous plantations. By the middle of the eighth decade the population was sufficient to warrant the setting off of that portion of Baltimore County lying east of the Chesapeake into a new unit named in honor of the aged proprietor, Cecil, Lord Baltimore. A proclamation issued on the 6th of June, 1674, runs as follows:

Proclamation [19]

By his Excellency the Capt Generall of Maryland

"To all the Inhabitants of the said Province or Others whom these may concerne Charles Calvert Esqr Capt Generall of the said Province sendeth Greeting Know yee That whereas severall persons are already seated within the limitations hereafter mentioned and aswell for the preservation of the peace In that part of the province as for the ease and benefitt of the Inhabitants there or which shall hereafter Inhabite there I doe hereby declare & publish that from the mouth of the Susquehanough River and so downe the easterne side of Chesepeake Bay to Swan point and from thence to Hell point and so up Chester River to the head thereof is hereby erected Into a County and called by the name of Cecill County. And I doe hereby further declare that the Southerne bounds of Baltemore County be the South side of Potapsco River and from the highest plantation, on that side of the River due south two miles Into the woods And that the north side of Petuxent River begining at the north side of Lynns Creeke be adjoyned to Ann Arrundell County And that the Sheriffs of the severall respective Countyes of Cecill, Baltemore, Ann Arrundell and Calvert make proclamation hereof in their said Countys respectively and imediately after proclamation Coppy hereof affix at the Court house doore of their respective Countyes In wittnes whereof I have hereunto sett my hand and caused the lesser Seale of this province to be hereunto affixed the sixth day of June in the 42th yeare of the Dominion of Cecilius &c Annoq Dom 1674 Charles Calvert

To Nathanlel Stiles High Sheriff of Cecill County"

The area thus included would embrace practically all of what is now Kent County. This was more than Baltimore County had included prior to the proclamation. Moreover, it contained Yarmouth town, where at times the Kent County Court had been held. Such a curtailment of territory, embracing some of the more populous districts, was apparently too much for the Kent countians. The Governor was quickly appraised of his error and within two weeks issued the following supplemental proclamation:

"By the Capt Generall of Maryland [20]

"fforasmuch as by a late Proclamation beareing date the sixth day of this instant June some Additions were made to severall Countys upon the divlsion of that of Baltemore County and by the same proclamation it was then declared that Swan Point downe to Hell point on Chester River should be and remaine for the future belonging to that Easterne side of the Bay lately erected and called by the name of Cecill Couuty upon further consideration hereof it is thought most necessary that so much of the Easterne

[19] Md. Arch., 15: 39.
[20] Md. Arch., 15: 41.

side as was formerly added to Kent County doe still remaine and belong to the said County as afore notwithstanding that part of the said proclamation in wittnesse whereof I have hereunto sett my hand and caused the lesser seale of this Province to be hereunto affixed the 19th day of June in the 42rh yeare of the Dominion of Cecilius &c Annoq Dmi 1674

To all whom these may Concerne."

The prime mover in the establishment of this county appears to have been Augustine Herrman, perhaps the strongest man in the Province at this time. Although subsequently a loyal adherent of Lord Baltimore it was his discernment, while an ambassador from the Dutch of Manhattan, that recognized the weak point in the Maryland charter by which Delaware was ultimately lost to the Baltimores. The scheme for the establishment of a new county in the northern part of the Province was not new. Already the people had distinguished East Baltimore County from the remainder on the Western Shore and by 1670 Herrman, in his map, had not only named but indicated the bounds of the new county which was not erected by proclamation until four years later.

There is no record showing the extent of that part " of the Easterne side as was formerly added to Kent County." It probably included the settlements on the north side of the Chester and along the Bay perhaps as high as Worton Point. The line, if there ever was one, probably divided the neck between the Sassafras and the Chester from west to east.

The general act for dividing and regulating the several counties of the Eastern Shore passed by the General Assembly of 1706[21] finally settled the line between Cecil and Kent as it is to-day by enacting that

" From and after the 1st of May 1707, Kent county shall begin at the south point of Eastern neck, and from thence up Chesapeake bay to Sassafras river, and up said river to the south end of the long Horse bridge lying over the head of the said river, and from thence with a line drawn east by south, to the exterior bounds of this province."

The eastern limits of Cecil County formed by the exterior limits of the State have had an unusually interesting history which cannot be given in full in the present paper.[22] Each portion of the line has some historic

[21] Ch. 3.

[22] See report on the Resurvey of the Mason and Dixon Line, Md. Geol. Survey, Repts., Vol. VII.

significanee. The boundary from the Sassafras to the tangent stone in the vieinity of the Pennsylvania Railroad is a part of the general tangent line whieh was run from the middle point of an east and west line extending from Fenwiek Island to the Chesapeake. The northerly line was run from this middle point in a way to be tangent to a eirele of twelve miles radius whose eenter was in Neweastle, Delaware. Sueh a line was the result of a long-pending suit between the Penns and the Baltimores, and the attempt of the Lord High Chaneellor to express speeifieally what was intended by James II and his Counеil in their deeree of 1685. Numerous attempts were made to run this diffieult line during the years 1760 to 1763, but it was not finally loeated and marked until the work of Messrs. Mason and Dixon a few years later.

At the time the boundaries were determined the exaet eonditions of the eountry were not known and the provision was made that if the tangent line touehed the eirele south of the east-west diameter that the due north line from the tangent point should not subtraet any portion of the eirele from the possessions of the Penns.

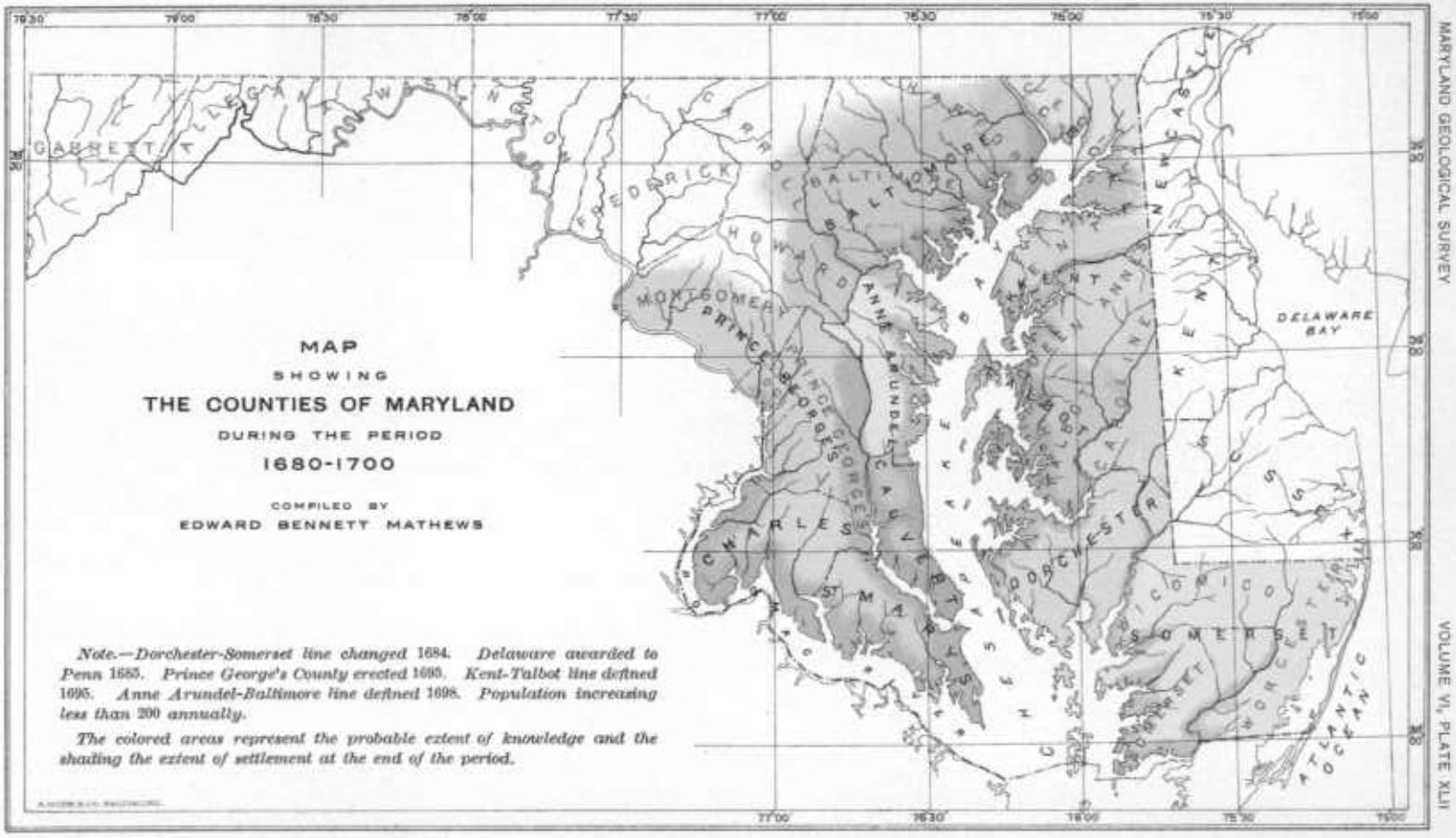
The seeond portion of the eastern line is a small part of the twelve-mile eirele whieh lay west of the due north line, passing through the tangent point. The eirele itself represents the attempt of James II while still Duke of York to retain the integrity of the old settlement on the Delaware when the King, his brother, granted Pennsylvania to William Penn. The aetual loeation of this eirele was the oeeasion of mueh eontroversy during the long-drawn dispute between the Penns and the Baltimores. Their eommissioners wrangled regarding the eenter of the eirele, whether it should be twelve miles in radius or eireumferenee, and whether or not the miles should be measured horizontally or surfieially. The are itself, so far as it forms a boundary of Ceeil County, was originally run by Mason and Dixon and has subsequently been resurveyed by Col. Graham in 1849 and Captain Hodgkins in 1892. The third portion of the eastern boundary is a straight line in the meridian of the tangent point extending from the so-ealled point of interseetion to the latitude of the east-west boundary run by Mason and Dixon. The intersection point at the southern end of this meridian line, situated just south of the

Baltimore and Ohio R. R. tracks, has been the scene of many interesting incidents, some of them of questionable character, on account of its marking the intersection of the jurisdiction of three states.

The northern boundary of Cecil County is a portion of the famous Mason and Dixon line which was run to mark the settlement of a controversy between the Penns and the Baltimores, which sprang up during the latter part of the seventeenth century. The first attempt to define the line between the two provinces and thus define the northern boundary of Cecil County, was the old Talbot line run under the direction of Charles, Lord Baltimore, in 1682. This line, also known as the Octoraro line, was the rough, blazed boundary passing in a more or less crooked line from the mouth of Octoraro Creek to Chester, Pennsylvania. The next line was the so-called "temporary line" run in 1739 by commissioners representing both interested parties. This boundary was laid off to permit the settlement of the territory in the adjoining provinces without the stimulation of border disputes. East of the Susquehanna River, that is, north of Cecil County, the line was placed 15¾ miles south of the southernmost point from Philadelphia as it was at that time. This line was a straight line and therefore not a true east and west line. The boundary determined by Mason and Dixon was an east and west line and therefore curved to allow for the curvature of the earth and was run in the latitude of 15 miles south of the point in Philadelphia previously adopted. A portion of this line was redetermined by Col. Graham in 1849 and all of it was resurveyed by Captain Hodgkins in 1903.

CECIL COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 4 election districts.
1799 Ch. 48. Confirms Acts of 1798 Ch. 115.
1799 Ch. 50. Commission appointed to divide county into 4 election districts.
1801 Ch. 59. Commission authorized to make report to County Clerk.
1812 Ch. 19. Polling place in 3d election district changed to jail at Charlestown.
1823 Ch. 63. 1st election district called Cecilton.
1823 Ch. 114. Polling place of 3d election district to be the jail or any other place which may be procured.


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1680-1700
COMPILED BY
EDWARD BENNETT MATHEWS
Note.—Dorchester-Somerset line changed 1684. Delaware awarded to Penn 1685. Prince George's County erected 1695. Kent-Talbot line defined 1695. Anne Arundel-Baltimore line defined 1698. Population increasing less than 200 annually.
The colored areas represent the probable extent of knowledge and the shading the extent of settlement at the end of the period.
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
CECIL
NEWCASTLE
KENT
QUEEN ANNE'S
TALBOT
CAROLINE
DELAWARE BAY
HOWARD
MONTGOMERY
PRINCE GEORGE'S
ANNE ARUNDEL
CALVERT
CHARLES
ST MARY'S
DORCHESTER
WICOMICO
SOMERSET
WORCESTER
ATLANTIC
79°30'
79°00'
78°30'
78°00'
77°30'
77°00'
76°30'
76°00'
75°30'
75°00'
39°30'
39°00'
38°30'
38°00'

1835 Ch. 259. Repeals previous acts and appoints Commission to divide county into not more than 7 districts the same to report to clerk of Cecil County Court.

1836 Ch. 267. Confirms Acts of 1835 Ch. 259.

1839 Ch. 164. Changes polling place of 5th election district to Charlestown.

1840 Ch. 105. Act of 1839 Ch. 164 repealed.

1845 Ch. 226. Polling place of 2d election district changed from Oldtown to Chesapeake City.

1853 Ch. 94. Erects new election district out of parts of the 6th and 7th election district with boundaries as follows:

"Beginning at the Octoraro creek where it enters into Maryland, thence down said creek to the Susquehanna, up said river to the Pennsylvania line and thence along said line to the place of beginning."

1856 Ch. 227. New election district erected out of parts of 4th, 5th, and 6th election districts as follows:

"Beginning for the same at the Pennsylvania line where it intersects the public road near John Donohoo's, thence south by said road to its intersection with the road from Rising Sun to Brick Meeting House, thence south by said road until it intersects the road from Brinkley's Cross Roads to Brick Meeting House, thence east by said road until it intersects North East Creek, thence south by said creek to the bridge on the road from Shalamlah to Nowland's corner, thence east by said road to the road leading from Elkton to the Pennsylvania line near McDonnelly's, thence west by said line to the place of beginning.

That all that portion hereby laid off from the fourth and sixth districts shall constitute the ninth election district, and the polls shall be held at the village of Brick Meeting House."

1858 Ch. 273. Changes lines between the 5th, 6th, and 9th election districts as follows:

"Beginning for the bounds of the said ninth election district, at the Pennsylvania Line, at the road near John Brown Joiner, thence south with said road to its intersection with the road leading from Rising Sun to Brick Meeting House, thence east with said road to the northwest corner of the lands of Jacob Job, thence south along the line dividing the lands of Jacob Job from those of D. H. Heath, of Job H. Kirk from Joseph Laird, and of Joseph Haines from Thomas Maxwell, to a large Black oak tree in the road leading from Brick Meeting House to Farmington, thence south by a straight line to the Butler Stone, near Slicer's School House, on the Charleston road, thence by said road to the intersection of the road from Battle Swamp to Nowland's Corner, thence by

said road to the North East Creek at Gilpin's Bridge, thence by the present lines of the ninth and the Pennsylvania line, to the place of beginning.

That all that portion hereby laid off from the fifth and sixth districts shall belong to the ninth election district."

1860 Ch. 338. Changes line between 3d and 5th election districts to run as follows:

"Beginning on a point on said line where the road from Elkton, to Turkey Point, crosses Plumb creek, it shall run in a straight line direct to the spot where the road from Elkton to North East crosses Mill creek."

CHARLES COUNTY.

The history of Charles County falls into two distinct periods, the first relating to the old Charles County, the second to that which has been maintained to the present day.

Old Charles County was erected in accordance with instructions received from Lord Baltimore, who had apparently made an agreement with his friend Robert Brookes that the latter should be commander of a county to be erected for the purpose of including the colonists which Brookes was to bring over to Maryland. In accordance with these instructions the Governor on November 21, 1650,[25] with the advice of his Council

"erected the Southside of Putuxent River beginning at the Sasquehannah Point extending it self from thence into the Middle of the Woods towards S*t* Maries Southward, and from thence Westward along the middle of the Woods betwixt Patomeck and Putuxent Rivers as farr as Matapania towards the Head of Putuxent River and from thence againe Eastward along the River side to the said Sasquehannah Point, into a County by the name of Charles County, and Robert Brookes Esq*r* to bee Commander thereof."

The local terms introduced here are of interest and warrant a word of explanation especially since various local historical authorities have drawn wrong inferences regarding them. Susquehanna Point is the same as the present Cedar Point and the line proposed for the southern boundary of Old Charles County corresponds approximately to the location of the present Three Notch Road. At that time the Patuxent River was only thought of as extending to the head of navigation or to the junction

[25] This date is taken from the revocation, Md. Arch., 3: 308. Md. Arch., 3: 259.

of the Western Branch. The Big Patuxent above this point at that time had been explored to little or no extent and even into the eighteenth century was known as Snowdens River rather than the Big Patuxent. This divergence in the use of local terms is frequently encountered where only parts of the natural features were known at the period of the first settlement.

Old Charles County was not of long duration. By the 28th of September, 1653, Lord Baltimore had issued instructions to discharge Robert Brookes and in July, 1654, the Governor, by the advice of his Council, repealed the act of 1650 "touching the Erecting Some part of the South Side of Patuxent River into a County by the Name of Charles County." At the same time the Governor decided to

"Erect make and appoint both sides of Putuxent River into one County by the name Calvert County Bounded on the South Side with Pynehill River or Creeke to the head thereof and from thence through the woods to the head of Putuxent River being the Northerly bound of St Maries County, and bounded on the North Side with the Creeke upon the Westerne Side of Chesepeacke Bay called the herring Creeke and from thence through the woods to the head of Putuxent River being the Southerly bound of Annarundell County."

The new Charles County, or Charles County as it is known to-day, was erected by the Governor and Council April 13, 1658.[24] The sheriff of Charles County is mentioned in the Assembly for 1659 and frequent references are made in succeeding years. The motive for the erection of this new county was the accommodation of the inhabitants in the growing settlements along the estuaries of the Nanjemoy and Port Tobacco creeks. Clearings at the time extended but a short distance away from the water's edge or the stream bottoms and though the number of inhabitants was small the distance from the Court House at St. Mary's City was sufficient to occasion inconvenience. The first definite statement found regarding the limits of Charles County are found in the general act of 1695, defining the limits of many of the then existing counties. According to this act Charles County was to begin upon the

[24] Md. Arch., 3: 341.

upper side of the Indian and Bird creeks where the upper bounds of St. Mary's county end and

"Extend it selfe upwards as farr as Mattawoman Creek and branch and bounding on the said Branch by a straight line Drawn from the head thereof to the head of Swansons Creek in Putuxent River including all that Land lying on the uper part of Birds Creek and Indian Creek Branches where St. Marys County Ends to the Lower side of Mattawoman Creek and Branch & Swansons Creek and Branch between Putuxent and Potomock Rivers as aforesaid."

The territory lying north of the northern boundary of Charles County was included within the newly-erected Prince George's County. Just why the small neck between Swansons and Indian creeks on the Patuxent River was included within Charles County is hard to say. It was probably due to the use of natural bounds and the ignorance of local geography. Such few settlers as may have been upon the neck would have preferred to retain their allegience to Calvert County rather than attend court after long journeys through the woods or around Point Lookout, if they went by water. The extent of settlements along the Potomac was practically coextensive with the limits of Charles County, since there existed at the time an agreement with the Indians by which the whites were not to settle upon Mattawoman Creek. The agreement, however, was not observed for many years as the erection of Prince George's County and the settlements along Rock Creek in the District of Columbia began about this time.

The bounds of Charles County established by the act of 1695 have suffered but one modification since their original creation. This was in 1748 when, according to Chapter 14 of the laws of that date, at the request of certain inhabitants in the lower part of Prince George's County part of the territory in question was transferred to Charles County. The new boundary was defined to be:

"a Line drawn from *Mattawoman*run, in the Road commonly called the *Rolling Road*, that leads from the late Dwelling Plantation of Mr. *Edward Neale*, through the lower Part of Mr. *Peter Dent's* Dwelling Plantation, until it strikes Patowmack River, at or near the bounded Tree of a Tract of Land whereon *John Beall*, junior lives (standing on the Bank of the aforesaid River, at the lower end of the aforesaid River, at the lower End of the aforesaid *Beall's* Plantation)."

The area included between this line and the Potomac River became a part of Charles County as it is to-day.

CHARLES COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 4 election districts.
1799 Ch. 48. Confirms Act of 1798 Ch. 115.
1799 Ch. 50. Commission appointed to divide county into 4 election districts.
1819 Ch. 157. Polling place of 2d election district at Allen's Fresh changed.
1856 Ch. 174. County Commissioners authorized to appoint examiners to lay off a new election district.
1868 Ch. 138. Commission appointed to divide county into not less than 6 nor more than 9 election districts.
1870 Ch. 264. Amends Act of 1868 Ch. 138 giving County Commissioners the right to change lines of election districts upon petition.

DORCHESTER COUNTY.

The lowlying shores of Taylor's Island immediately across the Bay from the Patuxent River and the deeply-indented estuary of the Choptank early attracted the colonists toward the Eastern Shore, but the activity of the Indians and the isolation from their neighbors prevented for a time any extensive settlements. Even the first Delegate, Richard Preston, elected in response to the call of 1669 appears to have lived not in Dorchester, where he owned large tracts of land, but on the shores of the Patuxent River. By 1659 considerable land had been surveyed on the shores of the Choptank, Taylor's Island, about Tar Bay, and the Honga River, and on either side of the straits. It is estimated that there were at that time in the territory which now is included within Dorchester County at least 500 inhabitants, as more than 100 settlers are shown from the rent rolls of that period.[25]

It is not known exactly when Dorchester County came into being. The records now extant show no act of Assembly or fiat of the proprietor erecting the same. Certain facts point to October 22, 1668, as the date of its erection. The first evidence of its existence lies in the writ issued to Raymond Stapleford on the 4th of February, 1669, by Governor

[25] Jones: History of Dorchester County, p. 52.

Charles Calvert, requiring him to prepare for an election.[26] At the election occurring in the following April Richard Preston is recorded as a Delegate to the Assembly and Daniel Jenifer as a Burgess. Before this time there are no records of representation of Dorchester County in either House. It therefore seems probable that the County was erected in the latter part of 1668 through proclamation of the proprietor, Cecilius, Lord Baltimore. On the 6th of May, 1669, we have the record[27] of the appointment of commissioners to keep the peace in Dorchester County and in the commission it is stated that "we will that the said County extend to Great Choptank River, including the South Side thereof to be accounted and taken to be within the said County of Dorchester . . . ."

The next reference to Dorchester County is in the records of the Council meeting at St. Mary's on the 22d of October following in a minute of the order to the sheriffs of Somerset, Dorchester, Talbot, and Baltimore counties regarding the seating of persons "on the Seaboard Side of Deleware Bay from the Bounds of Virginia to the degree 40 Northerly Latitude."[28] From this it may be inferred that the bounds of the county at the time of its erection were the Choptank River on the north and the Nanticoke River on the south, on the west Chesapeake Bay, and on the east a disputed boundary. It should be remembered that at or just before this time Lord Baltimore had received a confirmation of his charter from Charles I, and that he was claiming with increasing vigor his rights to the Delaware territory. On the other hand the Dutch through their deputation of 1659 and subsequent correspondence were asserting with equal vigor their rights to the territory of New Sweden which they had recently subjugated. Four years before the establishment of Dorchester County the captured possessions of the Dutch, as far as the east bank of the Delaware, had been given to the King's brother, James, Duke of York. The Duke's representative thought it wise to claim both sides of the Delaware and by 1668 had commenced to give grants in the Delaware territory. Lord Baltimore was evidently eager to establish his claims to the Delaware territory by the

[26] Md. Arch., 2: 185. [27] Md. Arch., 5: 52-54. [28] Md. Arch., 5: 56.

presenee of colonists before there should be a direct conflict with the powerful Duke of York. No question had as yet arisen concerning the relative rights of William Penn and Lord Baltimore since the grants to the former were not made until about 15 years later. On paper the original bounds of Dorchester County undoubtedly extended to Delaware Bay, but the swiftly-rolling events of the Dutch capitulation, the assumption of authority by the Duke of York, and the subsequent granting of the territorial rights by him to William Penn did not allow time for Lord Baltimore to establish by possession his rights to the eastern portion of what might have been Dorchester County according to the territorial limits defined in the Maryland charter. Practically the eastern limit of Dorchester was the western limit of New Sweden until after the work of the surveyors in 1761-1768, when Mason and Dixon finally determined the eastern limits of Maryland which were accepted as such by the English Chancellor in 1769.

From the date of its erection until the fall of 1684 no change was made in the boundaries of Dorchester County. Somerset County had exercised its authority over what is now the Fork District No. 1, or the territory lying between the northwest (Marshyhope Creek) and the northeast branches of the Nanticoke River, claiming the former to be the main branch of the river and consequently its northwestern boundary. On October 4, 1684, appears the following minute[29] on the Proceedings of the Council:

"Severall disputes having been, concerning the maine branch of Nanticoke River wch is said to be the bounds betweene Somrsett and Dorchester Counties, for the uncertainty whereof, the bounds of each County have also been disputed, and severall Errors may thereupon ensue, which to avoid for the future any to rectifie as much as may be what is past This board passed this following ordr (viz:)

Somersett and Dorchester County bounds to be ascertained.

Maryland ss: By the honble the Councill

Whereas Nantecoke River is said to be the bounds betweene Sommersett and Dorchester Counties, and there have been many disputes and doubts concerning the maine branch, and it is not sufficiently resolved which it is to the greate disquiett and disturbance of the Inhabitants there Seated: ffor redress whereof, and in ordr to settle the same to avoid any future contro-

[29] Md. Arch., 17: 286.

versie or dispute, It is by this board considered and Ordered that the Comrs formerly appointed to lay out for the Indians seated upon the said River of Nantecoke their Land assigned them by his Lsp: (viz:) Coll William Stevens, Capt Henry Smith, Mr ffrancis Jenckins, and Capt David Browne of Sommersett County, Majr Thomas Taylor; Mr Bartholomew Ennalls, and Mr Charles Hutchins of Dorchester County, or any four or more of them (whereof the said Coll William Stevens, and Majr Thomas Taylor to be alwaies One) be and they are hereby authorised appointed and Empowered to consider and enquire into the prmisses; soe as to ascertaine the said maine branch of Nantecoke River and bounds between the sd Two Counties, which they are required to certifie unto this board by the first day of the next Provinciall Court for further approbation and confirmation thereof, to be recorded for the true bounds aforesaid, and as such to continue and remaine to posterity. . . . ."

This order, which established the southern boundary of the county as it is, was reaffirmed by the Act of 1742, Chapter 19, when the line between Somerset and Dorchester counties was said to be down the river from Broad Creek to its mouth.

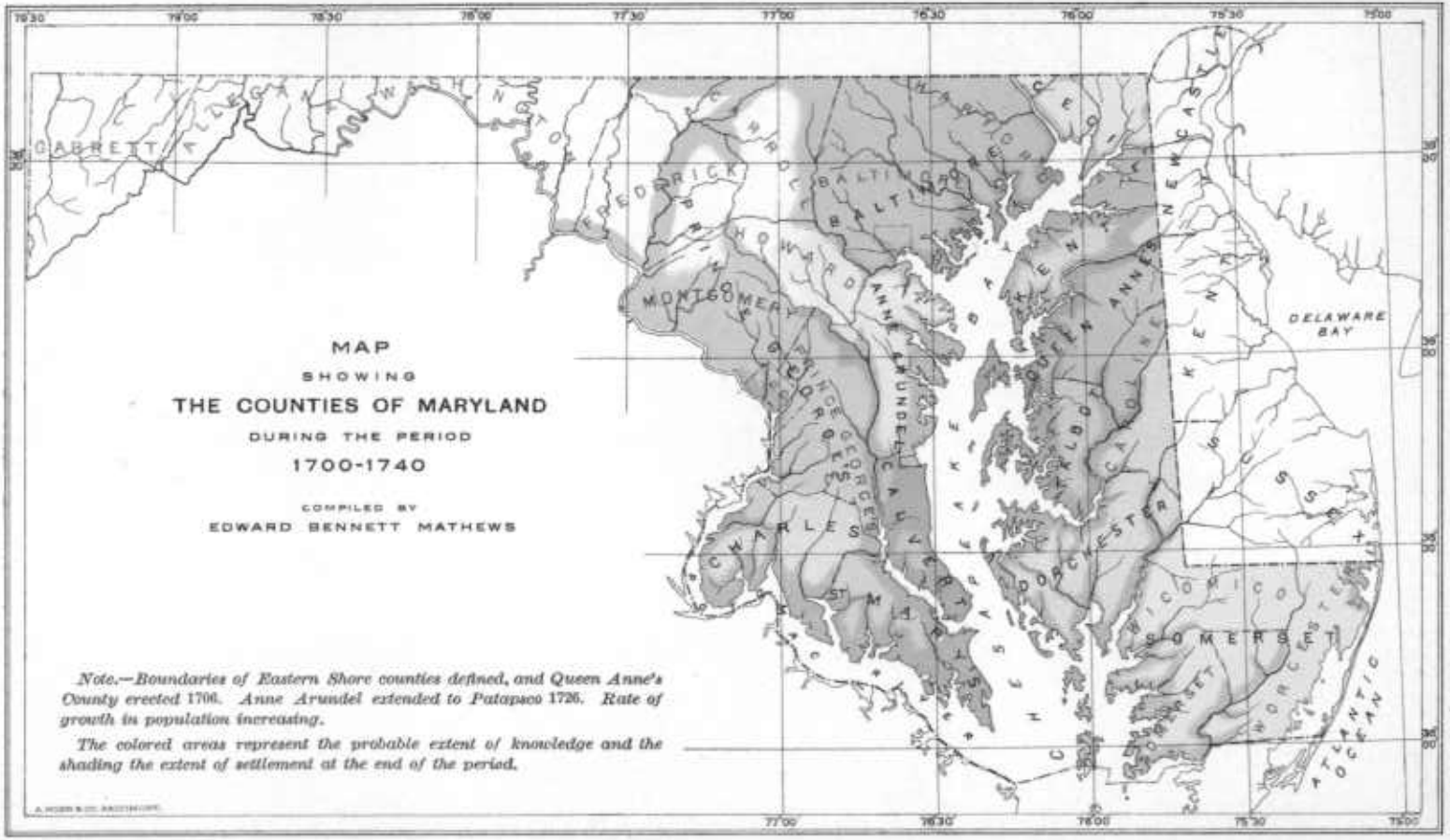
The creation of Queen Anne's County by the Acts of 1706, Chapter 3, which was passed on the 19th of April, 1706, modified the northern boundary of Dorchester County after May 1, 1707 when the Act went into effect. According to this Act it was definitely stated that Sharp's Island belonged to Talbot and not to Dorchester County. The southern boundary of Queen Anne's County was defined as follows:

"Bounded on the South with Talbot county, to Tuckahoe Bridge and from thence with Tuckahoe Creek and Choptank River to the mouth of a branch falling into the said river, called or known by the name of White Marble branch and from thence in a northeast line to the extent of this province."

According to the phrasing of this Act Dorchester would lose all that territory lying between White Marble branch and an easterly line drawn from the head of Choptank River. Since most if not all of this little strip was at this time actually in the possession of the Penns and since the famous Chancery case between the proprietaries of Maryland and Pennsylvania was at that time in Court in England the loss was more apparent than real. A real curtailment of territory did, however, take place in 1773.

A minor change in the Dorchester-Worcester line was made by the General Assembly in 1750.[30]

[30] Acts of 1750, Ch. 15.


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1700-1740
COMPILED BY
EDWARD BENNETT MATHEWS
Note.—Boundaries of Eastern Shore counties defined, and Queen Anne's County erected 1706. Anne Arundel extended to Patapsco 1726. Rate of growth in population increasing.
The colored areas represent the probable extent of knowledge and the shading the extent of settlement at the end of the period.
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
BALTIMORE
HARFORD
CECIL
HOWARD
MONTGOMERY
PRINCE GEORGES
ANNE ARUNDEL
QUEEN ANNES
KENT
DELAWARE BAY
CALVERT
CHARLES
ST MARYS
DORCHESTER
TALBOT
CAROLINE
WICOMICO
SOMERSET
WORCESTER
VIRGINIA
PENNSYLVANIA
DELAWARE
75°00
75°30
76°00
76°30
77°00
77°30
78°00
78°30
79°00
79°30
38°
37°30'

"Branch running up to widow Owens. late the wife of William Owens, and from thence up the main branch between John Marriotts and Edward Burns shall be the division between the two counties of Dorchester and Worcester."

By the erection of Caroline County out of portions of Dorchester and Queen Anne's counties according to Chapter 10 of the Acts of Assembly of 1773, passed on November 6 of that year, Dorchester County lost control of a fair portion of its territory. This included that portion of Caroline County lying east of the Choptank River and north of the following boundary:

"Beginning at a point on the north side of the mouth of Hunting Creek, in Dorchester County, and from thence running up and with the said Creek to the main road at James Murray's mill, thence with that road by St. Mary's White Chapel parish church to the north-west fork bridge, thence with the main road (that leads to Cannon's ferry) to Nanticoke river, thence with the said river to and with the exterior limits of the aforesaid county of Dorchester to the exterior limits of Queen Anne's County."

It is not easy to determine with certainty the location of these individual points but it is probable that the line laid out in 1773 is the same as that now laid out with the exception of the modifications passed in 1825 and 1880.

The change in the division line between Dorchester and Caroline counties made by Chapter 81 of the Laws of 1825, which was passed on February 17, 1826, was a minor one associated with the change of the public road whose location was altered to "promote the convenience of the public, as well the convenience of the said Mark Noble." Mr. Noble found it inconvenient to have his land lying on either side of the boundary line and accordingly petitioned the Legislature for the alteration which was accordingly made.

The change of boundary authorized by Chapter 208 of the Acts of 1880 arose from the inconvenience produced by the passage of the boundary line through the center of Federalsburg. The division of authority and jurisdiction had occasioned numerous difficulties in connection with the public schools and the administration of justice. The entire voting population residing within the territory transferred petitioned the Assembly that they might be removed from Dorchester to Caroline County. It was accordingly enacted by the Assembly

"That all that part of Dorchester county, to wit: beginning at a point on Main street, in the town of Federalsburg, where Bridge street terminates, and which is an intersection of a boundary between Dorchester county and Caroline county (marked "A" on the plat prepared by John B. Isler, a surveyor of Caroline county, dated January twenty-second, A. D., eighteen hundred and eighty), and thence running with said Main street, which is the present division line of said counties, the following courses, viz: north eight degrees west, thirty-one perches; north thirty degrees west, thirty-nine perches; north forty-six degrees west, thirty-two perches; north forty-six degrees west, thirty-two perches; thence, still with the county road and present boundary line between the said counties, north sixty-one degrees west, twelve perches; north eighty-two degrees west, seventy-six perches and twelve links; north eighty-four and one half degrees west, nineteen perches and twelve links; south fifty-nine degrees west, twenty-two perches and fourteen links; south fifty-four degrees west, fifteen perches and six links; south sixty-seven degrees west, eight perches and nineteen links; south seventy-seven and one half degrees west, thirty-eight perches and nineteen links; south seventy-seven degrees west, twenty-three perches and one link; south eighty degrees west, fourteen perches; north eighty-nine degrees west, twenty-seven perches and ten links; north seventy-seven and one half degrees west, eighteen perches and ten links; north eighty-five and one half degrees west, eighty-one perches and eight links; north seventy-seven degrees west, seventeen perches and seven links; north eighty-one degrees west, twenty-one perches; north sixty-five and one half degrees west, six perches and ten links, to a point in the said county road where a division line between the lands of Wm. A. Allberger and Mrs. Ann Noble terminates; thence, with the same reversed and through the lands of Robert McCrea, A. W. Flowers, John Dickerson, and Mrs. Rose Morris, south four degrees west, four hundred and forty perches, to a county road leading in an easterly direction towards the said town of Federalsburg; thence with the same and bounded thereby, north eighty-nine degrees east, two hundred and twenty perches; south seventy-six and one half degrees east one hundred and twenty perches to the county road from Williamsburg to Federalsburg; thence with the same and bounded thereby, north seventy-five degrees east, twenty perches; south seventy-eight and one half degrees east, twenty-five perches; thence through the lands of Charles Pinyard, south seventy-eight and one half degrees east, forty-three perches, to the northwest fork of the Nanticoke river; thence with the same and its marshes and passing through the land of Charles Pinyard, R. McGee and Charles W. Jefferson; north ten degrees west, thirty-five perches; north five and one half degrees east, forty perches; north three and one half degrees west, eighteen perches; north forty-three degrees east, fourteen perches; north forty-two degrees east, twelve perches; north forty-seven degrees east, nine perches and twelve links; north fifty-six degrees east, ten perches; north thirty-six degrees east, twelve perches; north twenty-eight degrees east, twenty perches; north forty-one degrees east, forty perches, to a point opposite to where Miles Run empties into the northwest fork of the Nanticoke river; thence crossing the said northwest fork south sixty-eight degrees east, ten perches, to a point at or near the mouth of Miles Run; thence with said Miles Run and its meander-

ings (the same being the boundary between the first and twelfth districts of Dorchester county), north thirty-three degrees east, thirty-six perches; north sixty-five degrees east, ten perches; north fifteen degrees east, ten perches; south thirty-eight degrees east, nineteen perches; north five degrees west, sixteen perches; north thirty degrees east, twenty-two perches; south seventy-seven degrees east, twelve perches; south ninety degrees east, twenty-two perches: south seventy-five degrees east, six perches; south twenty-nine degrees east, six perches; south thirty-one degrees east, twelve perches; north seventy-six degrees east, eight perches; north fifty-four degrees east, twelve perches; south eighty-five degrees east, twenty perches, to the county road from Johnson's Cross Roads to Federalsburg, which county road is also the boundary between Dorchester and Caroline counties; and thence with the same and bounded thereby, north thirty-one degrees west, two hundred and thirty-six perches; south eighty-two degrees west, fifty-six perches, to the place of beginning, be transferred to Caroline county, and shall hereafter form a part of the fifth election district of said last named county." . . . .

DORCHESTER COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 3 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 3 election districts.

1816 Ch. 35. County divided into 5 election districts.

1816 Ch. 127. Commission provisionally appointed to run boundaries and appoint election places.

1817 Ch. 42. Confirms Acts of 1816 Ch. 35.

1821 Ch. 166. Polling place in 3d election district to be Levin Woolford's house.

1821 Ch. 188. County divided into 6 election districts.

1822 Ch. 2. Confirms Acts of 1821 Ch. 188.

1822 Ch. 5. Commission appointed to lay off in a single district the "country between the branches of the Nanticoke River commonly called the Fork."

1823 Ch. 16. Confirms Acts of 1822 Ch. 5.

1826 Ch. 181. County divided into 7 election districts.

1826 Ch. 177. Commission appointed to lay off the districts.

1827 Ch. 2. Confirms Acts of 1826 Ch. 181.

1828 Ch. 1. County divided into 8 election districts by the division of the 7th district.

1829 Ch. 1. Confirms Acts of 1828 Ch. 1.

1829 Ch. 10. Commissioners appointed to divide the Cambridge or 7th election district into two election districts.

1831 Ch. 40. Part of the 3d election district annexed to the 2d district.

"Beginning at the forks of the road at Minons old field, and running down and binding with the road leading to Cratchens Ferry, to Thomas Davidson's school house, thence with a private road by said school house; and

through the divisional lane between said Davidsons and Elijah Bunsfield, to the road leading from Vienna to New Market, thence with said road to the place of beginning."

1831 Ch. 135. Polling place of 4th election district changed to Parson's Creek.

1836 Ch. 69. Line between 4th and 5th election districts leading from Keene's Crossroads to Jones bridge, commonly called the Great Marsh bridge in Dorchester County changed to run from the said Keene's cross roads, with a straight line, to a place called Burton's Landing, and from thence southwest, until it shall intersect the line of the sixth election district.

1838 Ch. 212. Line between 4th and 7th election districts near Church Creek changed as follows:

"Beginning at a bridge near the Storehouse, formerly the property of Isaac & Williams, on Church creek in Dorchester county, then to run in a southerly direction, to the head of a branch called Hudwin's Branch, then with said branch to Button's Creek, then with Button's creek to blackwater river, and all that part of district number four, lying to the north and east of the above given line, shall be attached to and form a part of district number seven."

1840 Ch. 114. Polling place of 4th election district to be at Richard Tall's.

1844 Ch. 298. Voters to decide on polling place in Lake's district.

1846 Ch. 239. Line for 1st election district changed as follows:

"Beginning at the bridge over the north-west fork, branch or prong of Nanticoke river, at Federalsburg, thence down said branch or prong to the mouth of Harrison's Mill creek, thence up said creek to the dam of said mill, thence with the county road to Nicoll's Cross Roads, thence with the main road to intersect a road leading from Crotcher's ferry to the town of Vienna, thence to the nearest point on Chicone branch, thence with the meanderings of said branch to the main road leading from the Walnut landing to Vienna, and from thence with said main road to the aforesaid north-west fork, branch or prong of Nanticoke river."

1852 Ch. 117. Erects additional election district to be known as Church Creek district No. 9 with bounds as follows:

"Commencing on the county road leading from Church Creek to Cambridge, at the junction of the road leading to Little Black Water road, commonly called and known as Hurley's New road, and running with Hurley's new road to the point of intersection with the Little Black Water road, and thence continuing in a straight line to the Little Black Water river, thence down and with Little Black Water river to Big Black Water river, thence with

said Big Black Water river to the road leading to the Baptist Meeting House, thence with said road to the county road leading to Taylor's Island, thence with said county road to the head of Broad Cove, thence with said cove to the river, thence following the Fishing Creek branch until it comes opposite Hurley's new road, or place of beginning."

1852 Ch. 174. Erects additional election district out of 5th election district to be known as Strait's Neck district or district number ten, bounded as follows:

"Beginning at the head of Fox Creek, at or near Stapleford's wind mill, thence running to the county road to Holme's front gate, thence running with said road to the Black Water road, thence running and binding with said Black Water road to Fearim Creek bridge and from thence running down said Fearim creek to Fishing bay, thence running so as to include all the islands in and near the mouth of the Nanticoke river, belonging to Dorchester county, and in the fifth election district, to the line dividing Dorchester and Somerset counties, thence with said line down said river and Fishing bay, the Tangier sound and Holland straits, to the Chesapeake bay, thence with said bay, Hooper's Straits, Honga river, and Fox creek to the place of beginning. The place of holding elections to be at Todd town."

1854 Ch. 256. Erects an additional election district with the following bounds:

"Beginning at the bridge over Transquaking river, a little below Higgins' mills, thence running with the country road by Middletown, or Manning's road, to the drawbridge over Chicamacomico river, at Manning's store, then with and up said river until it comes to a point or place on said river opposite to the road running to Nanticoke river, known as the Hard or Craft's road, then with a straight line to said Hard road, then running with said Hard or Craft's road to the Nanticoke river to the public landing, a little south of Vicker's wharf, then down the said river so as to include all the islands belonging in the third election district, then to the mouth of Transquaking river, then up the said river to the place of beginning."

1858 Ch. 198. Changes polling place of 6th election district from Fishing creek ferry to the store of Robert H. Creighton.

1858 Ch. 235. Erects 12th election district out of No. 2 as follows:

"Beginning at the bridge over the Nanticoke river, at Federalsburg, thence with the county road that separates Dorchester from Caroline county, to Hunting Creek, thence with said Creek to Choptank river, thence with said river to Blink Horn Creek, thence with said creek to its head,

or until it intersects the county road leading from Cabin creek to Hunting creek, thence with the Manor line to Washington chapel, thence with the aforesaid line and road that divides the lands of Nathan Williams from Thomas A. Price, Nicholas Wright from Stephen Andrews and James M. Hurlock, thence following the plain road leading to Henry D. Wright's Mill and branch, thence with said branch to the Nanticoke river, thence with said river to the place of beginning."

1860 Ch. 165. Commission appointed to run and define boundary line between Somerset and Dorchester counties.

1861 Ch. 99. County divided into 13 districts. The old districts confirmed except in the case of the 7th district which is divided as follows:

"Beginning at the mouth of Black Water River and running up said river until it comes to the fork of the same; then with the east branch up to Maple dam bridge, then with the county road southerly, until it intersects David M. Corkrans road, then with said road to Martin's road, then by and with Martin's road until it intersects the county road leading from Bucktown to Cambridge, at or near Levin Mowbray's gate, then with said road leading from Bucktown to Cambridge north until it intersects the Cordtown road, then with the Cordtown road until it intersects the road leading from Vienna to Cambridge, then with said road to the corner of Doct. Curt's oat-field, and intersecting a road leading from the Cambridge and Vienna road to Airies, then by and with said road to Transquaking bridge, then with the Transquaking river to its mouth."

1862 Ch. 168. Erects an additional election district with the following bounds:

"Beginning at the bridge on the main branch of the Nanticoke river, at Federalsburg, thence with the county road that separates Dorchester from Caroline County, to Hunting Creek, thence with said creek to Choptank river, thence with said river to Blink Horn Creek, thence with said creek to its head or until it intersects the county road leading from Cabin Creek to Hunting Creek, thence with the Manor line to Washington Chapel, thence with the aforesaid line and road that divides the lands of Nathan Williams from Thomas A Trice, Nicholas Wright from Stephen Andrews and James M. Hurlock, thence following the plain road leading to Henry D. Wright's Mill and branch, thence with said branch to the main branch of the Nanticoke river, thence with said river to the mouth of Miles branch, thence with said branch to the county road leading from Johnson's Cross Roads to Federalsburg, thence with said county road to the place of beginning."

1864 Ch. 60. Enacts that all that part of 10th or Straight's District, lying south of Hooper's Straights, in Dorchester county, shall compose one district, called 14, or Holland's Island District.

1872 Ch. 75. Enacts that the district called fourteen, or Holland's Island district, formed from all that part of number ten, or Straight's district, lying south of Hooper's Straights, in Dorchester county, is hereby re-annexed and consolidated into a part and portion of election district number ten, or Straight's district.

1872 Ch. 156. 12th election district bounded as follows:

"Beginning at the bridge, on the main branch of the Nanticoke river at Federalsburg, thence with the county road that separates Dorchester from Caroline county to Upper Hunting Creek, thence up and with said creek until it intersects Lower Hunting Creek, thence up and with said creek to its head or until it intersects the county road leading from Upper Hunting Creek to Cabin Creek, thence with said road until it intersects the manor line, thence with said line to Washington Chapel, thence with the aforesaid line and road that divided the lands of Nathan Williams from Thomas A. Trice, Nicholas Wright, from Stephen Andrews and James M. Hurlock, thence following the plan road leading to Henry D. Wright's mill and branch thence with said branch to the main branch of the Nanticoke river, thence with said river to the mouth of Mile's branch, thence with said branch to the county road leading from Johnson's cross roads to Federalsburg, thence with said country road to the place of beginning."

1880 Ch. 208. Changes boundary line and transfers certain territory and population from Dorchester to Caroline county.

1880 Ch. 456. 14th or Linkwood election district established from 3d, 7th, and 11th election districts with bounds as follows:

"Beginning at the end of the Tates Bank road where it reaches the Great Choptank river, thence following said road until it intersects the road leading from Cambridge to Hicksburg; thence with said last named road until it reaches Jacktown; thence following the road from Jacktown to Bucktown, until it intersects the boundary line between district number seven or Cambridge district, and district number thirteen or Bucktown district, where it crosses said road; thence with the boundary line between the two last named districts until it reaches the Transquakin bridge beyond Airey's; then following the Transquakin river to the mouth of Dumpling Point creek; thence up said creek and branch to the county road at Middletown; thence with the county road leading to Salem, to Jones' Baptist Church; thence by the county road lead-

ing by the Little Birch mill to the new county road passing over Payne's mill pond; thence with the said new county road until it intersects the road leading from Hicksburg to East New Market; thence with the last named road in the direction of Hicksburg, to the forks of tbe road leading to Indian creek; thence with the Indian creek to the Great Choptank river; and thence down said river to the place of beginning."

1884 Ch. 362. Dividing election district 7 into two election precincts.

"Commencing at the centre of the outer end of Tbomas' wharf, thence running with the centre of High street to Poplar street, thence with the centre of Poplar street to Race street, thence with the centre of Race street to the town limits, thence with the centre of the County Road to Maple Dam bridge, thence with the county road to Lot's lane, tbence with Lot's lane to the limits of Cambridge district, and all that part of said election district number seven, or Cambridge, lying to the east of said line, shall be known as east Cambridge, or first precinct . . . . and all that part of said election district seven, or Cambridge, lying west of said line, shall be known as west Cambridge, or second precinct."

1890 Ch. 276. Creates a new precinct in Cambridge or 7th election district, to be known as the third or Dailsville precinct, bounded as follows:

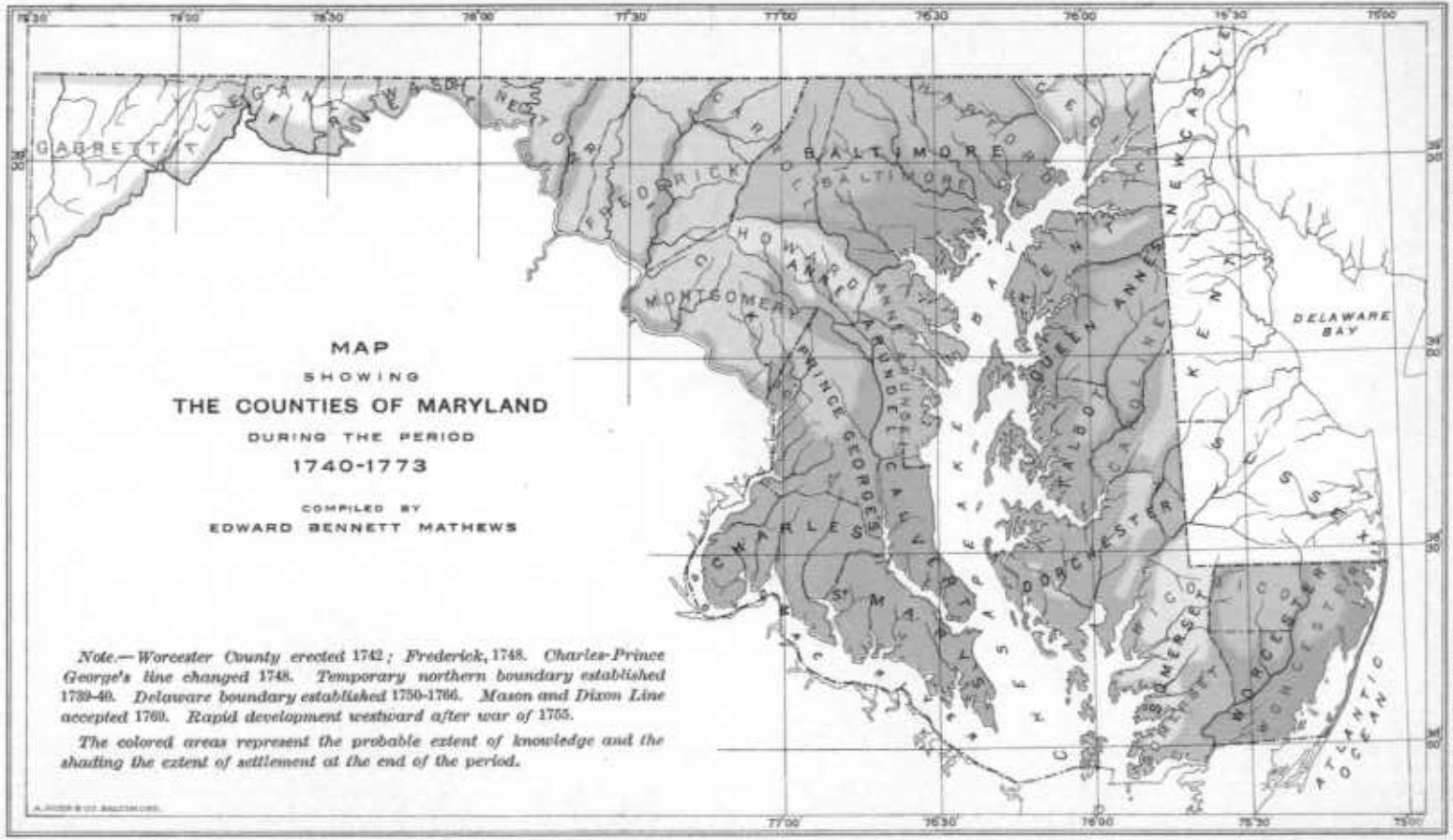
"Commencing at the mouth of Jenkins' creek; thence running with the centre of said creek and the branch that divides the Chamberlaine farm to the county road; thence in about a southern direction to a point in the centre of the Bayly road opposite the residence of Thos. Woolford colored; thence with the Bayly road and Church creek road, to limit of Church creek, or number nine election district of said county, the precinct hereby created being a part of the present western precinct."

1892 Ch. 565. Divides 4th elcction district into two precincts as follows:

". . . . all that part of said fourth or Parson's Creek district eastward of a line, beginning at the head waters of Parson's Creek and running with Stuart's canal to its intersection with the head waters of Black Water River, and with said river to the Big Water Bridge shall constitute the first or Madison precinct . . . . and all that part lying westward of said line shall constitute the second or Taylor's Island precinct."

1894 Ch. 491. 15th or Hurlock election district established with the following boundary:

"Beginning at the mouth of Benjamin Conway's Mill Creek, thence up said creek, mill pond, and branch to the county road to the Baltimore and Eastern Shore Railroad,


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1740-1773
COMPILED BY
EDWARD BENNETT MATHEWS
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
CECIL
HOWARD
ANNE ARUNDEL
MONTGOMERY
PRINCE GEORGES
CHARLES
ST MARYS
CALVERT
QUEEN ANNES
KENT
TALBOT
CAROLINE
DORCHESTER
SOMERSET
WORCESTER
DELAWARE BAY
ATLANTIC OCEAN
NEW CASTLE
Note.— Worcester County erected 1742; Frederick, 1748. Charles-Prince George's line changed 1748. Temporary northern boundary established 1739-40. Delaware boundary established 1750-1766. Mason and Dixon Line accepted 1769. Rapid development westward after war of 1755.
The colored areas represent the probable extent of knowledge and the shading the extent of settlement at the end of the period.

thence with said county road to the line dividing Caroline and Dorchester counties, thence with said line to the Choptank river, thence with said river to Wright's wharf and thence with the public county road to Blinkborn School House, then up Cabin Creek to the house where C. H. Prouse now resides, thence with the county road to a pond known as Bonner's bay, then down the branch and mill stream to Upper Cabin creek mill, until it crosses the county road leading from Cabin creek to Shilo church, and with said road to the county road leading from East New Market to Rhodesdale, and with said road to the fork district line, and with said line to the Nanticoke river, and up said river to the place of beginning."

1894 Ch. 601. Divides 4th or Parson's Creek Election district into two districts.

"The fourth or Parson's Creek election district of Dorchester county . . . . is hereby divided into two election districts, to be called district No. 4 or Parson's creek district, and district No. 16 or Madison district; and that all that part of the said fourth or Parson's creek district westward of a line beginning with the head waters of Parson's creek and running with Stewart's canal to its intersection with the head waters of Black Water river, and with said river to the Big Black Water bridge, shall constitute the new district No. 4, or Parson's creek district, with the voting place on Taylor's Island; and all that part of said fourth or Parson's creek district lying to the eastward of said line of division shall constitute the 16th or Madison district, and the voting place shall be at Madison."

1896 Ch. 227. Creates a new precinct in Strait's or 10th election district to be known as the 2d or Holland's Island precinct.

". . . . it shall consist of all that part of said Tenth election district lying south of Hooper's Straits of said county, the precinct hereby created being the extreme southern part of the present Strait's district, and the voting place for said second or Holland's Island precinct shall be at Holland's Island."

1898 Ch. 418. 3d precinct in Straits or 10th election district to be known as the 3rd or Elliott's Island precinct.

"It shall consist of all that part of said tenth election district lying east of Fishing Bay, and known as Elliott's Island, and the voting place shall be at Elliott's Island."

1900 Ch. 669. Changes the name of Parson's Creek election district to Taylor's Island election district.

1904 Ch. 555. Changes the line between election districts 15 and 2.

"Beginning at the mouth of Cabin creek and thence running up said Cabin creek to Lower Cabin creek mill, thence

up Cabin creek mill ponds and stream and branch until said stream or branch intersects the county road leading from Cabin creek village to Shiloh church, thence with said road to the county road leading from East New Market to Rhodesdale, and thence with said to the Forks District line."

1906 Ch. 494. Erects 17th election district out of parts of 3d, 11th, and 14th election districts.

"Beginning at the bridge on the county road at Little Brick Mills, and following the mill stream southward to the Chicacomico river; thence with said river southward to the Transquakin river; thence following said Transquakin river northward to Dumpling Point; thence northward with the center line of the branch known as Middletown Branch to the double bridges at Middletown; thence westward to the junction of the Linkwood road at the Middletown schoolhouse; thence with said road northward to the junction of the road leading from Salem to Linkwood; thence with said road westward to the mouth of the road known as the Red Lane; thence northward with said Red Lane road to the road leading from Little Brick Mills to Hawkeye; thence eastward with said Little Brick Mills road to the road leading from the old Baptist meeting house to the Little Brick Mills; thence northward to the place of beginning."

FREDERICK COUNTY.

The earliest settlements in Frederick County were made along the Monocacy River and date from the early part of the eighteenth century, some authorities claiming the first settlements to have been made as early as 1710. There were, however, no permanent settlements of any importance within the limits of the present Frederick County prior to the fifth decade of the eighteenth century. At this time many Germans from Pennsylvania found their way southward along the old Monocacy trail and settled in the fertile valley of the Monocacy in the vicinity of Grayson, Creagerstown, and Frederick. The growth in population in this region was very rapid and by 1748 it appeared wise to erect a new county for their accommodation. The act by which this was decreed enacted that

"Beginning at the lower Side of the Mouth of *Rock* Creek, and thence by a strait Line joining to the East Side of *Seth Hyatt's* Plantation, to Patuxent River . . . . then with *Patuxent* River to the Lines of Baltimore County, and

with the said County to the Extent of the Province; and that all the Land lying to the Westward and Southward of the said Lines be included in the new County aforesaid, and that after the Commencement of this Act the said new County shall be called *Frederick* County. . . . . "

Up to this time there had been little or no conflict between the settlements along the western border of Baltimore and the eastern side of Prince George's County. With the rapid influx of settlers from Pennsylvania and their easterly extension from the Monocacy valley over what is now western Carroll County, it became necessary to more sharply define the western boundary of Baltimore County. It was therefore enacted in 1750, Chapter 13, that the boundary between Frederick and Baltimore counties should be as follows:

"Beginning at a spring called Parr's Spring,, and running from thence N. 35° E. to a bounded white oak standing on the west side of a waggon road, called John Digges's road, about a mile above a place called Burnthouse Woods, and running thence up the said road to a bounded white oak, standing on the east side thereof, at the head of a draught of Sam's creek; thence N. 55° E. to a Spanish oak standing on a ridge near William Robert's, and opposite to the head of a branch called the Beaver-Dam, and running thence N. 20° E. to the temporary line between the provinces of Maryland and Pennsylvania, being near the head of a draught called Conewago, at a rocky hill called Rattle Snake Hill; . . . . "

The location of this eastern boundary of Frederick County cannot be determined with entire accuracy but certain of the early maps of the State show it approximately as represented on the accompanying plate for this date. No change appears to have been made in this line until the erection of Carroll County nearly a century later.

Up to the outbreak of the Revolutionary War no further change was made in the limits of Frederick County. Permanent settlements of Germans had in the meantime been made at Middletown, Tancytown, Sharpsburg, Thurmont, Union Bridge, Emmitsburg and Woodsboro as well as in the Hagerstown valley. At the Constitutional Convention of 1776 it was decided to divide this widely extended and now more or less populous Frederick County into three counties, Washington, Montgomery, and Frederick, corresponding to the Upper, Lower, and Middle Districts of Frederick County. The line of separation determined by this Convention was as follows: From the mouth of the Monocacy a straight line

was drawn to Parrs Spring, or the headwaters of the Patuxent, and the portion of Frederick County lying to the south and east was assigned to Montgomery County. The second line ran along the crest of South Mountain from the temporary line to the Potomac River. All the territory lying west of this was assigned to Washington County. In this way Frederick County was limited on the north, west, south, and southeast by its present bounds. Its eastern boundary was modified by the erection of Carroll County in 1836, and again in 1838 when the boundary lines were defined as running from Rocky Creek, one of the headwaters of the Monocacy River as it crosses the State line, thence with the said creek until the same is merged into the Monocacy River, thence with the latter to the mouth of Double Pipe Creek, thence up Double Pipe Creek to the mouth of Little Pipe Creek, thence with the latter stream to the mouth of Sams Creek, which it follows to its head.

FREDERICK COUNTY ELECTION DISTRICTS.

1798 Ch. 115.	County divided into 7 election districts.
1799 Ch. 48.	Confirms Acts of 1798 Ch. 115.
1799 Ch. 50.	Commission appointed to divide county into 7 election districts.
1802 Ch. 82.	County divided into 9 election districts.
1803 Ch. 19.	Confirms Acts of 1802 Ch. 82.
1803 Ch. 46.	Commission appointed to lay off county in 9 election districts who report to the County Clerk.
1821 Ch. 35.	County laid off and divided into 11 election districts.
1822 Ch. 6.	Confirms Acts of 1821 Ch. 35.
1824 Ch. 13.	Commission appointed to lay off election districts authorized.
1824 Ch. 84.	3d election district divided into two precincts.
1826 Ch. 31.	Erects additional election district from parts of the 6th and 7th districts to be known as the 12th election district [apparently not confirmed].
1826 Ch. 188.	Supplementary commission appointed.
1829 Ch. 168.	Erects additional election district from parts of the 3d election district to he known as the 12th election district. Commission appointed subject to confirmation.
1830 Ch. 35.	Erects additional election district from parts of the 6th and 7th election districts to he known as the 12th election district.
1830 Ch. 146.	Confirms Acts of 1829 Ch. 168.
1831 Ch. 112.	Erects two additional election districts, the 13th and 14th.
1832 Ch. 165.	Confirms Acts of 1831 Ch. 112 and appoints two commissioners to lay out the bounds.

1834 Ch. 27. Erects a 13th election district by a Commission.

1834 Ch. 213. Supplemental act filling vacancy caused by death.

1835 Ch. 256. Carroll County erected from parts of Frederick and Baltimore counties.

1836 Ch. 91. Confirms units of districts 1, 2, 14, 15, 3, 10, 4, 5, 11 as existing before Act of 1835 Ch. 256 and that the limits of districts 9 and 8 shall remain the same except insofar as modified by the lines of Carroll County.

1843 Ch. 323. Commissioners appointed to lay off a new district [15?] from Frederick and Creagerstown districts.

1847 Ch. 52. Commissioners appointed to lay off new district [16?] from parts of Hauvers and Middletown election districts.

1847 Ch. 147. Commissioners appointed to lay off a new district [17?] from parts of Buckeystown and New Market election districts.

1852 Ch. 100. Commission appointed to lay off and establish new election district out of parts of 8th, 9th and 11th districts.

"Commencing at the mouth of the Linganore Creek, thence up said creek to the head of William Jones' Mill dam, thence with a straight line as near as may be to Jacob Harmiss' dwelling house on the road leading from Liberty town, to Bigg's Ford on the Monocacy River, thence down said river to the place of beginning."

1852 Ch. 261. Beginning at the Frederick district line above George Blessing's, and running thence in a straight line, as near as practicable to intersect the Catoctin Creek, where the road leading from Smithburg to Frederick city crosses said creek, excluding the aforesaid George Blessing's dwelling; thence to the bridge lately built across the branch coming from Palmer's mill, on the road leading from the old Hagerstown road to Wolfville; thence to intersect the Washington county line above Jacob Renners including said Renner, thence with said Washington county line until it intersects the turnpike leading from Frederick to Hagerstown, thence to Shoemaker's school house; thence to Koogle's school house; thence to intersect the road leading from Beallsville to Middletown at Kennet's mill; thence to intersect the Frederick district line above George W. Sumners; thence with the said Frederick district line to the point first mentioned above."

1852 Ch. 279. Commissioners appointed to erect new election district out of Cregerstown, Emmittsburg, and Hauvers districts.

"Beginning at the summit of the Catoctin mountain, near the furnace, and running thence to a point near the blacksmith shop of Michael Zimmerman, thence from said shop along the public road to Thomas Metcalfe's land, thence with a straight line to John R. Boller's house, including said house, and the village of Graceham, thence along the public road leading from Mechanicsburg to the

Emmittsburg cross road, thence along the Emmittsburg road to a point where the branch, known as Beaver Dam, crosses said road, thence in a stralght llne to a point north of John A. Martin's house, thence in a northern direction to William Boller's farm, thence with the Emmittsburg road, leading to Wolf's tavern, to the cross roads from Mechanlcstown to Sabellesville, thence with a straight line to Harman's farm, thence with the south side of the road to the new cut road, near Gat's farm, and thence with a straight line to the place of beginning."

1854 Ch. 143. Erects a new election district [19?] as follows:

"Commencing at or near the stone bridge across Pipe Creek, near Diffendall's Mill; thence by the most sultable line to some point at or near Ladiesburg; thence by the most suitable line to the Hlll School House; thence to some point at or near the Copper Mine School House; thence with the Copper Mine Road, to some point at or near Nicholas Norris's farm, from thence to Sam's creek, the dividing line between Frederick and Carroll counties, and thence with said dividing llne to the place of beginning."

1856 Ch. 168. Dlvides the 2d election district into two precincts "by a line running from the Frederick and Woodsborough Turnpike Bridge, with the Turnpike road to Frederick City, and thence through Market street of said City, with the Turnpike road to the Monocacy Bridge; on the Georgetown Turnpike road."

1860 Ch. 332. Transfers portions of Buckeystown and Frederlck dlstricts to the Jefferson district by the following lines:

"Commencing at the top of Catoctin mountain, between the property of Willlam Hurshberger and Henry Culler, at the county road, and runnlng thence with sald road to the Frederick and Harpers Ferry Rldge road, at Mrs. Stockman's, and thence between the property of William Smith and William Hargate; thence between the property of John and Daniel Snider; thence in a straight line between the property of Jacob Remsburg and Hamllton Gisbert, and thence to strike the branch at the Georgetown road; thence along sald road, at the foot of the mountain, to the Trammelstown road, and thence up sald road to the top of the mountain, to the district line between Jefferson and Buckeystown districts."

1861 Ch. 74. Dlvides the western precinct of election district No. 2 into two precincts.

1862 Ch. 53. Dlvides the 2d election district lnto 2 precincts and repeals Acts of 1861 Ch. 74.

1862 Ch. 149. Polling place of 10th election district changed to Smithfield School House.

1872 Ch. 179. Defines the boundary of the 18th election district as follows:

"Commencing at the junction of the Buffalo Road and Talbot's Branch; thence running with said branch to the crossing of the Unionville and Linganore Public Road; thence with said road to the old Annapolis Road to the intersection of the New Market Road; thence with said road to Forrest Grove School House; thence with a straight line to the reservoir on the Baltimore and Ohio Railroad known as number thirteen; thence to the tobacco house on the Kemptown Road, formerly owned by Brook Buckstone; thence with the Buffalo Road to the place of beginning."

1872 Ch. 204. Divides the 2d election district into 4 precincts.

1878 Ch. 179. Additional election district, No. 19, erected from part of No. 8 with the following bounds:

"Beginning at a white oak tree at the intersection of the Coppermine road with the Johnsville District line, running thence south to the spring-house of Henry Carter, thence with spring branch to New Liberty road, thence south to the bend in the pubilc road west of the dwelling house of William H. Baker, thence with said public road until it intersects the Woodville District line, thence with said line to the Carroll county line, thence with said Carroll county line until it intersects Johnsville District line, thence with said line to the place of beginning."

1878 Ch. 250. Additional election district, No. 20, erected from portions of 2d and 3d election districts with bounds as follows:

"Beginning at the southwest corner of Mechanicstown district line and running with said election district line, bearing slightly southeast, to the crossing of the road leading from Eicholtz's mills to Lewistown, at a point near the dwelling-house of A. G. P. Wiles, thence in a southeasterly direction to the Woodsborough election district line on the Monocacy river, touching the north corner of George L. Devilbiss' dwelling-house, and with the Woodsborough election district line on a southerly course to Bigg's ford on the Monocacy river, thence bearing a northwesterly course to the north corner of Bethel church, thence bearing still a northwesterly course to intersect the Catoctin election district line at a point where said line strikes the Hamburg road, and thence with Catoctin district line in a northerly direction to the place of beginning, the territory included within these boundaries to be known by the name of Lewistown District or election district number twenty."

1884 Ch. 149. Additional election district, No. 21, erected from a portion of the 2d election district.

"Commencing at the northeast corner of Frederick election district number two, and thence running with the

western boundary of said district to its intersection with the Shookstown road; thence with the middle of said road to its junction with the county road leading by the artesian wells; thence from the said junction to the southeast corner of Edward Kemp's dwelling-house; thence with a stralght line to the centre of the brldge over the creek at Aubert's fording on the Rocky Spring road; thence with a straight line to the junction of the county road leadlng past Charles T. F. Howard's with the road leading to Parson's (formerly Getzendanner's) mill; thence with sald road in its centre to the mouth of the lane leading to Frederick and Emmittsburg turnpike; thence from the mouth of sald lane with a straight line to the boundary of the Lewistown election district at its intersection with the county road leading by and from D. Lunday's limeklins to the Frederick and Emmittsburg turnpike; thence from said intersection ln a northwesterly direction with the dividing line between Frederick clection dlstrict number two and Lewistown district number twenty to the first mentloned place of beginning on the Catoctin mountain, said election district to be called Tuscarora district or election dlstrict number twenty-one."

1888 Ch. 217. Gives County Commissioners power to create new election dlstricts whenever ln their judgement necessity arlses.

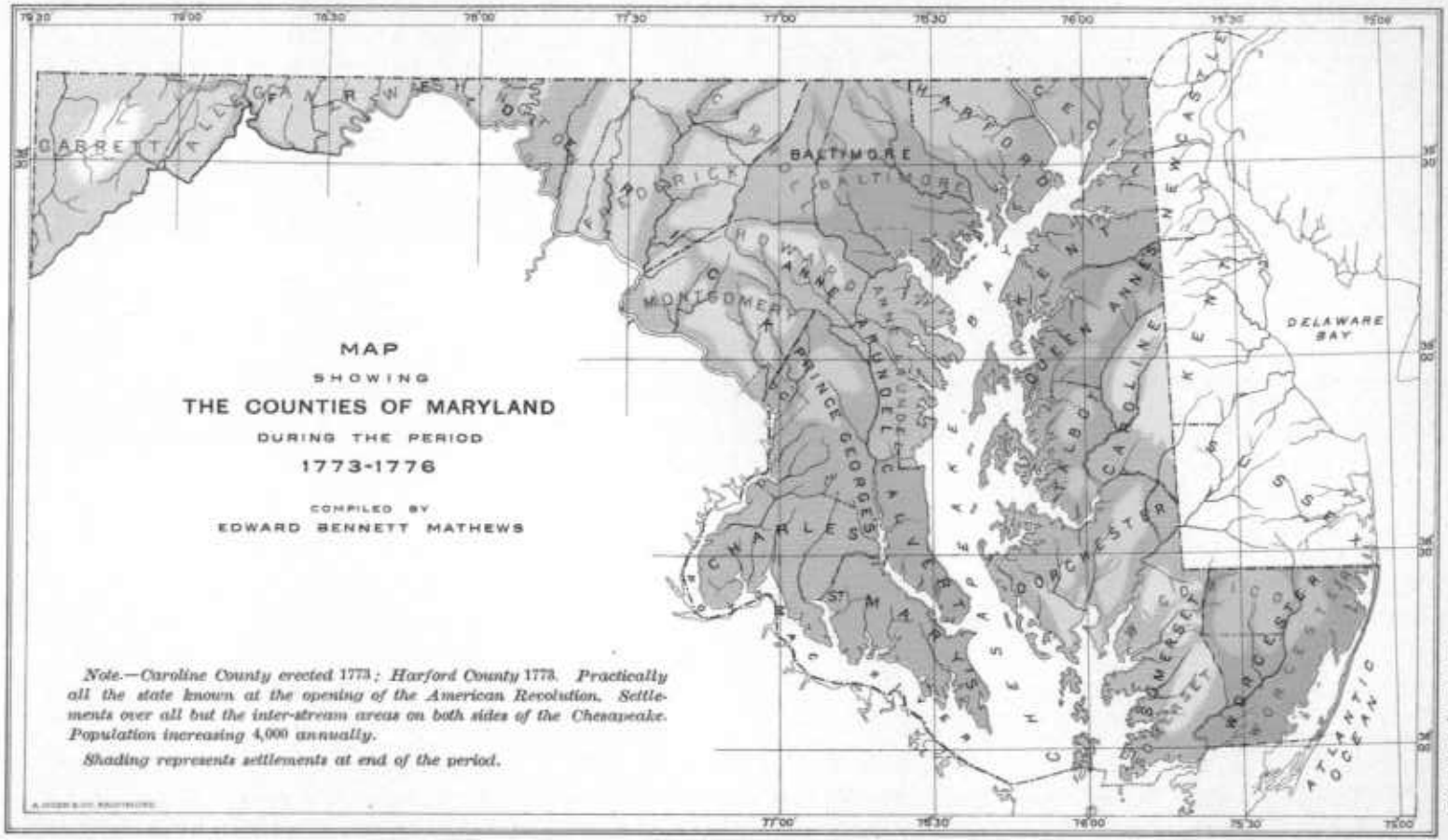
1894 Ch. 78. Divides the 12th election district into two precincts, the first coextensive with the town of Brunswick.

1896 Ch. 401. Additional election dlstrict, No. 22, erected from portlons of the 3d and 12th election districts with the followlng bounds:

"Beginning on the line divlding Frederick and Washington counties, on South Mountain, at a polnt known as Whlte Rock; from thence running ln a southeasterly direction to the Catoctln creek, in a southerly direction to where the Broad Run creek enters said Catoctln creek; then up the Broad Run creek to the entrance of a branch running from Harley's or "Boone's" pond; from thence wlth said branch to where it crosses the road leading from Burkittsvllle to Petersville; thence with said road to the entrance to Gouveneur road; thence with sald Gouveneur road westwardly across the Burkittsville and Knoxville road ln a straight line to the top South Mountain at the dlvlding llne between Frederick and Washington counties; thence with said mountain and dividing line to the place of bcginning."

1898 Ch. 155. Additional electlon district, No. 24, erected from a portion of the 2d election dlstrict with the followlng bounds:

"Beginning on the Catoctin mountain, at a point where Jefferson district or election district No. 14 and Middletown district or election distrlct No. 3 join on the bound-



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ary of Frederick district or election district No. 2; thence running easterly with the line of "Ballenger district" No. 23 to the southeast corner of the Mount Philip farm house; thence northeasterly with the line of the said "Ballenger district," at the southeast corner of Frederick Orland's dwelling house; thence northeriy following the road of the said Frederick Orland to the public road known as "Butterfly Lane" thence northeastwardly by a straight line to the Baltimore and Fredericktown turnpike road at the entrance to a private road or lane leading into the premises of W. W. Mines, on said turnpike; thence by and with the middle of said lane northwardly in a straight line to a point one hundred yards northeast of said W. W. Mines' residence; thence from said point due north by a straight line untii it intersects the southern outlines of Tuscarora election district No. 21; thence by and with said outline westwardiy to where it intersects the dividing line between Middletown and Frederick district, aforesaid; thence by and with the line or lines between said districts to the place of beginning." To be known as "Braddock district or No. 24."

1898 Ch. 203. Additional election district, No. 23, erected from parts of the 1st, 2d, and 14th election districts with the following bounds:

"Beginning on the Catoctin Mountain at a point where Jefferson district, or Election District No. 14, and Middletown district, or Election District No. 3, join on the boundary of Frederick district, or Election District No. 2; thence running easterly with the line of Braddock District No. 24 to the southeast corner of the Mount Philip farm house; thence northeasterly with the lines of the said "Braddock District" to the southeast corner of Frederick Oland's dwelling house; thence northerly following the road of the said Frederick Oland to the public road known as "Butterfly Lane"; thence easterly with said road until it reaches the Frederick and Jefferson turnpike road in a northeasterly direction until it intersects the Frederick and Ballenger's creek turnpike road; then with said Frederick and Ballenger creek turnpike road and the Point of Rocks road until it intersects the road leading from said Point of Rocks road to the Red Hill school house road, and continuing with said road until it reaches the Frederick and Jefferson turnpike road, near the second tollgate on said turnpike road on the summit of Catoctin mountain; then with the summit of said mountain in a northerly direction through Jefferson Election District No. 2 to the place of beginning . . . . To be known as Ballenger District or Election District No. 23."

1898 Ch. 230. Dividing election district No. 5 into two precincts.

"The fifth election district of Frederick county, commonly known as Emmittsburg district, is divided into two separate and distinct voting or election precincts as determined by a division line beginning at the Pennsylvania State line in the middle of the public road leading from Emmittsburg in said district to Gettysburg, in the State of Pennsylvania, and running thence by a southerly course along the middle of said road to the fountain in the public square at Emmittsburg and Frederick Turnpike to the first toll gate thereon, and thence along the middle of the Emmittsburg and Creagerstown public road to the southern line or boundary of said district; and all that part of said district lying west of said division line shall be and constitute precinct No. 1, and all that part lying east of said line shall be and constitute precinct No. 2 of said district."

1904 Ch. 85. Additional election district, No. 25, established from 2d precinct of No. 12 election district.

"That the boundaries of the said "Brunswick District" or "Election District No. 25" shall be the corporate limits of the town of Brunswick and coincident with the limits of the second voting precinct of said District No. 12, as the same were fixed by the Acts of 1894 Ch. 78.

1904 Ch. 596. Additional election district No. [26] erected from portions of the 11th and 13th election districts with the following bounds:

"Beginning at a point on the Monocacy river, in Woodsborough District, or Election District No. 11, now known as Link's ford, and running with the east bank of said river to the Frederick and Woodsborough turnpike bridge, over said river known as the Ceresville bridge; then with said Frederick and Woodsborough turnpike road to the place where said turnpike road intersects the Frederick and Libertytown turnpike road; then with the center of said Frederick and Libertytown turnpike road to the covered bridge over Israel's creek, known as Creamer's bridge; then with the west bank of said Israel's creek to the public road known as Johnson's lane; then with said public road to a point where the said public road intersects the public road known as the Ridge road, leading from Morgan's mill to the village of Mount Pleasant; then in a straight line to a point where the public road known as the Dutrow road intersects the public road known as Water street road; then with said Dutrow road to a point where said road intersects the public road leading from Libertytown to the Frederick and Woodsborough turnpike road known as the Middle road, being a point on the line

of the Liberty District, or Election District No. 8; then with said Liberty and Mount Pleasant District line to a point on said line at the southeastern corner of James Boane's land; then with the Woodsborough District line to a point where the said line intersects the Bostian's Mill public road at a point near Charles Nolley's residence; then in a straight line from said public road to a point on the Woodsborough and Frederick turnpike road known as Smith's School House; then in a straight line from the place of beginning . . . . to be known as Walkersville District."

GARRETT COUNTY.

Garrett County, although foreshadowed in the Constitution of 1850, is the youngest of the major political divisions of the State, having been erected by Act of Assembly in 1872. According to this Act provision was made for taking a vote of the people in the fall of 1872 as to whether or not they would erect a new county. The section of the Act defining the boundaries decreed

That all that part of Allegany county lying south and west of a line beginning at the summit of Big Back Bone, or Savage Mountain, where that mountain is crossed by Mason's and Dixon's line, running thence by a straight line to the middle of Savage River where it empties into the Potomac River; thence by a straight line to the nearest point or boundary of the State of West Virginia; then with the said boundary to the Fairfax Stone shall be a new county, to be called the county of Garrett.

The boundaries defined by this Act consist of three straight lines on the west, north, and east, and the Potomac River on the south. It would, therefore, seem that no difficulties could arise regarding the boundaries of Garrett County and yet few counties within the State have had as much trouble with the determination of their boundary lines during a single generation as has fallen to Garrett County in its 30 years of existence. The difficulties have been almost entirely with the eastern and western boundaries, the northern and southern offering little occasion for controversy.

Soon after Garrett County was set off from Allegany an attempt was made to mark the line of separation. The County Surveyor of Allegany County ran a trial line by the compass from the mouth of Savage River

to the Mason and Dixon line, which was intersected on Little Savage Mountain 4307 feet west of Big Savage Mountain, the point called for in the Act erecting the county. This line was marked by blazed trees and has been known as the old or Chisolm line. Six years later John Harned, County Surveyor of Garrett County, using similar methods, attempted to determine the true location of the line. Unlike his predecessor, he started at the summit of Big Savage Mountain and ran southward hoping to intersect the Potomac River at the mouth of Savage River, but his line reached the Potomac near Westernport. Neither line conformed to the demands of the original Act. Accordingly an Act was passed by the General Assembly in 1898 authorizing the Governor to procure a surveyor to run the line defined by the original Act. In accordance with this enactment a new line was run by L. A. Bauer, acting for the Maryland Geological Survey, who was assisted in his work by surveyors representing Allegany and Garrett counties. The method employed was that of triangulation with all the refinements commanded by modern geodetic practice. The line finally marked was a straight line intersecting the two terminal points as required by the law.

Subsequent to the running of the Brown-Bauer line its validity was questioned. An Act was passed by the Legislature of 1906 to the effect that the inhabitants living west of the line should vote upon its acceptance or non-acceptance. Since the Act did not specify the places where the inhabitants of the disputed territory should vote when transferred the validity of the line is still in question. Thus the eastern boundary of Garrett County is neither a straight line as called for by the original Act nor a crooked line connecting the two terminal points as originally defined.

The western boundary of Garrett County is also in dispute due to the fact that it is at the same time the western boundary of Maryland. According to the original charter to Lord Baltimore granted in 1632 the western limit of Maryland was to be a line running due north from the first fountain of the Potomac. When the region was a wilderness and but little known it was supposed that the head of the North Branch of the Potomac was situated at the Fairfax Stone and lines have accordingly been drawn north from this point which have served as the western

boundary of the county. The line generally accepted has been that run by Lieut. Michler in 1859-60 in accordance with a joint resolution passed by the legislatures of Maryland and Virginia. Since that time attention has been called to the fact that a true north line drawn from this point would cross the Potomac River and exclude part of the territory lying on the left bank of the river which, according to the charter should be in Maryland. A more important discrepancy has also been shown, namely, that the Fairfax Stone does not represent the head of the North Branch of the Potomac, which really rises on the slopes of Backbone Mountain at a higher point and a mile or more to the westward of the present line. In 1897 as a preliminary to the final adjudication of this dispute by the United States Supreme Court lines were run northward from the Fairfax Stone and the "Potomac Stone" placed at the true head on Backbone Mountain. These lines were both true north lines, one practically coincident with the Michler line, the other approximately parallel to it but a mile and an eighth to the westward. These lines converge slightly to the north on account of the curvature of the earth, the distance between the two being about 42 feet less on the Mason and Dixon line than at their southern ends. Should the final decision be favorable to the Maryland contention the land between the two lines would be added to Garrett County.

The northern boundary of the county is formed by part of the famous Mason and Dixon line surveyed prior to the Revolutionary War. Messrs. Mason and Dixon were not able at the time to mark this line with permanent stone monuments and there have been occasional discussions as to the exact location of the line. The recent resurvey of the entire boundary between Maryland and Pennsylvania under the direction of commissioners representing these two States involved the accurate marking of the line with stone monuments placed a mile apart.

The southern boundary of the county lies on the right bank of the North Branch of the Potomac, whose waters are accordingly within the limits of Garrett County.

GARRETT COUNTY ELECTION DISTRICTS.

Prior to 1872 included in Allegany County.

See also under Allegany County 1798 Ch. 115; 1799 Ch. 48, 50; 1805 Ch. 97; 1814 Ch. 34; 1817 Ch. 15; 1821 Ch. 133; 1835 Ch. 44; 1836 Ch. 2, 44; 1837 Ch. 183; 1841 Ch. 82; 1848 Ch. 396; 1849 Ch. 4, 282, 394, 463; 1852 Ch. 218; 1853 Ch. 289; 1856 Ch. 156, 221; 1860 Ch. 167, 310; 1862 Ch. 4; 1872 Ch. 79.

1872 Ch. 212. Separates Garrett County with the following boundary:

"All that part of Allegany county lying south and west of a line beginning at the summit of Big Back Bone or Savage Mountain where that mountain is crossed by Mason's and Dixon's line, and running thence by a straight line to the middle of Savage River where it empties into the Potomac River; thence by a straight line to the nearest point or boundary of the State of West Virginia; then with the said boundary to the Fairfax Stone shall be a new county to be called the county of Garrett."

1874 Ch. 307. Creating Garrett County as a part of the sixth Congressional district which shall be composed of Allegany County, Garrett County, Washington County, Frederick County, and Montgomery County.

1874 Ch. 369. An act to redistrict and renumber the election districts in Garrett County.

Sec. 1. That the election district heretofore known as district No. 1 in Allegany, shall be designated and known as election district No. 1 in Garrett County.

Sec. 2. That the election district heretofore known as district No. 2 in Allegany County shall be designated and known as election district No. 2 in Garrett County.

Sec. 3. That the election district heretofore known as district No. 3 in Allegany County shall be designated and known as election district No. 3 in Garrett County.

Sec. 4. That those portions of election district designated as districts 4 and 16 in Allegany County now embraced within the lines of Garrett County shall constitute a new election district which shall be designated and known as election district No. 4.

1876 Ch. 7. Changes line between 2d and 5th election districts to run as follows:

"Beginning at or near the summit of Winding Ridge, where said ridge is crossed by Mason's and Dixon's Line, then running with the summit of said ridge to Bear Creek, there intersecting or joining the present dividing line of said election districts, two and five, thence with the present dividing line as now located.

1876 Ch. 51. Changes the dividing line between the 3d and 5th election district to run as follows:

"Beginning at the Morgantown road where said road intersects the National Road, then running a south-east course to a point on the road known as the Samuel Engle Mill road, where said road crosses the top of Negro Mountain, and intersecting the present dividing line between election districts three and five, thence with the present dividing line as located."

1880 Ch. 309. Changes portion of line between 3d and 5th election districts to run as follows:

"Beginning at the top of Negro Mountain where the road known as the Samuel Engle Mill road crosses said mountain, and running thence with the said road to the Westerman bridge, over the Cashlman river, thence with the said river to the point where it intersects the dividing line between districts number three and number one."

1882 Ch. 89. Changes a portion of the line between the 5th and 6th election districts to run as follows:

"Beginning at the head of the north fork of Casselmans river, in a straight line, to Lynns Sugar Camp, and from thence to the top of Negro mountain, intersecting the Grantsville and Oakland road, and from thence to present district line, near the west place."

1882 Ch. 143. Erects two new election districts, Nos. 10 and 11, out of the 1st, 7th, and 8th election districts and changes the line between the 3d and 4th. The bounds are as follows:

"Beginning at the burnt school house on Hooppole Ridge, in district number seven, and running with Broad Foard Run as it now does to its mouth, intersecting with the Ryans Glade road, thence with said Ryans Glade road to the M. E. Church in Ryans Glade, in district number eight, from thence along the Altamont road to John Davis' saw mill, on a stream known as Laurel Run, and with said run to the North Branch of the Potomac River, thence with said North Branch to Kitzmillersville, and from thence with what is known as Hamill's line to the beginning . . . . shall be known and designated as district number ten."

"That the present dividing line between the third and fourth election districts of Garrett county be changed so as to run as follows: Beginning at the foot of Savage Mountain where the two county roads intersect, and running down said mountain to the head waters of Mill Run, then with said run to the dividing line between Allegany and Garrett counties, thence with said dividing line to district number nine, thence with said line to or near John Wilheim's at Little Savage, thence changing the dividing

lines of numbers three and four to run as follows: Beginning at the bridge across Little Savage near John Wilhelm's and running with Barton and Lonaconing road and running with said road to Mrs. Hanson Brown's, on Pea Ridge, thence with said road down and cross Pea Ridge to Henry Broadwater's Jr., at the head of Harton Hollow, from thence across to William W. Broadwater's, thence across to the head waters of Bear Pen Run, thence with said run to Savage River, thence with said river to the old ford, from thence across said river running with the public road to the place of beginning . . . . shall be known as district number eleven."

1884 Ch. 325. Changes a portion of the line between the 1st and 10th election districts to run as follows:

"Beginning as originally at Kitzmillersville on the north branch of the Potomac river, and running thence with the county road and lines now located to Wilson's store on the Baltimore and Ohio Railroad; thence leaving original line and running with and following the old road to the "Ingman Farm," then with road past little England school house to Deep creek bridge, there intersecting the original dividing line."

"That said part of said first election district hereby made a part of said tenth election district, shall be included in and constitute a part of the tenth election district."

1886 Ch. 208. Additional election district, No. 12, established from the 1st and 10th election districts with the following bounds:

"Beginning at North Branch of Potomac river, at the mouth of Lost Land run, running north with said run to the top of Back Bone mountain; thence with said mountain east to Bloomington road; thence with said road east to Folly run; thence along said run south to its mouth at beginning." Repealed by Acts of 1888 Ch. 4.

1886 Ch. 329. Changes a portion of the line between 5th and 6th election districts.

1888 Ch. 4. Repeals Acts of 1886 Ch. 208.

1890 Ch. 537. Additional election district, No. 12 or Bittinger, erected with the following bounds:

"Beginning at the ridge road where it intersects the meadow mountain road at Mary Otto's; then with ridge road by way of Yommer's mill to the Grantsville road at Benedict Beachey's; then to the top of Negro mountain by Rushe's mill, and John Spikers former place; then with the top of said mountain to the county road leading from John Harman's to the town of Accident; then with said road to upper end of John Harman's farm; then to the forks of the Oakland and Swanton road on the east side

of the mountain by way of Jeremiah Durst's; then to head of north branch of middle fork at Buck Mason's; then with said north fork to the mouth of Black Hawk, at Stemple's mill seat; then to mouth of Monroe's run by way of Ohaver's mill; then to James Resh's in back woods; then to Horse pond run by way of Ashford Warnick's then with said run to the place of beginning at Mary Otto's."

1892 Ch. 336. Changes a portion of the line between the 3d and 12th election district to run as follows:

"Beginning at the residence of James Madison Durst, then running in a straight line to the top of Meadow Mountain, then with said mountain to James Ross' residence, then by direct line to Charles O. Warnick's residence, thence by way of Jacob Hoovers to county road near Benedict Beachy's farm."

1894 Ch. 600. 1st and 10th election districts divided so as to make two voting precincts in the first election district and one voting precinct in the tenth district.

1896 Ch. 394. Divides the 7th election district into two precincts as follows:

"The first precinct shall be the territory within the following outlines to wit: All that part of said election district number seven as now laid out and established, east of the Hooppole road and on the east side of Third street, in the town of Oakland and the Aurora road. The second precinct shall be the territory of said district, as now laid out and established, on the west side of Third street, in the town of Oakland and the Aurora road."

1898 Ch. 4. Additional election district No. 14 erected from the 7th election district with the following bounds:

"all that part of district number seven as now laid out and established, lying east of the Hooppole road; Third street in the town of Oakland and Aurora road shall be known and designated as district number seven; and all that part lying west of Hooppole road; Third street in the town of Oakland and the Aurora road, shall be known and designated as district number fourteen."

1898 Ch. 36. Additional election district, No. 13, erected from portions of the 10th and 1st election district with the following bounds:

"Beginning at the mouth of Lost Land Run, and running with the northeast branch of said run to the Oakland and Bloomington road on the top of Backbone Mountain; thence, with said road along the top of said mountain, east, to what is known as the "Backbone Farm," above Swanton; thence, following the Mount Zion road, south, to the mouth of "Three Fork Run," at Chaffee; thence, with the Potomac River to the beginning."

1898 Ch. 304. Provides for running of a definite boundary line between Garrett and Allegany counties.

1900 Ch. 35. Changes line of 13th election district to run as follows:

"Beginning for the same at the mouth of Three Forks Run at Chaffee, where it empties into the Potomac River, and running thence with said run in a westerly direction up the south prong of said run, where the Mud Bridge crosses said branch on the Wilson and Kitzmiller County Road, and thence with said road to the top of Back Bone Mountain to intersect the second line of said district, as designated and set forth under the Act of eighteen hundred and ninety-eight, Chapter thirty-six, and thence with the lines, as set forth in the aforesaid Act of Assembly to the place of beginning."

1906 Ch. 730. An Act to provide for the definite and final establishment of the boundary line between Allegany and Garrett Counties, in order to bring under the assessment law certain untaxed lands in said counties.

HARFORD COUNTY.

The history of Harford County, so far as the boundaries are concerned, has been a very simple matter, few counties in the State having had as little change in their territorial limits. This is doubtless due to the fact of its situation, which permits the use of geographic features of well defined character for the boundaries. Settlements of a temporary or permanent character in what is now Harford County probably date back to the days of William Claiborne and his partners when they erected a trading post with the Indians on the island opposite Havre de Grace in 1627-29. One of the earliest permanent settlements was that of Col. Utie on Spesutie Island, which was made about the time of the treaty with the Susquehanna Indians, concluded in the year 1652. Soon after a small but thriving settlement sprung up on the Bush River. It was here that the original Baltimore town, which became for a time the county seat of Baltimore County, was situated though nothing but a few remnants of masonry mark its former site. The occupation of the shores along the estuaries of the Gunpowder and Bush rivers as well as the banks of the Chesapeake, took place rapidly and land was patented up Winter's and Bynum runs prior to 1700. By 1750 the southern part of the county was in private hands. When the county was established in

1773 the lands had been patented to the Pennsylvania line, although most of the settlements were still along the necks of the tidewater areas or extending along the streams and routes of travel across the Piedmont. Of the latter at this time there was the main road passing from Baltimore through Joppa to Elkton and branch roads from Abingdon to Stafford, Conowingo and Pennsylvania. There were numerous other routes of less importance branching off from the post road, such as that leading to Jarrettsville and Belair. About this time an east and west road through the northern part of the county was established.

According to the Acts of Assembly erecting Harford County it was ordered

> That after the second day of March next all that part of Baltimore county which is included within the bounds following, to wit: Beginning at the mouth of the little falls of the Gunpowder river, and running with the said falls to the fountain head, and from thence north to the temporary line of this province, and thence with the temporary line to Susquehanna river, thence with Susquehanna to Chesapeake bay, and thence with said bay, including Spesutie and Pool's islands, to the mouth of Gunpowder river to the beginning aforesaid shall be and is hereby erected into a new county, by the name of Harford county.

These are the limits of Harford County to-day with the exception of the northern boundary, which now follows the Mason and Dixon line and not the "temporary line" called for by the original Act. The use of this term in this place is of interest. The temporary line had been run as an *ex parte* line by the Pennsylvania commissioners in 1739. This line was to serve as a temporary boundary until the Penns and the Baltimores could come to a settlement regarding their controversy and have a permanent boundary marked. When Harford County was erected such a settlement had been reached and Messrs. Mason and Dixon had spent several years in this county surveying and marking the permanent line as it stands to-day. Their work was completed and they had returned to Europe five years prior to the erection of Harford County. It would, therefore, seem that the legislators had overlooked this fact for they could not have been ignorant of it after all the controversy, bitter feelings, and large amount of actual work involved in the establishment of the Mason and Dixon line. The fact that the tem-

porary line was only a short distance north of the Mason and Dixon line as finally established may have led to the inadvertent use of the term which had been a familiar, popular phrase to indicate the State boundary for more than a generation.

HARFORD COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 5 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 5 election districts.

1816 Ch. 36. Polling place of 1st election district changed to Abingdon.

1821 Ch. 214. Polling place of the 2d election district changed to Hall's Cross Road.

1822 Ch. 51. Polling place of the 4th election district changed to Samuel Marshall's new house.

1826 Ch. 41. Line between Hall's Cross Roads and Belle Air districts changed.

"Beginning at the point where the new road from Rock Run Bridge intersects the original line, thence running with the said new road to Quarry Run, thence down said run until it again intersects the original district line at Coxe's mill, and from thence with the original line to the place of beginning" . . . . annexed to Belle Air district.

1830 Ch. 26. Lines changed between the 2d, 3d, and 5th election districts so that

"that part of Harford County which lies between Deer Creek and the road that leads on the southern side of said creek, from William Willson's mill-dam by Joshua Husband's tan-yard to Priestford Bridge shall henceforth cease to be included in the second and third election districts, and the same is hereby declared to be included in and made part of the fifth election district in said county."

1842 Ch. 139. Erects Havre de Grace (defined by 1839 Ch. 267 and 1840 Ch. 64) as a new or 6th election district.

1876 Ch. 154. Calls for division into election precincts, as required.

1884 Ch. 20. Divides 1st election district into two election precincts.

"That the county commissioners of Harford county be and they are hereby authorized and directed to divide and lay out the first election district of Harford county, commonly called Abingdon district, into two election precincts, in such manner as in their judgement the public may require . . . . "

1898 Ch. 201. Authorizes supervisors to divide election districts into election precincts.

1906 Ch. 547. Redefines Baltimore-Harford County line. See Baltimore County.

HOWARD COUNTY.

The existence of Howard County as a distinct political unit dates from the Convention of 1850 although its outline is defined by the Acts of 1838, Chapter 22, which separated Howard District as a distinct part of Anne Arundel County. According to this Act the boundaries were to be as follows:

"Beginning . . . . at the intersection of the west shore of Deep Run with the southern shore of the Patapsco River, at or near Ellicott's furnace, and running southerly with said Deep Run, until it reaches the Baltimore and Washington Rail Road [now the Washington Branch of the Baltimore and Ohio Railroad]; and thence with the said rail road and including the same until it reaches the southwestern line of Anne Arundel county on the big Patuxent River" and thence with the said river, and the lines of said county until it intersects the northwestern point of said county, and running thence with the lines of Carroll and Baltimore counties to the place of beginning.

The territory now included within Howard County was a part of Baltimore County from 1659 to 1726. During the interval between the erection of Anne Arundel and Baltimore counties the territory was under the jurisdiction of the former. Subsequent to 1838 the relations with Anne Arundel County were rather loose. The progress of settlement of the region was upward along the valleys of the Patapsco and Patuxent rivers and more slowly upon the divides between, the frontier line being a crescent-like curve which moved slowly to the northwest from the original settlement along the Bay. During the interval from 1659 to some time later than 1727 the inhabitants along the valley of the Patapsco and above Warfield's Ridge, the beginning of the Piedmont, were residents of Baltimore County even though their homes and lands were subsequently in Anne Arundel. By an Act passed July 25, 1726, the land lying on the south side of the Patapsco River was taken from Baltimore County according to the following bounds:

"From the Head thereof, and from thence, bounding on the *south* side of the main Falls, being the Southernmost great Branch of the said River, and running as the said Branch runs, to the first main Fork of the said Falls."

The relative geographic positions of the heads of the Patapsco and Patuxent [Snowden] rivers are such that no line run due north from the head of the latter would intersect the former. The contemporaneous opinion in 1726 believed this to be possible, the idea obtaining that the

Patuxent had a more southerly course above Laurel than it has. It was clearly intended by the law that the major part of what is now Howard County should have been retained in Baltimore County. This instance is a good illustration of the way in which boundaries changed with increasing knowledge without any change in law. As information accumulated regarding the little known wooded courses of the Patuxent and Patapsco it became evident that each river headed farther north and west than had been supposed and that the "north line" must be moved farther and farther west to intersect the head of Snowden River. This movement westward continued until all of the territory between the two rivers was included in Anne Arundel County where it remained until the action of the Constitutional Convention of 1850 made Howard District, as defined in 1838, Howard County. According to the law of 1726 the jurisdiction and control of the Patapsco River is with Baltimore and Carroll counties since the south side of the river is definitely specified as the boundary.

Since the erection of Howard County only two counties, Wicomico and Garrett, have been erected within the State and each of these is separated at considerable distance from Howard County so that the latter has received no modification of its territory since the time of its erection.

HOWARD COUNTY ELECTION DISTRICTS.

Included in Anne Arundel County until 1850. See 1820 Ch. 168, 1822 Ch. 116, 1834 Ch. 186.

1838 Ch. 22. Howard District laid off as a municipal district from Anne Arundel County.

1841 Ch. 13. Polling place of 7th election district established at Cooksville.

1843 Ch. 195. Commissioners appointed to lay off county into five election districts.

1844 Ch. 69. Polling place for 3rd election district at Israel McKenzie's house. Divisional line between the said third and fourth election districts of said Howard District be and the same is hereby established as follows, to wit: From the entrance of General Hood's lane on the Frederick turnpike road, with and bounding on the road leading to Hobb's mill to the south termination of the lane between Perry G. Hobb's and Robert Hobbs, thence with a straight line to William Wesley Scrivnor's house, leaving him in the fourth district, and thence with a straight line to John Elder's, leaving him in the third district.

1860 Ch. 15. Changing and defining bounds of election district No. 1:

"Beginning at a point where the old Annapolis road crosses the Columbia turnpike road, and following the said old Annapolis road until it reaches a point at or near George Atocket's house; then by a road leading from the said old Annapolis road through the lands of William J. Timanus and Ashbury Fisher, until it intersects the county road from Hillen to Elk Ridge Landing, and then following the lines of said election district as now established, to the place of beginning."

1868 Ch. 388. Sixth election district erected.

"Beginning at a line at Jessop's Cut, on the Washington Branch of the Baltimore and Ohio Railroad, and running from thence, and binding on the old Annapolis and Elk Ridge road, which passes by the present election house of the first Election District aforesaid, until it intersects the Columbia Turnpike, thence running with and bounding on the said Columbia Turnpike until it intersects the division line between Montgomery and Howard Counties at the Patuxent river, thence bounding on said river until it intersects the Washington Branch of the Baltimore and Ohio Railroad, and thence bounding on said road to Jessop's Cut at place of beginning."

KENT COUNTY.

Prior to the settlement of St. Mary's City by the Maryland colonists but subsequent to the granting of "Cresentia" to Lord Baltimore, Charles I granted (May 16, 1631) a license under the Privy seal of Scotland which permitted William Clayborne to trade along the shores of the Chesapeake. To obtain the advantages arising from this license the latter, who had explored the Chesapeake in previous years, established a trading post on Kent Island in 1631. When the Marylanders settled in 1634 on the Potomac they claimed authority over Kent Island and its little trading settlement, and the contest for possession and control led to numerous conflicts between the State authorities and the followers of William Clayborne even after the report and order of the Committee of Trade and Plantations, which on the 4th of April, 1638, decided in favor of Lord Baltimore's rights. To show the authority of Lord Baltimore over this territory a commission was issued to John Langford as a sheriff for the Isle of Kent on the 9th of February.

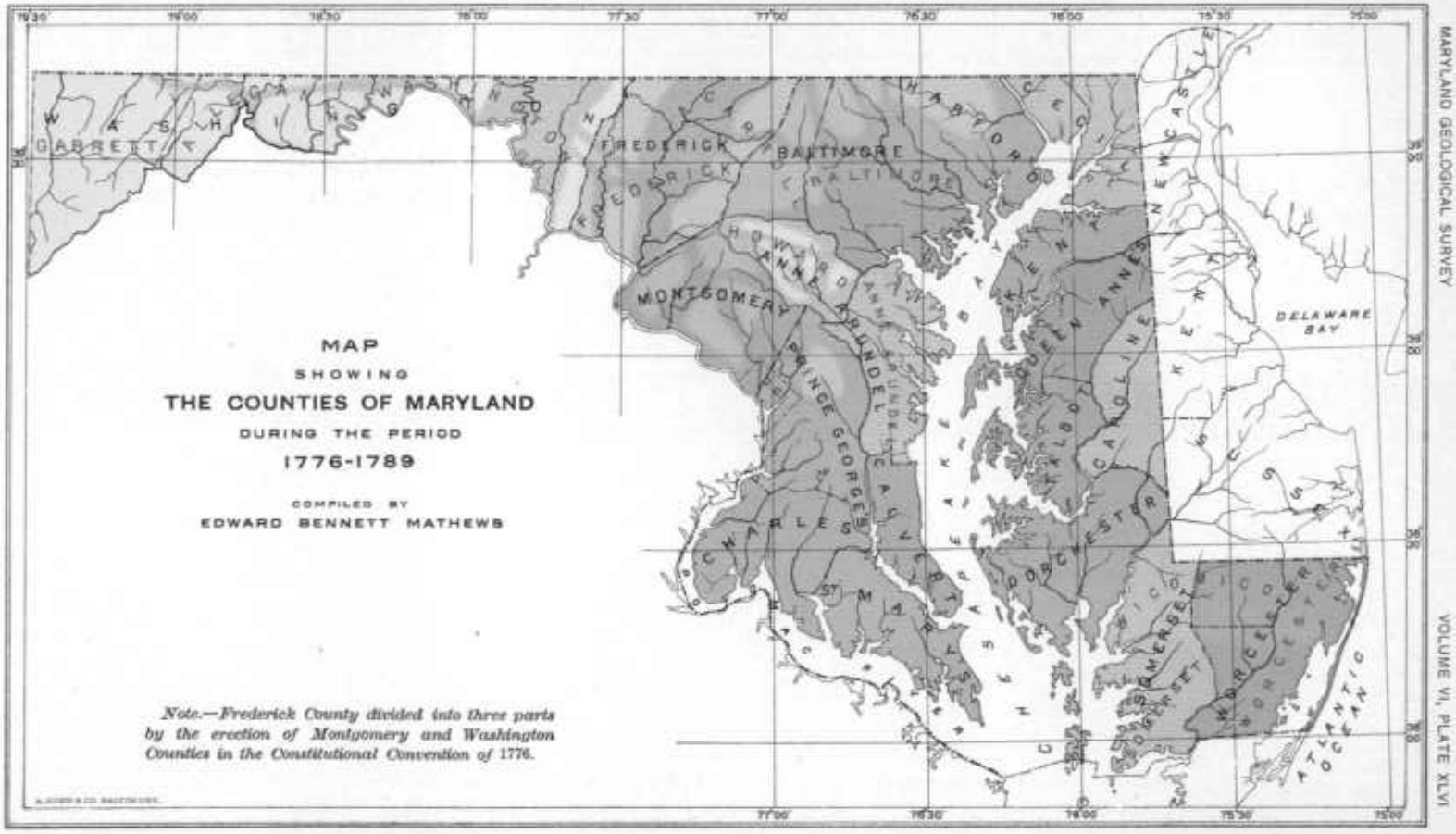
1637-8 (Md. Arch., 1:361; 3:62). The establishment of the shrievalty usually implies the existence of a county and this date has been adopted as the date of erection of Kent County. There is, however, among the Maryland archives (Md. Arch., 1:55) a copy of a law which was introduced in the Assembly on the 25th of the same month and subsequently engrossed on March 8, succeeding, which calls for the erection of the Isle of Kent into a hundred of St. Mary's County. The text of the law which, however, was never passed (Md. Arch., 1:39) runs as follows:

"Be it Enacted By the Lord Proprietary of this Province of and with the advice and approbation of the same that the Island commonly called the Isle of Kent shall be erected into a hundred & shall be within the County of St. Maries (untill another County shall be erected of the Eastern shoare and no longer) and shall be called by the name of Kent hundred. . . . . "

It is interesting to note from these records the indefiniteness of the county idea as held in Maryland at this time. Two years later, in October, 1640, the summons to the Assembly does not refer to the Isle of Kent as a hundred but the summons is addressed to its Commander (Md. Arch., 1:87). In the commission appointing Richard Thompson and William Luddington commissioners on the 2d of August, 1642 (Md. Arch., 3:105), the territory is spoken of as the "Isle and County of Kent." This is apparently the first definite calling of Kent County as such. At this date, also, a county court was established.

From its earliest recognition Kent County appears to have been analogous to St. Mary's County, the one representing the settlements on the Eastern Shore, the other on the Western. No changes were made upon the Western Shore until the erection of Anne Arundel County in 1650 and none on the Eastern Shore until the erection of Baltimore County in 1659. In neither instance were territorial limits assigned to the counties until the subsequent establishment of contiguous jurisdictions.

Prior to the establishment of Baltimore County in 1659 and Talbot County in 1662, the scattered inhabitants along the Eastern Shore of the Bay apparently transacted their business either at Kent Island or at St. Mary's City. With the erection of these new counties the jurisdiction of Kent appears to have been limited to that part of the Eastern Shore about Eastern Bay, while Talbot County exercised jurisdiction



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over the growing settlements about the mouth of the Choptank. No exact limits separating these two counties can be given as the order or Act by which Talbot was erected has not been found, the earliest reference to the same being the temporary appointment of Mr. Moyses Stagwell as sheriff of Talbot County February 18, 1661-2, upon which date there were also appointed county commissioners (Md. Arch., 1:425; 3:448). The only exception to this generalization that Eastern Bay was the dividing line appears to be with regard to Poplar Island, which was joined to Kent County according to the following enactment passed the 24th September, 1657 (Md. Arch., 1:361):

"It is Enacted and declared in the Name of his highness the Lord protector of England &c and by the Authority of this present Generall Assembly That the Island commonly called Poplers Island Lying near unto the Island of Kent be adjoyned unto the County of Kent, and from hence forth be of all persons so accounted, and taken to be . . . ."

Subsequently by proclamation,* dated June 21, 1671, "the northeast side of Chester as far as the bounds of Talbot county were formerly on that side" was added to Kent county. The first sharp statements of the boundary line between Talbot and Kent, occur in the Act passed May 22, 1695, which enacted

"That from and after the Twenty third day of April next [1696] after the end of this present Sessions of Assembly the Island of Kent shall be added to and made part of Talbott County and Deemed reputed and Taken as part thereof And That that part of Talbott County lying on the North side of Corsecia Creek running up the main Eastern Branch to the head thereof and then with a Course drawn East to the out side of this Province shall be the Southerly Bounds of the County of Kent and on the North by the County of Cecil any Law Statute or usage heretofore to the Contrary notwithstanding."

By this Act Kent Island, which had given the name to the county, was removed from its jurisdiction and the name Kent became limited to the territory which had subsequently been settled.

The northern boundary of Kent County was first determined by proclamation of Charles Calvert on the 6th of June, 1674, when it was decreed

"that from the mouth of the Susquehanough River and so downe the easterne side of Chesepeake Bay to Swan point and from thence to Hell point and so up Chester River to the head thereof"

* Kent County Land Rec., Lib. A, No. 1, p. 54.

should become Cecil County. On the 19th of the month a second proclamation was issued reciting the fact that upon further consideration it was thought best

"that so much of the Eastern side as was formerly added to Kent County doe still remaine and belong to the said county as afore."

This applies to the territory along the Bay shore chiefly south of Swan Point in the vicinity of Chester River, which had become settled ten or fifteen years earlier. There are no records to show just where the dividing line between Kent and Cecil counties was put at this time but the map of Augustine Herrman, supposed to have been finished in 1670 and copyrighted January 21, 1674-5, carries the name Cecil to a point near Church Hill. It would thus appear that the original intention had been to establish the lines given in the first proclamation. The settlements represented here are for the most part clustered about Swan Point and north on the Sassafras River, suggesting that the temporary line passed indefinitely northwesterly from the neighborhood of Chestertown to the mouth of the Sassafras. No records have been found indicating when the transfer referred to in the second proclamation had been made to Kent County. By 1706 the settlements had increased on the Eastern Shore and a general Act was passed April 19, 1706,

"dividing and regulating several counties on the eastern shore" (1706 Ch. 3).

According to this Act after the first of May, 1707, the boundaries of Kent County were to

"begin at the south point of Eastern neck, and from thence run up Chesapeake bay to Sassafras river, and up said river to the south end of long Horse bridge lying over the head of the said river, and from thence with a line drawn east and by south, to the exterior bounds of this province, and with the exterior bounds of this province until it intersect the line of Queen Anne's County, and with the said county down Chester river to Eastern neck, where it first begun, ... "

Although this boundary was defined prior to the settlement of the Delaware-Maryland boundary line, it very closely describes the boundaries of the present Kent County. At the time it was enacted the Proprietor and people of Maryland were actively resisting the claims of William

Penn and his followers to the Delaware watershed. The "Lower Counties" had, however, but recently separated themselves into a distinct political unit and were by no means inclined to allow Kent County to exercise authority over the disputed territory. The limits of the jurisdiction of Kent County were thus in reality not very different from those of to-day.

The eastern boundary was defined by the decree of the Lord High Chancellor of England in 1750 when he settled the limits between Maryland and the Delaware counties of Pennsylvania. This line was finally run and marked by Mason and Dixon about fifteen years later. It was described as a line drawn from the Middle Point of the Eastern Shore tangent to a circle of twelve miles radius drawn about New Castle, Delaware.

KENT COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 3 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 3 election districts.

1813 Ch. 157. Polling place of the 1st election district to be at a place selected by the judges.

1860 Ch. 21. Commissioners appointed to divide Kent County into 4 or 5 election districts as seems best.

1878 Ch. 220. Polling place of the 3d election district changed from "Worten Heights" or "Hanesville" to Smithville.

1884 Ch. 452. Establishes voting precincts in the 4th election district as follows:

"Beginning at the mouth of Radcliffe creek, and ruuning thence with said creek and the run or stream from the mill-pond of the Chestertown Straw Board Company, to where the said ruu or stream intersects the centre of the public road leading from Chestertown to Fairlee, at or near the said mills; thence by and with the aforesaid public road to Harrisburg to Fannell's branch, to school-house number four, to where the said road intersects the stream or run, which constitutes a part of the division line between the fourth and fifth election districts, and all that part of said Chestertown district number four, lying north and east of said division line as above indicated shall be known as "Precinct Number One" . . . . and all that part of the Chestertown district number four lying south and west of the aforesaid division line, shall be known as "Precinct Number Two."

1896 Ch. 289. Divides Kent County into 7 election districts bounded as follows:

"The first election district shall begin at the point on the boundary line between the States of Maryland and Delaware, where Kent county joins Queen Anne's county; and running thence by and with said State line northwardly to the line of Cecil county, then westerly with the division line between Cecil and Kent and with Sassafras river to Mill creek, then up mill creek to the head thereof and southerly to the public road leading from Lambson's to Chesterville, then with said public road through Chesterville and to Chester river at Crumpton, then up Chester river and with the division line between Kent and Queen Anne's counties to the beginning. The first election district is divided into two voting precincts, to be known as the Millington precinct, comprising all that part of the said first district which lies south of the Baltimore and Delaware Bay Railroad, with the voting place at Millington, and the Galena precinct, comprising all that part of the said district which lies north of the said Baltimore and Delaware Bay Railroad, with the voting place at Galena.

The second election district shall begin at Mill creek on Sassafras river, and running down Sassafras river to the public road at Betterton then with the said public road from Betterton to the intersection of said road with the public road from Coleman's to Lynch's, then with that public road to Lynch's and thence with the public road to Riley's mill on Morgan creek, then with Morgan creek to Chester river, then up Chester river to the public road at Crumpton, then with said public road to Chesterville and with the public road towards Lambson to the line of the first district, then with that line northerly to Mill creek, and with Mill creek to the beginning on Sassafras river, with the voting place at Kennedyville.

The third election district shall be as follows: Beginning at the public road at Betterton, on Sassafras river, and running down Sassafras river and down Chesapeake bay to the mouth of Worton creek; then up Worton creek to the public road at Buck Neck Landing; then with said public road to Militoto and with the public road towards Chestertown, until it intersects the public road from Eliason's to the Watson farm; then with that public road and the public road to Goose Hill to the mill stream; then with said mill stream to the public road at Riley's mill; then with the public road to and through Lynch's and with the public road through the Norris lands towards Barnard's wharf, as far as the public road near the mill at the head

of Stili Pond creek; then with that public road towards Still Pond and to the Chesapeake bay at Betterton, the beginning point, with the voting place at Worton.

The fourth election district shall begin in Chester river, and running up, by and with said creek to the pubiic road at Goose Hill; then with said puhlic road to the road leading to Worton Station; then with that road and the public road leading from Watson's to Eliason's and the public road towards Hanesville, and the public road from Eliason's to the public road from Fairlee to Chestertown; then with that public road towards Chestertown to the stream near the straw "Board Mill," then with said stream and Radcliff creek and Chester river to the beginning, with the voting place at Chestertown.

The fifth election district shall begin at the public road near Price's mill, the headwaters of Lankford bay, and running with said public road to Rees' corner and to Swan Creek bridge, and westerly to the Chesapeake bay, and down by and with said bay and with Chester river and the west fork of Lankford bay to the beginning, with the voting place at Rock Hall.

The sixth election district shall begin at Buck Neck Landing on Worton creek, and running with the public road towards Hanesville to Militoto; thence with the public road to the road from Fairlee to Chestertown; then with the public road leading from Aldridge gate to Lankford; then with the public road to Lankford; and with the public road from Lankford to Price's Milis; and to Rees' Corner and to Swan Creek bridge; and thence westerly to Chesapeake bay; and up and with said bay to Worton Creek; and up Worton Creek to the beginning, with the voting place at Fairlee.

The seventh election district shall begin at the mouth of Radcliff creek on Chester river, and run up said creek and stream to the public road from Chestertown to Fairlee; then with that public road to the public road from Aldridge gate to Lankford; then with that public road and the public road from Lankford to Price's Mill to the headwaters of the West York of Lankford bay, then down and with said bay and up Chester river to the beginning with the voting place at Pomona."

MONTGOMERY COUNTY.

Montgomery County has maintained with almost no variation the boundaries assigned to it at the time of its erection by the Constitutional Convention in 1776. Prior to that time its territory constituted the southeastern portion of Frederick County and had been settled to a greater or less extent along the valleys of the Potomac and Patuxent rivers and in the fertile upland in the vicinity of Sandy Spring. Nearly a century before its erection as a distinct county, settlements had been made in the vicinity of Georgetown along Rock Creek, and somewhat later in the neighborhood of Spencerville and along Sligo Creek.

According to the acts of the Convention of 1776 on the sixth of September of that year it was decided that

> Beginning at the east side of the mouth of Rock creek on Potomac river, and running with the said river to the mouth of Monocacy, then with a straight line to Par's Spring, from thence with the lines of the county to the beginning, shall be and is hereby erected into a new county by the name of Montgomery county.

The present lines were inherited, for the most part, from the earlier lines of Frederick County. It is, perhaps, of interest to recall in this connection the origin of some of the points along the present boundary and how they were originally chosen. Parrs Spring, as the head of the Patuxent River, had for many years been one of the prominent points in defining county boundaries. As early as 1654, when Calvert County was erected from a pre-existent Charles County the boundary line was said to extend to the head of Patuxent River, which was then the northerly bound of St. Mary's County. At that time the head of Patuxent River, however, was not known to be at Parrs Spring but was thought to exist in the vicinity of Laurel. The term was employed later in 1698 in defining the boundary line between Baltimore and Anne Arundel counties, although it is doubtful whether the legislators intended to have the line go north of Laurel. By 1748, when Frederick County was erected, it is probable that the source of the Patuxent was approximately, if not exactly, known. It was at this time also that the line now forming the southeastern boundary of Montgomery County was determined. This is the northern end of a straight line passing from the lower side of

the mouth of Rock Creek to the east side of Seth Hyatt's plantation and thence to Patuxent River. The southern end of the line from Takoma to the mouth was set aside by the erection of the District of Columbia in 1791, when this portion of the county was ceded to the Federal Government. One line which may be regarded as individual to the history of Montgomery County, that established at its erection, has remained unchanged to the present day.

MONTGOMERY COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 5 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 5 election districts.

1805 Ch. 83. Changes polling place of 4th election district to Coalsville.

1805 Ch. 97. Confirms Acts of 1805 Ch. 83.

1809 Ch. 110. Polling place of 1st election district to be selected by Commission.

1821 Ch. 223. Commission appointed to lay off the 5th election district and to select election places.

1833 Ch. 217. Changes line between 1st and 5th election districts to run as follows:

"Beginning at the mouth of Hawling's river, and running up the same to the mouth of Stoney Branch, thence up the southermost fork of said branch to the source thereof, near Centreville, and on a farm now belonging to William Birdsall, then with a straight line to the mouth of Beale's Branch, and then with a straight line to the ford of Rock creek, called and known by the name of Rickett's Ford."

1843 Ch. 27. Polling place of 4th election district to be at the Court House.

1868 Ch. 466. Commission appointed to run and mark the Prince George's County line.

1870 Ch. 471. Relates to the running of the Prince George's County line.

1872 Ch. 226. Authorizes additional payments on Prince George's county line.

1876 Ch. 143. Authorizes a referendum on dividing the county into 12 election districts with polling places defined by this Act. [Apparently not carried.]

1878 Ch. 22. Additional election district, No. 6, created with the following bounds:

"Beginning at the crossing of Little Seneca creek by the County road leading from Gaithersburg to Barnesville, and running down and with said Little Seneca creek until it empties into Great Seneca creek, then down and with said Great Seneca creek until it empties into the Potomac river,

then down and with said Potomac river to the mouth of Watt's branch, then up and with said Watt's branch to the mouth of Piney branch, then up and with said Piney branch until the same is crossed by the Public road in the direction of Darnestown, until the same intersects the road known as the Du Tirf Mill road, then with and up said road as it is described in the plat recorded in Liber J. G. H., number seven, folio six hundred and three of the Land records of said Montgomery county, until the same intersects the Galthersburg and Barnesville road in the direction of Barnesville to the place of beginning, to include Harris and Watkins islands in the Potomac river."

1878 Ch. 87. Additional election district, No. 7, created with the following bounds:

"Beginning on the Potomac river at the point where the dividing line between Montgomery county and the District of Columbia crosses, the same then running with said dividing line in a northeasterly direction until the same crosses near the residence of Hon. Montgomery Blair, then with said dividing line in a southeasterly direction until the same is crossed by the turnpike leading from Brookville to Washington city, then with said turnpike in a northerly direction until the same is crossed by the Metropolitan Branch of the Baltimore and Ohio Railroad, then with said railroad in a westerly direction until the same crosses the county road east of Rock creek and near Newport mills, then with said county road until it intersects the turnpike leading from Rockville to Georgetown, then with a straight line to the intersection of the Orendoff mill road with the old Georgetown road, near the residence of Isaac O. Rabbitt, then with said Orendoff mill road until the same is crossed by Thomas' run, then down and with said Thomas' run until the same empties into Cabin John creek, then down and with said Cabin John creek until the same empties into the Potomac river, then down and with the Potomac river to the place of beginning."

1878 Ch. 117. Additional election district, No. 8, created from portions of the 1st and 5th election districts.

"Beginning at Brown's bridge on the Patuxent river, and following the county road known as the limekiln road to its crossing of Ashton and Coalsville turnpike, then with the continuation of said limekiln road to Holland's Corner, then with the Norwood branch of the Union turnpike to the crossing at Holland's branch, then continuing with said limekiln road to Brookville and Washington turnpike, then with said pike to the Baltimore and Rockville road, thence with said Baltimore and Rockville road to the bridge crossing Rock creek, then following up and

with the eastern branch of Rock creek to the bridge crossing said creek at William E. Muncastee's mill, then with the county road leading to the village of Redland to where the said road crosses the western branch of Rock creek, at what was formerly known as Rickett's ford, then following up and with said western branch of Rock Creek to where it crosses the road leading from Rockville to Unity, near the farm of Walter M. Talbot, then following said road to its intersection with the road leading from Mechanicsville to Laytonville, near the residence of Fletcher R. Veitch, then following the road leading from Laytonville to Brookville to the crossing of the public road near the Catholic church and the village of Mount Zion, then with said public road to Hawling's river, near the residence of Thomas D. Gaither, then down and with Hawling's river to the Westminster road, near Allen Bowie Davis' mill, then with the said Westminster road to the intersection of the road leading to Triadelphia, north of the store of Frederick O. Gaither, then with said road to the bridge across the Patuxent river at the village of Triadelphia, then down and with said Patuxent river to Brown bridge, the place of beginning."

1880 Ch. 228. Additional election district, No. 10, erected with the following bounds:

"Beginning at the mouth of Cabin John creek, thence up and with said Cabin John creek to the mouth of Thomas' run, thence up and with said Thomas' run until the same is crossed by the Orendorff mill road, thence with a straight line to where Piney branch is crossed by the public road near the residence of Mrs. Upton West, thence down and with said Piney branch until it empties into the Potomac river, thence down and with said Potomac river to the place of beginning."

1880 Ch. 301. Additional election district, No. 9, erected from portions of the 1st, 2d, 4th, and 6th election districts.

"Beginning for the same at the cross roads in the village of Germantown, and running thence with the Neelsville road to the Georgetown and Frederick road, thence across said Georgetown and Frederick road to the road leading from the Neelsville Presbyterian Church to the old Baltimore road, thence with said road to its intersection with the old Baltimore road, thence with said old Baltimore road to Seneca bridge, thence with the road leading from Seneca bridge to Rockville, via the village of Redland to where the said road is crossed by Mill branch, near the farm of William O. Householder, thence with a straight line to the intersection of the Georgetown and Frederick road, with what is known as the Gaither

road between the residences of George M. Grapp and Lemuel Clements, thence with said Gaither road to its intersection with the Rockville and Darnestown road, near the residence of Thomas W. Stonestreet, thence with said Rockville and Darnestown road, in the direction of Darnestown, to its intersection with what is known as the Quince Orchard road near the Quince Orchard school house, thence with said Quince Orchard road to its intersection with the Gaithersburg and Barnesville road, near the St. Rose's Catholic Church, thence with said Gaithersburg and Barnesville road, in the direction of Barnesville, to the place of beginning."

1882 Ch. 32. Changes the dividing line between the 3rd and 6th election districts to run as follows:

"Beginning at the mouth of Great Seneca creek; thence up and with said Great Seneca creek to the mouth of Dry Seneca creek; thence up and with said Dry Seneca creek to the mouth of Half-Way branch; thence up and with said Half-Way branch until the same is crossed by the line dividing the farms of Joseph Dyson and Benoni Allnutt; thence with a straight line, in a southwest course, through the lands of Benoni Allnutt, to the east branch of Beaver Dam creek; thence down and with said east branch of Beaver Dam creek to the Potomac river; thence down and with the said Potomac river to the place of beginning, and now embraced within the limits of (Medley's) the third election district of Montgomery county shall hereafter be a part and parcel of (Darnestown) the sixth election district of said county, and all people," etc.

1882 Ch. 93. Changes the dividing line between the 6th and 9th election districts to run as follows:

"Beginning on the Gaithersburg and Barnesville road, where the same is crossed by Gunners branch, thence down and with said Gunners branch to Great Seneca creek, thence down and with said Great Seneca creek to the mouth of Long Draught branch, thence up and with said branch until the same is crossed by the road leading from the Quince Orchard school house to the Galthersburg and Barnesville road, thence with said road leading from said Quince Orchard school house to said Gaithersburg and Barnesville road to its intersection with said Gaithersburg and Barnesville road near the St. Rose's Catholic church, thence with said Gaithersburg and Barnesville road in the direction of Barnesville to the place of beginning."

1882 Ch. 168. Additional election district, No. 11, erected and a portion of the 3d election district added to the 2d.

"Beginning for the same where the Gaithersburg and Barnesville road is crossed by Little Seneca creek, thence

with said Galthersburg and Barnesville road in the direction of Barnesville, and through the village of Boyds to where the said Galthersburg and Barnesville road is intersected by the new cut road on the north side said Galthersburg and Barnesville road, about a half mile from said village of Boyds, and at the wheelwright shop of Hiram Stottiemyer; thence with said new cut road across the Baltimore road to where the said new cut road intersects the Barnesville and Clarksburg road at the residence of Jerome Thompson; thence with said Barnesville and Clarksburg road for about a quarter of a mile in the direction of Barnesville to where said Barnesville and Clarksburg road is intersected by the road leading therefrom to Hyattstown; thence with said road leading to Hyattstown to where the same is crossed by the branch near the residence of John W. Nicholson; thence down and with said branch to where the same is crossed by the dividing line in a westwardly direction to the Potomac river; thence down and with said Potomac river to the mouth of Little Monocacy creek; thence up and with said Little Monocacy creek until the same is crossed by the mouth of Monocacy and Dawsonville road through Beallsville, in the direction of Dawsonville, to where said mouth of Monocacy and Dawsonville road is intersected by the road leading therefrom to Boyds (known as the Richard T. White road), and near the residence of the late Dr. Nicholas Brewer; thence with said last mentioned road until the same is crossed by the spring branch north of the residence of the late Robert Dade; thence down and with said spring branch to Buck Lodge branch to Little Seneca creek; thence up and with said Little Seneca creek to the place of beginning."

1884 Ch. 104. Changes name of Mechanicsville District, No. 8, to Olney district, No. 8.

1884 Ch. 108. Changes name of Great Falls district, No. 10, to Potomac district, No. 10.

1884 Ch. 125. Additional election district, No. 12, erected with the following bounds:

"Beginning for the same at the head of Patuxent river, and running thence down and with said river to where the same is crossed by the public road at John J. Mullinix' grist and saw mill; thence with said public road in a westwardly direction until the same is intersected by the road leading from Damascus to Laytonsville, near the residence of Aden M. Bowman; thence with a straight line to the spring, the head waters of the Great Seneca creek, near the residence of Mareen Duvall; thence down and with Great Seneca creek to its confluence with Wild-Cat

branch; thence up and with Wild-Cat branch until the same is crossed by the public road leading from Washington D. Waters' grist and saw mill to Cedar Grove postoffice; thence with said last-mentioned road to Cedar Grove postoffice; thence with the road leading from Cedar Grove postoffice to Damascus until said road is crossed by the new-cut road at Fillmore N. Poole's blacksmith shop; thence with said new-cut road through the lands of William Williams and others until said new-cut road is intersected by the road leading from Clarksburg to Damascus, thence with said road leading from Clarksburg to Damascus, in the direction of Damascus, until the same is intersected by the road leading from Luther N. King's store to Luther G. King's distillery; thence with said last-mentioned road to said Luther G. King's distillery; thence with the road leading from Luther G. King's distillery to the Hyattstown and Damascus road, near John M. King's gate; thence with said Hyattstown and Damascus road in the direction of Hyattstown, until the same is intersected by the public road leading to Price's distillery, in Frederick county; thence with said last-mentioned road to the Frederick and Montgomery county line, thence with said line to the place of beginning."

1886 Ch. 386. Election district, No. 13, erected and changes the name of the 5th election district from Berry's election district to Colesville district No. 5.

"Beginning for the same at the county road known as the "Lime Kiln" road, where the same is crossed by the Little Northwest Brauch; thence with said Lime Kiln road to its intersection with the Brookeville and Washington Turnpike; thence with said turnpike to the Baltimore and Rockville road to the bridge crossing Rock creek; thence down and with said Rock creek until the same is crossed by the District of Columbia and Montgomery county dividing line; thence with said dividing line in a northeasterly direction until the same corners near the residence of Mrs. Mary C. Blair; thence with the said dividing line in a southeasterly direction until the same is intersected by the dividing line between the counties of Prince George's and Montgomery; thence with said last mentioned dividing line until the same is crossed by the Northwest Branch; thence up and with said Northwest Branch to its confluence with the Little Northwest Branch; thence up and with the Little Northwest Branch to the place of beginning."

Name of Berry's election district changed to Colesville Number five.

1898 Ch. 40. Changes the name of Cracklin district, number one, to Laytonsville district, number one.

1904 Ch. 260. Changes dividing line between 2d precinct of 4th election district and the 7th election district to run as follows:

"Beginning at the intersection of the road leading from Garrett Park with the turnpike leading from Rockville to Bethesda; thence with a straight line to the intersection of the Orendorf Mill road with the Old Georgetown road, near Bean postoffice; thence with the Old Georgetown road in the direction of Bethesda, to its intersection with the road petitioned for by F. W. Bargerter and others, as per plat recorded in Plat Book No. 1, Plat No. 51, of record in the Clerk's office of the Circuit Court for Montgomery County; thence with said last mentioned road to its intersection with the turnpike in the direction of Rockville to the place of beginning, and now embraced within the Seventh Election District of Montgomery County, shall hereafter be a part and parcel of the second precinct of the Fourth Election District of said county. . . . . "

PRINCE GEORGE'S COUNTY.

The earliest settlements in Prince George's County were made upon the Patuxent side of the county in the vicinity of Mataponi Creek, from which point to Swansons Creek stretched a more or less scattered plantation close to the river banks. The earliest records show that the inhabitants along the river were regarded as living in St. Mary's County. In 1650, when old Charles County was erected, the south shore of the Patuxent was included in it and such settlements as were made within the present limits of Prince George's County were under the immediate control of Robert Brooke, Commander of old Charles County. In 1654 old Charles County was abolished and the territory on both sides of the Patuxent was erected into Calvert County. Somewhat later Calvert County was limited to the territory on the eastern side of the Patuxent and Prince George's County became part of the new Charles County which was erected in 1658. This was the condition of affairs up to the general act of 1695 when Prince George's County was erected. It was then enacted

"that the Land from the upper side of Mattawoman and Swansons Creeks & Branches Extending upward bounded by potomock on the West and Patuxent River on the East shall be and is hereby Constituted founded & Incorporated into a County of this Province and shall be Denominated Called and known by the name of Prince George's County and shall from and after

the said Twenty third day of Aprill next Ensueing being St. George's Day as aforesaid have and enjoy all other Rights benefitts and priviledges Equall with the other Countys of this Province such as sending Burgesses to Assemblys haveing County Courts Sherriffe Justices and other Officers and Ministers requisite & necessary and as used in other Countys of this Province."

At the time Prince George's County was erected there were settlements along the Patuxent nearly up to Laurel but there were few if any settlements on the Potomac side in the vicinity of Piscataway Creek on account of the presence of the friendly Indians, who had reserved to themselves this territory for a permanent abode. There were, however, settlements or small outposts at the mouth of Rock Creek within the present limits of Georgetown and along the Anacostia River in the vicinity of Hyattsville and Bladensburg, and as far up the Northwest Branch as the present Montgomery line.

Within the next two decades these settlements had extended beyond the present limits of Prince George's County although they were at that time within its limits. During these same years the whites began to settle on the territory formerly claimed by the Indians, who ultimately left the Europeans in undisputed possession.

The first curtailment of territory assigned Prince George's County occurred in 1748 when the county was reduced to its present limits, including the District of Columbia, by Chapters 14 and 15 of the Laws of Maryland for 1748. According to the first act which was stimulated by a petition by some of the freeholders in Prince George's County who found it inconvenient to attend the County Court at Upper Marlboro, it was enacted

"That from and after the Tenth Day of *December*, in the year One thousand seven hundred and forty eight the Land lying at present in *Prince George's* County, and contained within the bounds following, viz., by a Line drawn from *Mattawoman* run, in the Road commonly called the *Rolling Road*, that leads from the late dwelling Plantation of Mr. *Edward Neale*, through the lower Part of Mr. *Peter Dent's* Dwelling Plantation, until it strikes Patowmack River, at or near the bounded Tree of a Tract of Land whereon *John Beall*, junior now lives (standing on the Bank of the aforesaid River, at the lower end of the aforesaid *Beall's* Plantation) then with the River to the Mouth of *Mattawoman* Creek, shall be and for ever hereafter deemed as a Part of *Charles* County. . . . "

The second act passed in 1748 related to the erection of Frederick County from all the less settled portions of Prince George's County. According to this law it was enacted

"that all the land lying to the westward of a line beginning at the lower side of the mouth of Rock Creek and thence by a straight line joining to the east side of Seth Hyatts plantation, to the Patuxent River should be taken from Prince George's County and made into a new jurisdiction to be called Frederick County."

A portion of this line still forms the boundary between Montgomery and Prince George's counties.

The final change in the boundaries of Prince George's County was made in 1791 when the District of Columbia was ceded to the National Government from portions of Montgomery and Prince George's counties.

PRINCE GEORGE'S COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 5 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 5 election districts.

1816 Ch. 26. County divided into 6 separate districts, the additional district to be laid off from portions of the 2d, 3d, and 5th election districts.

1817 Ch. 9. Confirms Acts of 1816 Ch. 26.

1817 Ch. 30. Commission appointed to lay out the new district and to report to the County Clerk.

1836 Ch. 114. Commission appointed to select a new polling place in 6th election district and to report to Clerk of Court before July 15, 1836.

1843 Ch. 255. Commission appointed to lay off a new election district, No. 7, out of the 3d district and to report to County Clerk.

1847 Ch. 8. Changes line between Bladensburg and Spalding's election districts to run as follows:

"Beginning at a place called Jones' fork, which branches off from the stage road leading from Washington City, District Columbia, to Upper Marlboro', and from the said fork with the public road leading to Thomas B. Crawford's mill, and thence with a private road from said mill to a gate on the Springfield estate, formerly owned by Elisha Berry, standing near the public road leading to the forest of Prince George's, and from said gate to the stage road leading from Washington city to Upper Marlboro." (Commissioners appointed.)

1847 Ch. 117. Supplemental act to Acts of 1843 Ch. 255 changing the polling place of the 7th election district to Queen Anne's.

1849 Ch. 123. Changes the line between the 1st and 7th election districts to run as follows:

"Beginning at the mouth of a stream called the Horsepen branch, on the west bank of the big Patuxent river, and thence westerly with said stream to the farm or plantation of Mrs. Walter Bowie, and thence southerdly in a direct line to a place known as Hickory Hill, on the road between the farms or plantations of Mrs. Walter Bowie and Richard W. Isaacs, and thence with said road to its point of junction with the main or public road within and on the farm or plantation of Dr. Thomas McGill near the Chapel, and thence westerly with said road to its point of junction with the public or main road, within and on the farm or plantation of Mrs. Mary McGruder, and now the boundary line, in part, between said districts."

1849 Ch. 226. Additional election district, No. 8, erected from the 4th district to be called Aquasco, with the following bounds:

"Beginning at the county wharf at Magruder's ferry, and running with the public road leading from thence to the Brick Church of St. Paul's Parish, from thence with the public road that leads to Washington, via T. B. until it shall intersect the line dividing Nottingham, or the fourth election district of the county, from the Piscataway, or the fifth election district of said county, then with the said dividing line of said district to the Charles county line and thence with the said county line and the Patuxent river, to the place of beginning."

1854 Ch. 221. Polling place of the 6th election district changed to Jesse Ridgeway's house.

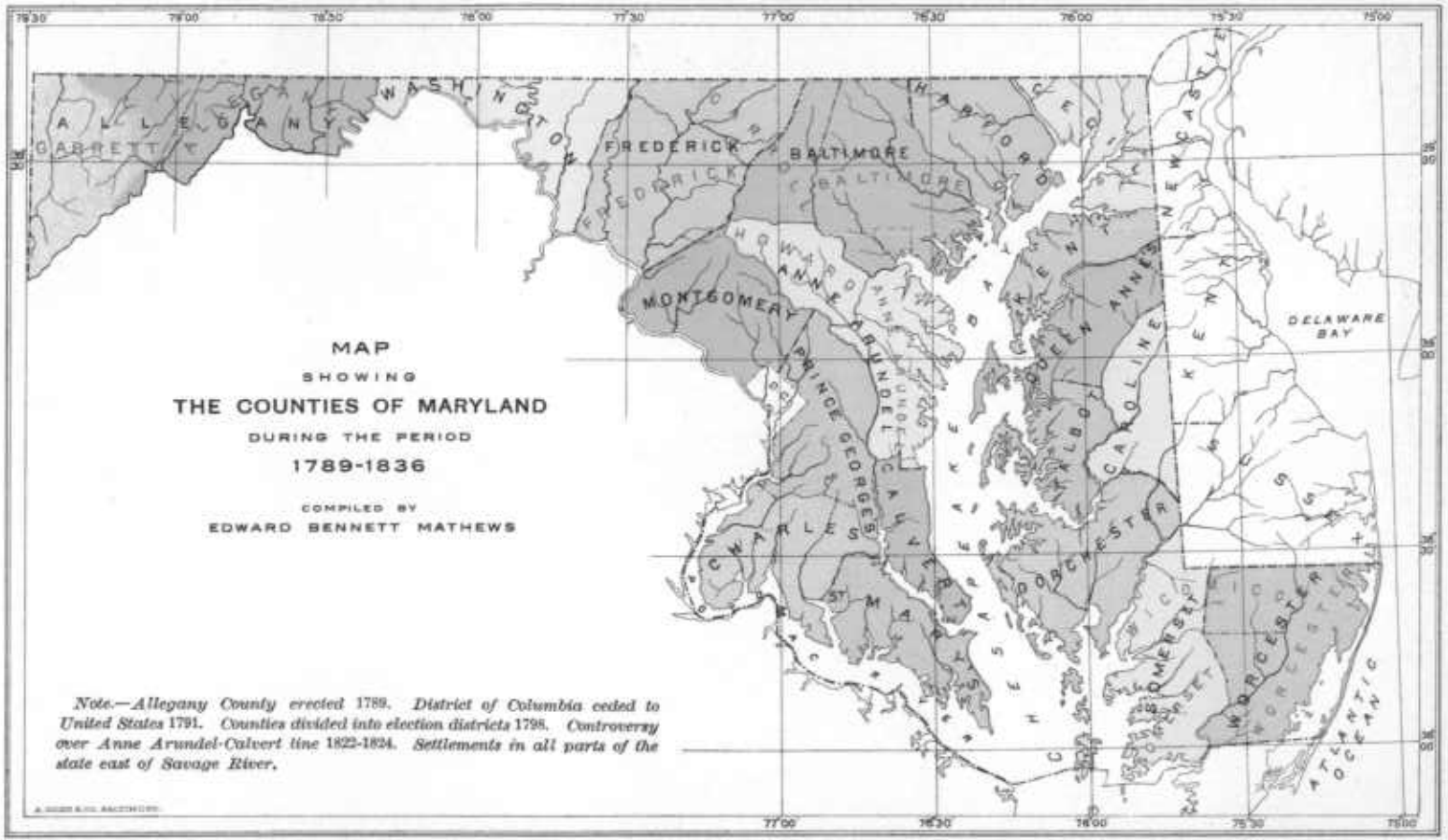
1854 Ch. 301. Additional election district, No. 9, erected with the following bounds:

"Beginning at a point on Piscataway branch at its intersection with the new cut road, and running up and with said branch, until it intersects the Marlborough and Piscataway road, thence with said road to a point where a road leading to Centreville commences, thence with the latter road to the Alexandria and Marlborough road, thence with the said road to Palmer's tavern, thence a road to the Marlborough and Piscataway road, to a road leading to Piscataway branch, thence with Piscataway branch to the place of beginning."

1861 Ch. 81. Polling place of the 6th election district changed to the village of "Long Old Fields."

1868 Ch. 262. Additional election district, No. 10, erected out of the 1st election district with the following bounds:

"Beginning at the bridge across the Patuxent river


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1789-1836
COMPILED BY
EDWARD BENNETT MATHEWS
Note.—Allegany County erected 1789. District of Columbia ceded to United States 1791. Counties divided into election districts 1798. Controversy over Anne Arundel-Calvert line 1822-1824. Settlements in all parts of the state east of Savage River.
ALLEGANY
GARRETT
WASHINGTON
FREDERICK
BALTIMORE
HARFORD
CECIL
NEWCASTLE
HOWARD
MONTGOMERY
ANNE ARUNDEL
PRINCE GEORGES
CHARLES
CALVERT
ST MARYS
QUEEN ANNES
KENT
TALBOT
CAROLINE
DORCHESTER
SOMERSET
WORCESTER
DELAWARE BAY
ATLANTIC OCEAN
79°30
79°00
78°30
78°00
77°30
77°00
76°30
76°00
75°30
75°00
39°30
39°00
38°30
38°00

near the old Iron Works Mill and running thence up the road to the late Doctor Theodore Jenkins, thence leaving said road and running with the road leading by James Coursey's and the Mine Banks now owned by Charles E. Coffin, and with said road to John D. Latchford's, so as to include said Latchford's residence in the District hereby created, crossing the turnpike and railroad west of the said Latchford's house in a straight line to the Furnace road near Thomas Mitchell's, and running with said Furnace road to the new county road leading to Contee's Station, and thence with said road to the Montgomery County line, thence with the Prince George's County line to the beginning."

1868 Ch. 466. Calls for a marking of the Montgomery-Prince George's line and the filing of a map in each county seat.

1870 Ch. 226. Changes line between the Marlborough and Spalding's election districts as follows:

"Beginning at William Brady's blacksmith shop in the village of Forestville, and running thence with the public road leading from said village of Alexandria Ferry to its intersection with the public road leading from said Ferry to Upper Marlborough, at the lower gate of the estate of the late Charles F. Calvert, thence with the said Alexandria Ferry and Upper Marlborough road to its intersection with the Washington and Upper Marlborough road at Centreville, thence with said Washington and Upper Marlborough road to the place of beginning."

1870 Ch. 471. Appropriates money for marking Montgomery line.

1872 Ch. 226. Authorizes additional payments for running Montgomery line.

1872 Ch. 367. Additional election district, No. 11, created with the following bounds:

"Beginning for the same at the intersection of Burche's branch with the public road leading from Washington city to T. B. in Piscataway district, thence up the said branch with the Piscataway and Nottingham district line to the Marlboro' district line; thence with said Marlboro' district line to its intersection with the public road from Paul Talbert's to Croom's, at the farm of the late Adderton Sweeney; thence with said road toward Paul Talbert's to its intersection with the public road leading from Edward Magruder's farm, near Mattaponi branch thence with said road to the public road leading towards the residence of Mrs. Almira Turton, thence with said public road to its intersection with a small stream of water between the farms of said Mrs. Turton and the late Mrs. Susan Mudd; thence down said stream of water to Mattaponi branch; thence up said branch to the crossing of the public road at said branch below the farm of said Mrs.

Almira Turton; thence from said branch with the public road leading towards the village of Nottingham, until it intersects the public road from Brandywine to Nottingham; from this point in a straight line, to the private road of Henry F. Worthington's, leading through the farms of James A. Hyde, Leonard H. Early and R. W. G. Baden, to the private road from Horsehead to Nottingham; thence with said private road from said Worthington's to the branch between the farms of James A. Hyde and R. W. G. Baden; thence up said branch to the mouth of a small stream of water running through the western portion of said Baden's farm; thence up said stream to its source at St. Paul's Church Spring; thence to the public road at St. Paul's Church; thence with said public road leading towards Brandywine, until it strikes the public road leading from Robeysville; thence up said road to a small stream of water near the old public school house known as Forrest Grove; thence down said stream of water to the boundary line between Charles and Prince George's counties; thence with said line to the Mattawoman branch, with said branch to the public road leading from Beantown to Piscataway at G. W. Gardner's; thence with said road until it intersects the public road leading from Sharpensville to T. B.; thence in a straight line to the public road leading from Piscataway to T. B., at a point sixty yards below John A. Coe's dwelling, so as to include John A. Coe in the new district; thence in a straight line to Piscataway branch, to take Thomas H. Lusby in the new district and leave G. R. H. Marshall in Piscataway district; thence up said branch to the beginning."

1874 Ch. 487. Additional election district, No. 12, erected from parts of Piscataway and Spalding's election districts with the following bounds:

"Beginning at the boundary line between the District of Columbia and Prince George's county, at the ferry, and running with the river to Broad Creek; thence with said creek to J. W. Webster's, leaving said Webster's in Piscataway District; thence with the road leading from said Webster's to the late John Palmer's house; thence with the Marlboro road leading from Palmer's to the new road by Temple's Mill, it intersects Grimes' Cross-Roads, leading to Silver Hill Post-Office; and from thence in a straight line to a point on the district line, on the farm of Col. Maddox, and thence with said district line to the ferry."

1876 Ch. 147. Additional election district, No. 13, erected with the following bounds:

"Beginning at the Vansville district line intersecting

the branch road of the Baltimore and Potomac Railroad from Baltimore to Washington city, then south with said railroad to the district line of the district of Columbia, then with the old established lines to the point of beginning."

1878 Ch. 180. Additional election district, No. 14, erected with the following bounds:

"Beginning for the same at the Priest bridge, and running with the county road west by Collington, on the Baltimore and Potomac Railroad, and through the farms of John T. Clark, Sr., Richard W. W. Bowie, C. C. Magruder, Jr., Cecelia Cross and George Duale, of D., to Buena Vista, on the Bladensburg line to Mrs. Friends, thence north in a straight line between the property of James B. Smith and Henry Soper to the head of Beck's branch, thence with said branch to and across the Beaver Dam branch, thence in a straight north line to the public road leading from Beltsville to the Patuxent river at the iron works bridge, thence with said river to the place of beginning."

1882 Ch. 311. Enlarges Spalding election district according to the following line:

"Beginning for the same on the District of Columbia and Upper Marlboro' turnpike, opposite the residence of Thomas W. Smoot, near Centreville, and extending northeastwardly to and including the dwelling-house of Elisha E. Berry; thence in the same direction to the point on the public road leading from Forestville to William Shuler's farm, where the private road which leads to the farm and residence of J. T. Berry intersects the same; thence with said public road northwestwardly to the aforesaid turnpike at William T. Moore's blacksmith shop; thence with said turnpike to the beginning."

1898 Ch. 130. Additional election district, No. 15, erected from portions of the 3d and 6th election districts with the following bounds:

"Beginning at a point on the road leading from Upper Marlboro to Croome, where the corporate limits of Upper Marlboro crosses said road, it being near the rectory of the Protestant Episcopal Church in Upper Marlboro, and running with road until it reaches the boundary line of Nottingham district or Election District No. 4; thence with the present line separating Election District No. 3, or Marlboro District, from Election District No. 4, or Nottingham District; thence with the boundary line separating Election District No. 3, or Marlboro District, from Election District No. 11, or Brandywine district, to the line separating said Election District No. 3 from Election

District No. 9, or Surratts District; thence with the line separating the two last mentioned districts, to Spalding's District line near the store house of Enos F. Pumphrey; thence with the road from Washington to Marlboro, formerly a turnpike, to a point on said road where a road turns off leading to Camp Springs, said point being a little west of the present residence of George W. Richardson; thence in a straight line northwardly to A. B. Sansbury's store; thence with the public road in front of said store, which leads from Forestville to W. H. Shuler's residence, leaving said store in Spalding's District eastwardly, to the Marlboro District line at the intersection of the last mentioned road and the road which leads to the county almshouse; thence with the line separating Marlboro and Spalding's Districts to the line of Election District No. 13, or Kent District; thence with the line separating Marlboro and Kent Districts to a road which intersects said line at a point between the farms of the heirs of the late William J. Bowie and Corydore Coville; thence with said road through the farm of John F. McGregor past the farms of Elisha E. Berry, John H. Traband and others, until it reaches the bridge on the road from Marlboro to Washington, near the residence of George C. Merrick; thence with the corporate limits of Upper Marlboro, first in a westwardly and then in a southerly direction to the beginning, leaving all of the town of Upper Marlboro in the third or Marlboro Election District."

1898 Ch. 328. Changes line between Surratt's and Piscataway Election districts to be as follows:

"The said line shall start at the point where the said division line turns east below Tipp's store, and shall thence run north to Tinker's branch, to the division line between said districts to the point where the said branch crosses the public road in John Steed's farm; and it shall be the duty of the Supervisors of Election, etc. . . . "

1900 Ch. 308. Additional election district, No. 16, erected from the 2d election district as follows:

"That a new election district be laid out and established out of Bladensburg District laying northwest of the main stem or Washington branch of the Baltimore and Ohio Railroad in Prince George's County, to be known by the name of Election District No. 16 or Hyattsville Election District.

And that the boundaries of said Election District No. 16, or Hyattsville District, shall be as follows: Beginning at a point where the Baltimore and Ohio Railroad crosses the Vansville Election District line at College Station; thence along said railroad to the District of Columbia line; thence

with District of Columbia line to the Montgomery County line to the place of beginning.

That the portion of the present Bladensburg District, or Election District No. 2, situated and laying southeast of the Washington branch of the Baltimore and Ohio Railroad, be and the same is hereby made a new district to be known as and called Bladensburg Election District, or Election District No. 2."

1902. Ch. 66. Line between the 13th and 7th election districts changed to run as follows:

"Beginning at the point on the boundary of the fourteenth election district of said county where it now begins, and running from thence with the road leading to Hall's Station on the Baltimore and Potomac Railroad until it reaches the Northeast branch; thence with said branch until it intersects the Western branch; and thence with the Western branch to the northern boundary line of the third election district."

1906 Ch. 345. Additional election district No. 17, erected from parts of the 16th and 2d election districts with the following bounds:

"Beginning at the points where the tracks of the Baltimore and Ohio Railroad cross the "Northwest Branch" and running thence with the meanders of said branch in a westerly direction to the point where the said branch leaves the corporate limits of Hyattsville; thence in a northerly direction to the point where the "Ellersville road" intersects the "New Cut road"; thence in a northeasterly direction with said "New Cut road" to its intersection with the "Coalsville road"; thence in a northerly direction with said last mentioned road to where it intersects the public road leading to the Maryland Agricultural College; thence in an easterly direction with the present dividing line between Vansville and Hyattsville districts; and according to the present location of said dividing line to where the same intersects the Baltimore and Ohio Railroad; thence in a southerly direction with the line of said railroad to a point directly opposite to the electric power house at Riverdale, and from said Baltimore and Ohio Railroad, at said point, in a southeasterly direction to a gate on the property of Charles A. Machems near the gravel hill on the "Edmonston road"; thence southerly with said "Edmonston road" to the northern corporate limits of Bladensburg; thence westerly with said corporate limits to a point where the "Eastern Branch" intersects the "North West Branch" to a point where the tracks of the Baltimore and Ohio Railroad crosses said "North West Branch," the place of beginning."

QUEEN ANNE'S COUNTY.

Queen Anne's County, although not ereeted until 1706, includes within its borders the earliest settlement of Europeans along the Eastern Shore of the Chesapeake Bay. The early trading post of William Claiborne was ereeted on Kent Island in 1631, and settlements were made on the mainland about 1647, a few years prior to the agreement with the Indians made in the summer of 1652, whieh allowed the establishment of white settlements on either side of Chesapeake Bay as far south as the Choptank and Patuxent rivers.

The early settlements of Queen Anne's County were ineluded first in Kent and subsequently in Talbot eounties until the Maryland inhabitants had been so thoroughly distributed over the entire Eastern Shore as to make it advisable to take up with more eare the division of the territory into eounties. After several petitions had been presented to the Assembly of 1704 and referred to the next sueeeeding session the General Assembly of 1706 enaeted a law whieh was approved April 18, 1706, entitled:

"An Act for the dividing and regulating several counties on the eastern shore of this province, and constituting a county, by the name of Queen Anne's County, within the same province."[31]

When this law was enaeted there had been already ereeted on the Eastern Shore the eounties of Ceeil, Kent, Talbot, Dorehester, and Somerset, the latter two embraeed all the territory south of the Choptank while the first four covered the territory north of this river. By the law of 1706 the region between the Sassafras on the north and the Choptank on the south was divided into three eounties, the third being the new eounty of Queen Anne's. Aeeording to the law

"From and after the said 1st of May, 1707, the Island called Kent Island, and all of the land on the south side of Chester river, to a branch called Sewell's branch the said branch to the head thereof, and from thence with an east line to the extent of this province, and bounded on the south with Talbot county, to Tuckahoe bridge and from thence with Tuckahoe creek and Choptank river to the mouth of a branch falling into the said river, called

[31] Chapter 3 of the Laws of 1706.

or known by the name of White Marble Branch, and from thence with a northeast line, to the extent of this province, shall be, and is hereby constituted founded and incorporated into a county of this province, by the name of Queen Anne's county and to have and enjoy all rights benefits, privileges, equal with the other counties of this province.

The eastern limits of the province of Maryland remained unsettled during the years of controversy between the proprietors of Maryland and those of Pennsylvania who had acquired control of Delaware until the Chancery decision of 1750, and no line was run to indicate its location until a decade later when the local surveyors who immediately preceded Mason and Dixon cut a vista along the boundary as it now is in their efforts to establish a true tangent line. The boundary was not marked until 1765, when Mason and Dixon erected the well-known monuments which had been imported from England. Before the settlement of the boundary there had been little or no development of the disputed territory which lay midway between the waters of the Delaware and the Chesapeake and little inconvenience had arisen from the uncertainty regarding the position of the State boundary.

Scarcely ten years after the final settlement of the eastern boundary, portions of Queen Anne's and Dorchester counties were erected into the new county of Caroline. According to the Act[32] the boundary line between Queen Anne's and Caroline counties was to run from the intersection of the State boundary with

"the main road that leads from the Beaver-dam causeway to Dover-town in Kent county, upon Delaware, thence with the said road to the Long marsh, thence with the said marsh and stream of the branch of Tuckahoe creek to Tuckahoe bridge, thence with the said creek to Great Choptank river."

According to this boundary all the territory lying between the main branch of the Choptank on the east and Tuckahoe bridge on the west, which had formerly been a part of Queen Anne's county was taken from it and given to Caroline.

QUEEN ANNE'S COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 3 election districts.
1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

[32] Laws of Maryland 1773, Chapter 10, Liber R G. Fol. 249.

1799 Ch. 50. Commission appointed to divide county into 3 election districts.

1820 Ch. 69. County divided into 4 election districts, the 4th district laid off adjoining and between the 1st and 2d districts.

1821 Ch. 27. Confirms Acts of 1820 Ch. 69.

1821 Ch. 92. Commission appointed to lay off the county in 4 election districts who are to report to County Clerk.

1826 Ch. 180. County divided into 5 election districts, the new one to be taken from the 3d election district.

1827 Ch. 1. Confirms Acts of 1826 Ch. 180.

1827 Ch. 25. Commission appointed to lay out the new district.

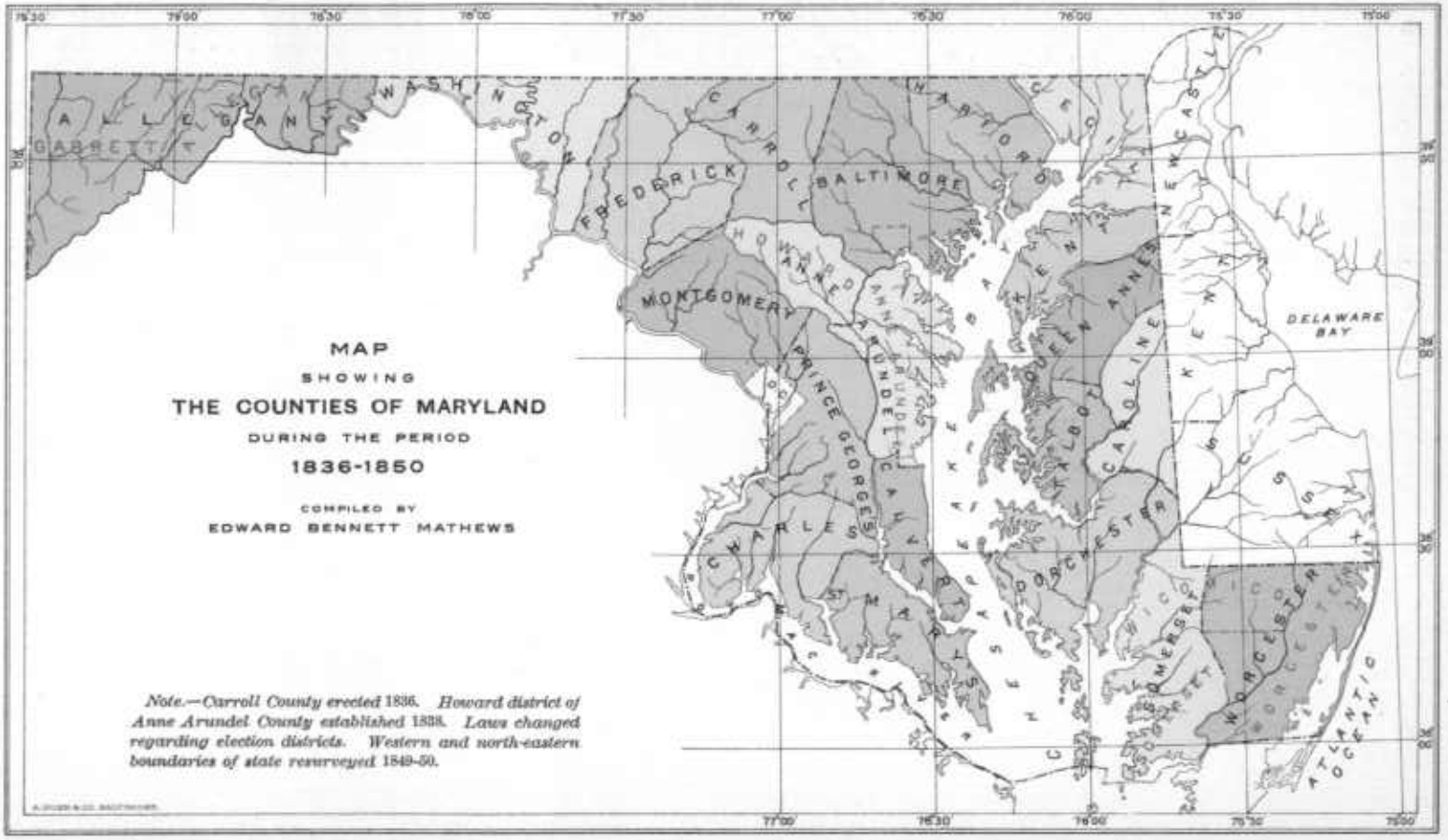
1849 Ch. 79. Polling place of 1st election district changed to or near Dening's Store.

1876 Ch. 75. Additional election district, No. 6, erected out of parts of 1st, 2d, and 3d election districts as follows:

"Beginning at Hillsborough, and running with the division line which separates Caroline and Queen Anne's counties, up to the public road from Bennett Down's to the puhlic road running from Roesville; thence with the public road runuing from William D. Smith's to the hrick school house; thence with the public road to Carrville station; thence with the public road to the public road running from Ruthsburg to Centreville; thence with a straight or imaginary line to Hall's Cross Roads; thence with the public road to Willoughby' shops; thence with the public road dividing Queen Anne's and Talbot counties to the beginning point."

1882 Ch. 244. Additional election district, No. 7, erected out of portions of the 1st and 2d election districts as follows:

"Beginning at the bridge spanning Chester river, at a place known as Turner's mills, above Sandtown, and following the public road in a southerly direction until it intersects the public road leading from Andover branch to Sandtown; thence with said road in a southwesterly direction to the forks of said road; thence with the left fork in a southwesterly direction between the lands of Edwin W. Spear, John Benson and others, until it intersects what is known as Casey's cross-roads; thence with the public road direct to Hackett's Corner; said road leading between the lands of James B. Stevens, Edwin W. Spear, Benjamin T. Brigg's, the heirs of Thomas Taylor, Joseph E. Briscoe's land, also Samuel Casey and John C. Hackett; said Hackett's Corner intersects the main road leading from Sudlersville to Cappage's Landing; from thence in a straight line to the waters of Red Lyon branch, at a place known as William L. Godwin's mill-pond; thence up and with said hranch until it intersects the public


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1836-1850
COMPILED BY
EDWARD BENNETT MATHEWS
ALLEGANY
GARRETT
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
CECIL
NEWCASTLE
MONTGOMERY
HOWARD
ANNE ARUNDEL
PRINCE GEORGES
CHARLES
CALVERT
ST MARYS
BALTIMORE
KENT
QUEEN ANNES
TALBOT
CAROLINE
DELAWARE BAY
DORCHESTER
SOMERSET
WICOMICO
WORCESTER
ATLANTIC OCEAN
Note.—Carroll County erected 1836. Howard district of Anne Arundel County established 1838. Laws changed regarding election districts. Western and north-eastern boundaries of state resurveyed 1849-50.

road leading from Crumpton to Dudley's Chapel, at John McFadden's grist mill; thence along and with said public road in a southerly direction until it intersects the public road leading from Sudlersville to Church Hill, at school house number eight; thence along and with said public road leading to Church Hill until it intersects the direct road to J. B.; thence along and with said road to J. B.; from thence along and with the public road leading between the lands of William Hopkins, Joel R. Clements and John F. Godwin, until it intersects the public road leading between the lands of said John F. Godwin, John T. Baxter and others, to the main road leading from Barton's Corner to Church Hill; thence along and with said road in a northerly direction to Barton's Corner; from thence with the public road leading between the lands of Johns Evans, William Hurlock and the heirs of John Brown to African Union Church; thence with the public road running between the lands of Dr. Joseph Catlin, James Francis Hall and William Hurlock, and the heirs of Joseph Catlin, deceased, until it intersects the public road leading from Sandtown to Chestertown at Round Top Corner; thence with said Chestertown road in a westerly direction until it intersects the branch flowing into Rosin Creek; said creek running between the lands of the heirs of B. S. Ford, the Kihler tract, and others; thence with the waters of said branch and creek to the waters of the Chester river; thence with Chester river to the place of beginning."

1888 Ch. 268. 5th election district divided into two separate election precincts.

"By a line beginning at the head of Blunt's creek, an estuary of Chester river, and running thence in a straight line to the head of Dividing cove of Wye river, between the lands of Mrs. Mary C. Bryan and the lands of William W. Nelson, and thence with Wye river to the extreme end of Bennett's Point; that part of said fifth election district lying north and east of said line and including Wye island to be and constitute one of said precincts, and to be known as Queenstown, or precinct number one. That part of said district lying south and west of said line to be and constitute the other of said precincts, and to be known as Winchester, or precinct number two.

ST. MARY'S COUNTY.

St. Mary's County is the parent county of the State as in it the first settlement was made in 1634 under the grant to Lord Baltimore. During the succeeding years the settlement on the St. Mary's River was slowly extended along the shores of the Potomac towards the present western limits of the county. At an early date settlements were also made along both shores of the Patuxent River as high as Mataponi Creek. During the first year or two of settlement when the few colonists present were busily engaged in establishing their homes, there appears to have been no county government, the affairs being regulated directly by Governor Calvert and his advisers.

The date of the erection of a county government for St. Mary's is not known, the first reference, however, is under date of June 29, 1637, when a commission was issued to James Boldridge as sheriff (Md. Arch., 3:61). A few months later the county was spoken of as such and county officials were mentioned. During February following a bill was introduced incorporating the Isle of Kent as a Hundred of St. Mary's County. Other documents show that the inhabitants along the Patuxent were also included in the same jurisdiction. It is therefore evident that at first St. Mary's County maintained control over all of the settlements within the limits of the Province, even though far beyond the confines of the present county.

The first abridgement of its jurisdiction is indicated in October, 1640, when Kent Island is first spoken of as a county, although John Langford had been appointed a sheriff for the Island about the time that St. Mary's county itself was erected. This earlier date is the one usually chosen for the creation of Kent County but the conceptions of county limits and county authority were somewhat vague at that time.

The second curtailment of the territory included within St. Mary's County was made in 1650, when Charles County was erected as a favor to Robert Brookes, a friend of Lord Baltimore, who was on the point of bringing a company of colonists to the Province. This Charles County, usually spoken of as Old Charles County, included the settlements on either side of the Patuxent River to the head of navigation. It was the

fore-runner of Calvert County, to which it was changed a few years later. As the maps show, St. Mary's County at this time was settled only a short distance into the woods from the shores of the Potomac, and the northern limits of its jurisdiction followed the divide between the Patuxent and Potomac drainage. Anne Arundel County was also erected from portions of St. Mary's County in 1650 to accommodate the new settlements made on the shores of the Severn. This new county may possibly have included one or two inhabitants who had formerly been counted in St. Mary's County, but it is doubtful if settlements on the Patuxent River had passed the mouth of Lyons Creek at that early day. The settlements on the Severn were made during the year preceding the erection of Anne Arundel County.

The Puritan government of 1654-1656 changed the names of the three counties on the Western Shore since the originals flavored too strongly of Romanism. For a short time St. Mary's County was officially known as Potomac County.

The year 1658 marks the limitation of St. Mary's County on the west by the erection of the new Charles County. This is evidenced by an order in Council dated April 13, 1658 (Md. Arch., 3:308), and the references to a sheriff of Charles County in the early part of 1659. This new county probably included part of the territory embraced in the older Charles County on the Patuxent River. The record of the limits established at this time have not been found. The present definition of the western boundary of St. Mary's County is found in the general Act of Assembly of 1695. This Act was introduced on the 21st of May and was passed on the following day. According to its terms

> "from & after the Twenty third day of Aprill next being St Georges Day after the end of the present Session of Assembly . . . . the bounds of St Marys County shall begin att Point Look out and Extend it Selfe up Potomock River to the Lower Side of Birds Creek and so over by a Straight line Drawn from the head of the maine branch of the said Birds Creek to the head of Indian Creek in Putuxent River and which falls into Putuxent River including all that Land lying between Putuxent and Potomock Rivers from the lower part of the said two Creeks and branches of Birds and Indian Creek by the line aforesaid and Point Look out as aforesaid."

This definition of the county boundaries holds to-day and St. Mary's

County is the earliest to receive its final form. Each of the other eleven counties then existing has had some modification, although that of Calvert has been no more than the sharper definition of its line with Anne Arundel County. Charles County received a small part of the territory assigned at this time to Prince George's County, but otherwise remains the same. Cecil County has been curtailed by the transfer of the south bank of the Sassafras to Kent County. All of the others have yielded territory for the formation of new counties.

ST. MARY'S ELECTION DISTRICTS.

1798 Ch. 115. County divided into 3 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 3 election districts.

1801 Ch. 59. Commission authorized to make alterations and report to County Clerk.

1806 Ch. 29. County divided into 4 election districts, the additional election district "adjoining and between the first and third districts as they are now numbered."

1807 Ch. 8. Confirms Act of 1806 Ch. 29.

1807 Ch. 28. Commission appointed to review election districts and to make changes provided district No. 2 remain unchanged.

1816 Ch. 5. Polling place of the election district No. 2 changed.

1822 Ch. 112. County divided into 5 election districts, the additional district to be taken and laid off from the 4th election district.

1823 Ch. 154. Commission appointed to lay off the 5th election district, Charlotte Hall and Chaptico to be places of election in the 4th and 5th election districts.

1824 Ch. 16. Acts of Commission legalized, confirmed and made valid.

1831 Ch. 190. Commission appointed to ascertain and describe the bounds of the several election districts and to report to the Clerk of County Court before Aug. 1, 1832.

1856 Ch. 277. New election district, No. 6, established with the following bounds:

> "Commencing at the Horse landing on the Patuxent river, thence with the most direct main road to St. Joseph's church, thence with said road by Bond's store and until it intersects the Rich Neck road, thence across Rich Neck swamp with said main road to its junction with the Mackintosh road near M. Joy's farm, thence from said junction in the most direct route to the division line and up the Patuxent river to the place of beginning."

1876 Ch. 283. Additional election district, No. 7, erected from the 4th election district as follows:

"Beginning at the crossing of St. Clements Bay Run, by the stage road, and running thence with said stage road towards Chaptico, until it reaches the north-east end or corner of "Neales' Lot," on said stage road, thence by a direct line to the head waters of Brambly Creek, thence by the waters of the Wicomico and Potomac Rivers and St. Clement's Bay to the beginning, including the several islands contiguous to the last described waters. . . . So much of the fourth election district as is not included within the aforesaid lines, shall continue to be known as the fourth election district."

1878 Ch. 423. Changes part of the dividing line between 4th and 5th election districts to run as follows:

"That that portion of the fourth election district of St. Mary's county lying north of a straight line starting from a point at which the road leading from the Three Notch road to St. Joseph Church, known as the Forest Hall road, intersects the said Three Notch road, running thence north eighty-eight degrees, west three and one-half miles, to the junction of Sothoron's run with the northwest branch of Chaptico bay, be and the same is hereby taken from said fourth election district of said county and added to and included in the limits of the fifth election district of said county."

1878 Ch. 466. Additional election district No. 8, erected from part of the 2d election district.

"So much of the second election district of St. Mary's county as lies on the northeast side of the following lines shall be known as the "Bay" or "Eighth Election District"; that is to say beginning at the line of the third election district where the same is intersected by what is known as the "Western Branch," and running with said branch to the head of St. Mary's river, thence with said river to the line of the first election district; and the voting place in said eighth election district shall be at "Centerville."

So much of the second district as lies on the southwest side of the aforesaid dividing line shall still continue to be known as the second election district, and the place of voting in said district shall be at or near the "Oak Store."

1882 Ch. 140. Changes the lines between the 4th and 7th election districts so

"That so much of the Fourth Election District of St. Mary's county as is included in the following lines shall hereafter be known as the Seventh Election District, that

is to say: Beginning at the crossing of St. Clement's bay run by the stage road, and running thence with said stage road towards Chaptico, until it reaches the northeast end or corner of "Neale's lot," on said stage road; thence by a direct line to the headwaters of "Notley Hall creek"; thence by the waters of the Wicomico and Potomac rivers and St. Clement's bay to the beginning."

1884 Ch. 259. Additional election district, Island district number nine, erected out of election district No. 2.

"That a new election district be formed out of St. George's island, a part of the Factory district, or election district number two, ... to be known as the Island district, or election district number nine."

1888 Ch. 522. Changes boundary line between 5th and 6th election districts as follows:

"Beginning at Turner's Store, situated on the three notch road, and running with said road to the road leading from said three notch road, and through the lands of G. W. L. Buckler and W. C. Ruder to a place called and known as "Horse Landing," on the Patuxent river."

1902 Ch. 65. Commissioners appointed to resurvey and mark the Charles County line.

SOMERSET COUNTY.

Settlements were made in the territory now forming part of Somerset County in the early years (1661) of the planting of Maryland. Others were also made on the eastern shore of Virginia, but those were sufficiently separated to leave little occasion for the controversies regarding boundaries which have marked the territory during the last two centuries and a half. By 1663 the disputes were sufficiently frequent to cause correspondence between Governor Calvert and the governor of Virginia, and in 1665 a commission was appointed by the two states for the running of a divisional line. On the 25th of June, 1868, an agreement was made between Philip Calvert and Edmund Scarborough regarding the line which had already been run. This line constitutes the southern boundary of Somerset and Worcester counties. The record of the creation of Somerset County in the form of a proclamation from Cecilius, Lord Baltimore, to Stephen Horsey and others is preserved in the Proceedings of the Council, Liber HH, pp. 268-270.[33] That

[33] Md. Arch., 3: 553-555.

portion of the proclamation, dated August 22, 1666, dealing with the limits of the county, runs as follows:

"Caecilius Absolute lord . . . . for the ease & benifitt of the people of this or pvince & for the Speedy & more exact Admncon of Justice have erected & doe by theis pnts erect all tht Tract of land wthin this our province of Maryland bounded on the South with a line drawne from Wattkins point (being the North point of tht bay into wch the River Wighco formrly called Wighcocomoco afterwards Pocomoke & now Wighcocomoco againe doth fall exclusively) to the Ocean on the East. Nantecoke river on the North & the Sound of Chesipiake hay on the West into a County hy the name of Sommersett County in honor to our Deare Sister the lady Mary Somersett. . . . ."

The erection of this county was but one of many steps taken by the proprietor to stimulate settlement along that portion of his territory on the Eastern Shore which was gradually becoming occupied by people from the Delaware side who held patents from representatives of the Duke of York. On October 22, 1669, the rent of any who should settle on the seaboard side was redueed to a shilling for each fifty aeres; at the same time it was also ordered in accordance with the instructions from the lord proprietor under date of 28th of July, 1669,

"that from the Whore kill to the degree of forty Northerly Latitude be erected into a County and called by the Name of Durham County and that from the Hore kill to Mount Scarborough be likewise erected into a County & called as the Lord Proprietary shall hereafter direct" (Md. Arch., 5: 57).

These counties were evidently intended to inelude part of what had but a few years before been assigned to Somerset County and the dividing line, determined in great measure by the area settled, would probably have followed along the divide of the Delaware-Chesapeake watershed. The reeords, however, of these eounties show that they never existed except in name. Officers, it is true, were appointed and certain land records were kept but the title to the territory was in dispute, the inhabitants in great part of different stoek and nationality from that of St. Mary's, and little authority was ever exereised by the Maryland government in these temporary counties. If Durham and its companion county had been erected permanently the eastern boundary of Somerset County would have beeu changed to approximately as it was in 1742 when the Woreester County of to-day was ereeted.

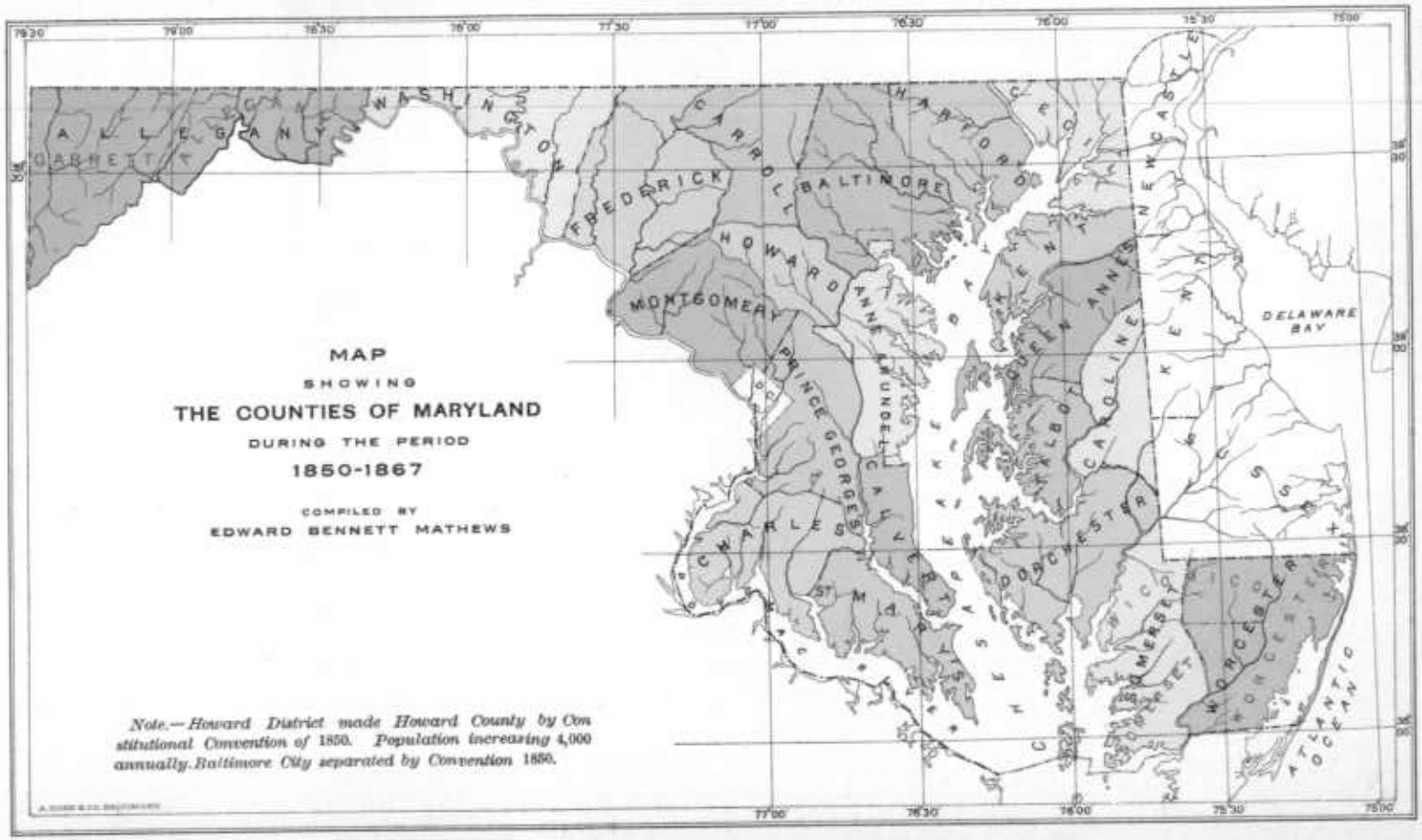
It is, however, interesting to note the claims implied by the limits of these counties in their bearing on the broader question of the ownership of the Delaware seaboard which was the subject of so much discussion before the Privy Council Committee of Trade and Plantations during the years 1683 to 1685. According to the Herrman map of 1670 Mount Scarborough lay just south of the present town of Snow Hill in Worcester County. It would accordingly appear that in the lord proprietor's mind his title to the territory from the Calvert-Scarborough line of 1668 to the Whorekill was equally good in all parts, a fact which has its bearing on the assertions of the Penns that Cape Henlopen lay some 15 or 20 miles south of the Whorekill at the time of the original grant.

The unnamed county foreshadowed in the proprietary's instructions of 1669 was approximately the same as that named and defined by the proclamation of June 19, 1672, by which Worcester County was erected out of a portion of Somerset. According to the proclamation the proprietor states

"for that we are informed that Several Persons are seated there without our Leave or License or without the Leave or License of our Captain General of our said Province and we having erected that part of oursd Province Beginning at the Southernmost Branch of a Bay now called Rehoboth Bay and from thence running Northerly up the Sea Board side to the South Cape of Deleware Bay and thence to the Whore keil Creeke and up the Bay to the fortieth degree Northerly Latitude into a County and do hereby erect the same into a County and it is our will and Pleasure that it shall he a County and called by the name of worcester County in our said Province of Maryland." (Md. Arch., 5: 108.)

This county, like its companion Durham County, was only temporary and is distinct from the Worcester County erected in 1742, although the area included is approximately the same except in so far as the modification of the exterior limits of Maryland influenced the county. As in the case of the original instructions the boundary line between Somerset and Worcester was not defined even in the more detailed proclamation of 1672. It is probable that the line, if occasion had arisen for its location, would have been placed about the same as the later line prescribed by the Act of 1742.

In the fall of 1684 the question of jurisdiction over the territory


MAP
SHOWING
THE COUNTIES OF MARYLAND
DURING THE PERIOD
1850-1867
COMPILED BY
EDWARD BENNETT MATHEWS
ALLEGANY
GARRETT
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
CECIL
KENT
QUEEN ANNE'S
TALBOT
CAROLINE
DORCHESTER
SOMERSET
WORCESTER
WICOMICO
HOWARD
MONTGOMERY
PRINCE GEORGES
ANNE ARUNDEL
CALVERT
CHARLES
ST MARYS
DELAWARE BAY
ATLANTIC OCEAN
Note.—Howard District made Howard County by Constitutional Convention of 1850. Population increasing 4,000 annually. Baltimore City separated by Convention 1850.

lying between the northwest (Marshyhope Creek) and the northeast branches of the Nantieoke River became acute. Prior to this time Somerset County as the older had assumed the northwest branch to be the main Nanticoke River, and had accordingly exercised authority over the territory between the two branches. On October 4, 1684, the Governor and Council issued an order that the bounds of Somerset and Dorchester County be determined. A commission was appointed to ascertain the main branch of the Nanticoke River and the bounds between the two counties and their findings were ordered to be filed with the next succeeding Provincial Court (Md. Arch., 17:286 cited under Dorchester County). The decision of the commission was that the main branch was the one that has been accepted as such from that time to the present day. This decision of the commissioners defining the meaning of the original boundaries fixed the location of the northern boundaries of Somerset County permanently, except in so far as they have been subsequently modified by the determination of the Delaware-Maryland boundary line and the erection of Worcester and Wicomico counties.

The erection of Worcester County by the Acts of 1742, Chapter 19, permanently limited Somerset County on the east. The line at this time according to the Act was to run

"up the Westernmost Side of the said Creek [Dividing Creek] and to the Bridges called Denstone's Bridges, and from thence West to the main road called Parahawkin-Road; thence up and with the said road to John Caldwell, seniors, saw-mill, thence up and with the said road over Cox's Branch, to Broad Creek Bridge, and down the said Branch and Creek into Nanticoke-River."

This boundary remained the limit of Somerset County on the east until the State Convention of 1867 when Wicomico County was erected out of portions of Somerset and Worcester counties. The old boundary ran from the crossing of Dividing Creek by the road from Snow Hill to Princess Anne along the road running from that point to Fruitland, and thence to Salisbury along the main road on the east side of the railroad to Laurel, Delaware. By the decision of 1750 determining the Delaware boundary line the Somerset boundary stopped just east of Delmar and

thence followed west and north the state boundary to the Nanticoke River.

According to the boundaries of Wicomico County established in 1867 all that portion hitherto belonging to Somerset County lying north of a line passing

"up the channel of the Wicomico River to the mouth of the Wicomico Creek, thence with the channel of said creek and Passerdyke Creek to Dashield's or Disharoon's Mills, thence with the mill-pond of said mills and branch following the middle prong of said branch, to Meadow Bridge, on the road, dividing the Counties of Somerset and Worcester, near the southwest corner of farm of William P. Morris"

was set apart to form the western portion of the newly erected county.

SOMERSET COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 3 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 3 election districts.

1821 Ch. 159. Commission appointed to select polling place for the 3d election district.

1824 Ch. 146. County divided into 6 election districts, the first or upper to be divided into 3 and the second or middle into two, and the third or lower to remain.

1825 Ch. 27. Confirms Acts of 1824 Ch. 146.

1825 Ch. 69. Enacts that election district No. 2 or the Middle District shall be further subdivided and that 2 additional election districts shall be established therein; one of which shall be made convenient to the voters on the north side of Wicomico Creek, and the other shall be at or near Dublin or Cokesbury.

1826 Ch. 68. Confirms Acts of 1825 Ch. 69.

1828 Ch. 123. Commission appointed to change the line between Dublin and Brinkley districts to run as follows:

"Beginning on Pocomoke river at the divisional line of the lands of Littleton Dennis and George W. Powell, and to run thence northwardly with the same to Steven's Branch, and thence up, by and with the said branch to the county road leading from Curtis' chapel to Stevens' Ferry."

1829 Ch. 115. Changes polling place of Dames Quarter district.

1831 Ch. 127. Enacts that so much of the lower election district of Somerset county, as is contained within the following lines, that is to say, beginning at Steven's Ferry, and running thence by and with the county road, by James Smith's, until it strikes the county road, leading to Rehoboth, and thence crossing the said road in a line direct until it strikes the

Pocomoke river, to the eastward of the mansion of Littleton Upshur Dennis, Esquire, and thence by and with the said river to the place of beginning at Stevens' Ferry, by and the same is hereby added to the Dublin election district.

1831 Cb. 33. Princess Anne election district subdivided and additional district established convenient to voters of Hungry Neck.

1831 Cb. 147. Commission appointed to divide Somerset County north of Wicomico into 4 (Barren Creek, Tyaskin, Quantico, Salisbury) election districts.

1832 Cb. 5. Confirms Acts of Commissioners appointed by Acts of 1831 Ch. 33.

1832 Ch. 31. Confirms Acts of 1831 Cb. 147.

1833 Ch. 7. Prolonging time to carry out provisions of Acts of 1831 Cb. 33.

1833 Ch. 11. Additional election district erected to be known as the Smith's Island district.

1834 Ch. 21. Confirms Acts of 1833 Ch. 11.

1837 Ch. 356. Commission appointed to designate a polling place in Salisbury.

1841 Ch. 36. Commission appointed to designate polling place in Tyaskin district.

1847 Ch. 246. Commission appointed to fix a polling place in Salisbury.

1852 Ch. 24. Additional election district, No. 11, erected, It enacts:

"That part of Somerset County known as Potato Neck, and bounded on the one side by Annamessex river from its mouth to Kingston bridge, from thence by and with the county road to Black Creek Bridge, from thence by and with Black creek to Monokin river, and from thence by and with Monokin river to its mouth, shall constitute a separate and additional district . . . . , to be called District number eleven, or Potato Neck District."

1853 Ch. 301. Additional election district, No. 12, to consist of

"All that part of Smith's Island which is included within the limits of Somerset county.

1854 Cb. 312. Additional election district, No. 13, erected with the following bounds:

"Beginning at a place on the Nanticoke river, called Bacon quarter, and running from thence by and with the county road, from said place to Levin Wright's dwelling house on said road, and from thence a due east course until it intersects the Maryland and Delaware line."

1856 Ch. 41. Erects additional election district, No. 14, Lawson's, out of part of the 6th or Brinkley district. Boundaries modified by next act.

1856 Ch. 117. Election district No. 14 defined with the following bounds:

"Beginning at the head of Couibourn's creek, thence by and with a private road, dividing the lands of John C. Horsey and Southey Mills, to the county road leading from Kingston to Jefferson's corner; thence by and with

the said county road to White's road; thence by and with White's road, to the district bridge, at what is called the Branch, near John Miles; thence by and with East creek to the Pocomoke, dividing the lands of Littleton Whitting ton and Nathaniel Tull; all that part lying South and West of the aforesaid line, and included in what was formerly called Brinkley's district, to constitute the aforesaid election district, number fourteen or Lawson's district, and all the remaining portion to constitute Brinkley's district, number six, as heretofore."

1858 Ch. 20. Additional election district, No. 15, established from the 4th election district with the following bounds:

"Beginning at the northeast side of the mouth of a creek commonly called Rock creek, and thence running due south, until it intersects another stream of water, commonly called Fishing creek, all that portion lying west of the aforcsaid line, and included in what was formerly called Dames' Quarter District, to constitute the aforesaid Tangier District, or Election District No. 15, and all lying to the west of the said line, to constitute Dames' Quarter District, No. 4, as heretofore."

Repealed 1860 Ch. 84.

1860 Ch. 84. Repeals Act of 1858 Ch. 20.

1860 Ch. 165. Resurvey of Dorchester-Somerset boundary line authorized.

1860 Ch. 385. Accepts the Maryland-Virginia line laid down in 1688.

1868 Ch. 24. Defines which old districts are hereafter to be in Wicomico.

1868 Ch. 82. Names and numbers the election districts after separation of Wicomico county as follows:

"Princess Anne District, number one; Dames' Quarter District, number two; Brinkley's District, number three; Dublin District, number four; Hungry Neck District, number five; Potato Neck District, number six; Smith's Island District, number seven; Lawson's District, number eight; Tangin District, number nine.

1870 Ch. 326. County Commissioners authorized to change polling place in Dames' Quarter election district.

1872 Ch. 428. Fairmount substituted for Potato Neck.

1874 Ch. 43. Established a new 7th election district out of parts of the former 7th and 8th election districts as follows:

"all that district in said county now known as Smith's Island or election district number seven, and also all that part of said Lawson's district south of the following line, viz: Beginning at the mouth of Apes Hole Creek on Pocomoke Sound; thence by and with the channel of said Creek to Apes Hole Bridge; thence by and with the county road to Mariner's Church; thence by a straight line to the mouth of a lane running between the lands of L. Dow Lawson and William Davey near Jacksonville in said district; thence by and with said lane to the little Anna-

messex River; thence by a straight line to the mouth of Flat Cap Creek."

1878 Ch. 186. Divides Dames Quarter District, number 2, and annexes to it a portion of Princess Anne District, number 1.

"Commencing for the same at a point on Tangier Sound, or Monie Bay, known as Dames' Quarter District, and running thence in a southerly direction across the marsh, said marsh being the division between Dames' Quarter and Pigeon House to Monokin River, thence by and with the channel of said Monokin River to the mouth of Goose Creek, near the residence of William E. Waters, thence by and with the channel of said Goose Creek to the mouth of a ditch near the head of said creek, thence by and with said ditch to the county road near the residence of Thomas Heath, thence by a right line due north to the county road commonly known as the Black or Monie Road, thence by and with that road to the bridge crossing Great Monie Creek, known as the Waterloo Bridge, thence by and with said creek to Tangier Sound and the place of beginning. That portion of the said Dames' Quarter District west of the first line mentioned in this act—viz., the line running from a point on Tangier Sound or Monie Bay, as the case may be, to the Monokin River—is hereby annexed to Tangier District, number nine" . . . .

1878 Ch. 214. Changes the name of Hungry Neck, or election district number 5, to Mount Vernon District, or election district No. 5.

1878 Ch. 45. Additional election district, No. 10, erected from 7th election district the new district to "comprise all that territory belonging to the State of Maryland on Smith's Island."

This practically repeals Acts of 1874 Ch. 43 and re-enacts Acts of 1853 Ch. 301 so far as they relate to Smith's Island.

1880 Ch. 146. Changes the line between Dames' Quarter District, number 2, and Princess Anne District, number 1, to run as follows:

"Commencing for the same at a point on Monie Bay, known as Dames' Quarter Creek, and running thence in a southeriy direction across the marsh, said marsh being the division between Dames' Quarter and Pigeon House, to Manokin River, thence by and with the channel of said Manokin River to the mouth of Goose Creek, thence to the mouth of a ditch to the county road, near the residence of Thomas Heath, thence by the county road leading from Princess Anne, westward to John B. Wailers' store, thence northward, by the county road leading to Waterloo Bridge, thence northwesterly by and with the channel of Little Monie Creek, thence northwestwardly by and with the channel of Little Monie Creek to Monie Bay to the beginning. That portion of Dames' Quarter District as now constituted not included in the district as now consti-

tuted, is hereby annexed to Princess Anne District, number one."

1882 Ch. 306. Additional election district, No. 11, established out of the 2d and 9th election districts, bounded as follows:

"on the north by the head of Tangier sound and Monie Bay; on the west by a creek commonly known as Pigeon House creek, to its head; and thence by and with a ditch leading from the head of said creek to the county road, to the east of Henry Jones' residence; and thence in a straight line south to the channel of the Monokin river; thence with said channel of said river to the mouth of Fishing creek; thence north in a straight line to the mouth of a creek called Rock creek in Tangier sound."

1888 Ch. 218. Changes line between the Crisfield and Lawson's election districts to run as follows:

"Beginning at a ditch at Apes' Hole Creek, between the lands of John W. Coulbourn and George R. Stirling, thence running a westerly course by and with said ditch to the county road near the Methodist Protestant church, commonly called Mariner's church, thence by and with said county road to the Crisfield branch of the New York, Philadelphia and Norfolk Railroad, thence north by and with said railroad to its intersection with the present line dividing said districts, thence by and with said present line to the Annamessex river; but all other lines dividing said districts shall remain as heretofore and the belt of land between the old line and the line herein laid down is hereby annexed to Lawson's district."

1896 Ch. 386. Additional election district, No. 12, established out of a part of the 7th election district as follows:

"All that part of said Crisfield district, No. 7, east of the following line, viz: Beginning at the boundary of the town of Crisfield set up at Hammock's Point; thence by and with the line of said town in a straight line to the boundary of said town set up near the residence of Henry F. Jewett; thence in a straight line by and with said town line to the Rayfield road, where the line of said town of Crisfield crosses said road; thence by and with said Rayfield road to the east end thereof; thence a straight line due east to Apa's Hole Creek."

1898 Ch. 160. Additional election district, No. 13, erected out of parts of the 6th, 1st, 3d, and 13th election districts bounded as follows:

"Beginning at the center of Back Creek in Somerset county, opposite Captain Alexander W. Bozman's house; thence to the shore of said creek; thence, excluding said house, by and with said Bozman's private road to the main county road running from Fairmount to Westover, thence by and with said road running east to the intersection of

said road with the new road; thence by and with said new road to the county bridge spanning the Annamessex river, near the Scarborough property; thence across said bridge and by and with the road crossing the same to the intersection thereof with the old county road leading from Kingston to Marion, on the Annamessex side; thence by and with the said county road eastwardly to the place known as Kingston's Corner or Carroll's Corner, near the site of the M. E. Church; thence eastwardly by the county road to Pocomoke City to a place known as Bogg's Corner; thence northeastwardly by the county road leading by Robert W. Adam's steam saw mill to Green Hill; thence by the said county road to Dublin Station, on the N. Y., P. and N. R. R.; thence by and with said railroad to the centre of the bridge over King's creek; thence by and with the centre of King's creek, and down the same to the Manokin river; thence down the centre of said river to Back Creek, and thence up the centre of Back Creek to the place of beginning at the bridge crossing said creek near the said Thomas J. Furniss' property."

1898 Ch. 469. Changes line between Brinkley's election district No. 3 and Lawson's No. 7 to run as follows:

"Beginning at the mouth of Colbourne's creek and running up said creek with the channel until the county wharf is reached, at what is commonly called the "Steamboat Wharf" thence said line to run by and with the county road to Marion station; thence continuing with the road leading to "Tull's Corner," running by and with said road until the bridge commonly called the "Branch Bridge" is reached; thence by and with said creek or stream, crossed by said bridge, known as East creek to its mouth in the Pocomoke sound."

1902 Ch. 23. Changes line between election districts 13 and 3 to run as follows:

"Beginning with the county bridge, spanning the Annamessex river, near the Scarborough property; thence by and with the Annamessex river in an easterly direction to the old Annamessex river bridge near the residence of the late George R. Dennis; thence in a southwardly direction by and with the main county road to Carroll's Corner, near the site of the old Kingston M. E. Church; thence eastwardly by and with and following the present line between said Brinkley's and Westover districts to Bogg's Corner; thence northeastwardly by the county road leading to R. W. Adam's old steam mill site, to the present line between Westover and Dublin districts at or near said steam mill site.

1902 Ch. 30. Changes line between election district No. 3 and No. 8 to run as follows:

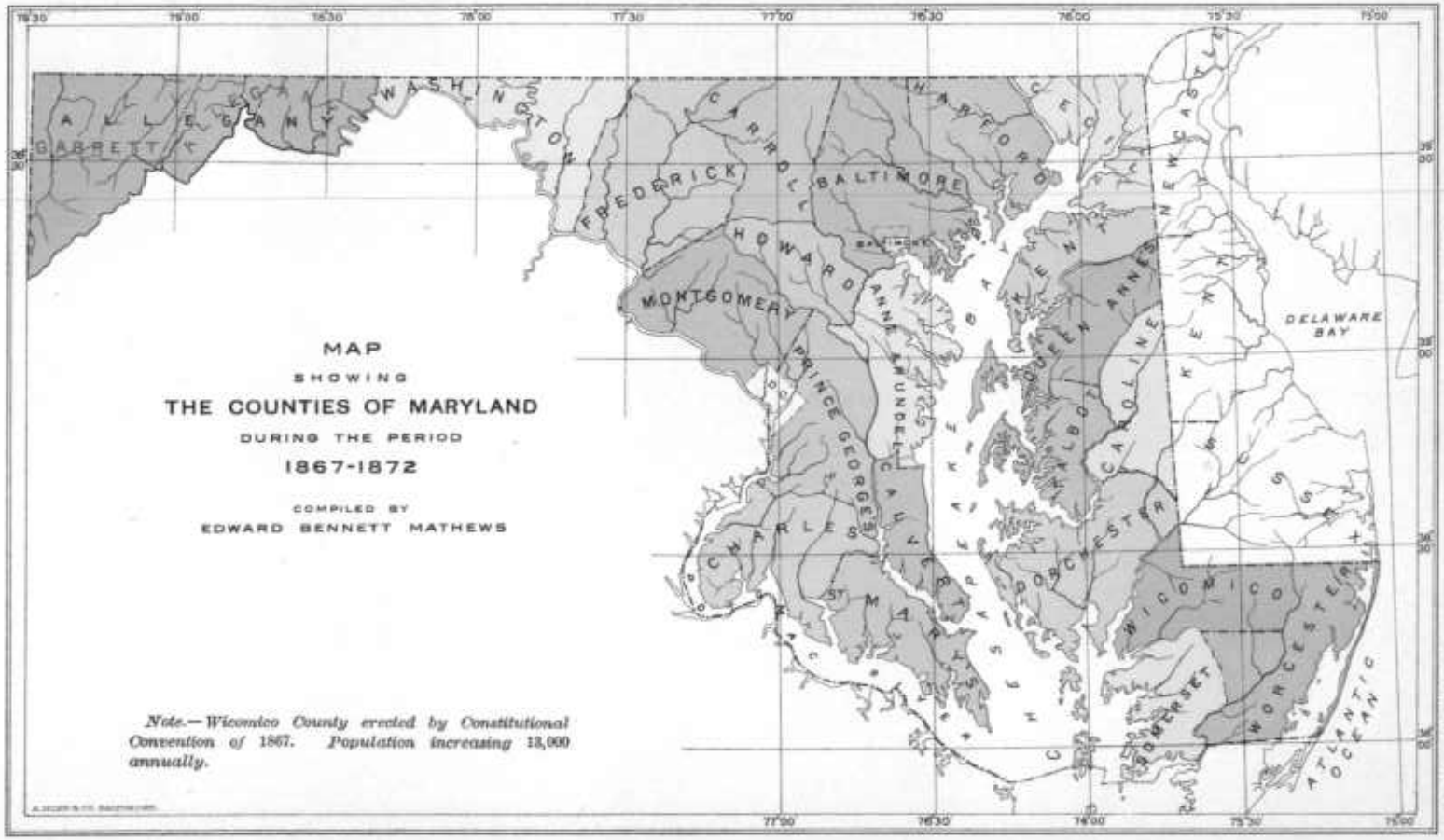
"Beginning at the mouth of Colbourn's creek, and running up said creek by and with the channel to the head thereof near the residence of Aden Davis; thence in a straight line to a lane, known as the Chapel lane; thence by and with said lane in an eastwardly direction, to the Crisfield branch of the New York, Philadelphia and Norfolk Railroad; thence by and with said railroad in a northwardly direction to a point where the county road leading from the "Steamboat Wharf" to Marion station crosses said railroad at said Marion station; thence in an eastwardly direction by and with the county road leading from said railroad crossing to Tull's corner until the bridge, commonly called "The Branch Bridge," is reached; thence by and with the creek or stream crossed by said bridge, known as "East Creek," to its mouth in the "Pocomoke Sound."

1904 Ch. 74. Additional election district 14th, created out of part of the 9th election district so as to

"embrace, comprise and include in said Deal's Island District No. 14 all that part or all those parts of Tangier District No. 9 as heretofore established, commonly known or called Deal's Island and Little Deal's Island in said county."

1904 Ch. 161. Princess Anne or 1st election district divided into two new election districts, 1st and 15th.

"to embrace, comprise and include all that territory known as Precinct No. 1, that is to say, all that part of Princess Anne Election District No. 1 lying and being situate west of that certain line beginning where the line of the Crisfield branch of the New York, Philadelphia and Norfolk Railroad crosses the southern extremity of said Princess Anne Election District No. 1, thence running in a northerly direction by and with said railroad to the point where the old county road, at or near the southern extremity of Main street in the town of Princess Anne, intersects said railroad, thence by and with said Main street through said town of Princess Anne and by and with the county road extension of said main street to the point where said county road first crosses said railroad near the residence of George T. McClemmy, thence by and with said railroad through the remainder and to the northern extremity of said district; and the other of said new districts hereby established, to be called and known as East Princess Anne Election District No. 15, and to embrace, comprise and include all that part of said Princess Anne Election District No. 1 which is now known and called Precinct No. 2 of said Princess Anne Election District No. 1, and lying and being situate to the eastward of the aforesaid divisional line."



TALBOT COUNTY.

The first settlement of whites on the eastern shore of the Bay was near Stevensville on Kent Island where the inhabitants were relatively free from sudden attacks of the Indians. For nearly two decades after the settlement on the island no attempts at gaining a foothold on the mainland are on record, although it is probable that when the Marylanders reduced Kent Island in 1647 some of the former inhabitants moved across the straits to the adjoining shore. On July 5, 1652, by a treaty the Susquehanna Indians granted to the whites the right of settlement along both sides of the Bay from the head of it to the Patuxent on the western shore and the Choptank on the eastern. The prospect of relative security seems to have stimulated migration landward along the shores of the Choptank, Chester, and intervening estuaries. In 1658 land was taken up on the Chester River and by 1665 grants are found recorded of land as high as Southeast Creek lying about five miles below Chestertown.

The growth of population on the mainland was met by the erection of Talbot County about 1661, the exact date is unknown as the order for its creation has not been found. The earliest record referring to the county is that of February 18, 1661-2, when the Council records the order "that Moises Stagwell be Sherriffe of Talbott County till the County Co^{rt} can meete to p^{r}sent other persons to the Gouernor & Councell." This would indicate that the county had just been erected and that the date assigned should be 1661-2 rather than 1660-1, as suggested by McMahon and others who have perhaps overlooked the differences in style of calendars. Nothing is known of the limits of the territory which was intended to be included within the new county, although it was limited on the Choptank River when Dorchester County was erected in 1668-9. The first suggestion of its western limits are found in the proclamations of the Governor appointing landing places for vessels during the years 1667 to 1669. From these it would appear that the northwestern boundary of Talbot passed along the eastern shore of the Front Wye River northward to the head of Harris Mill Branch and thence down Tanyard Branch and possibly up Langford's Bay toward Wharton Creek on the Bay shore. To the west of this line would be

Kent County with its County Court held on Kent Island until 1686, when it moved to New Yarmouth on Grays Inn Creek. On the east would be Talbot County to the eastern limits of the province, at this time nominally extending to the Delaware Bay, although the representatives of the Duke of York were just beginning to grant patents for its lands. On the north the boundary of Talbot County with respect to Baltimore County was obscure. The latter apparently included Sassafras River and early land records and ferry-rights would seem to indicate that the boundary line lay somewhere along the divide between the Sassafras and Chester rivers. What are now the first and second districts of Kent County may possibly have been an unsettled portion of Talbot in 1667, but it seems more probable that Talbot County did not exercise jurisdiction on the north side of the Chester River. On the 4th of June, 1671, according to the Kent County records [34] by proclamation it was ordered

> "that for the future the northeast side of Chester, as far as the bounds of Talbot County were formerly on that side, shall now be added to Kent County"

and it was also decreed that Poplar's Island, which had already been given to Kent County on September 24, 1657, should become a part of Kent County. From the terms of this proclamation it would appear that the territory had formerly been in Talbot County.

Twenty years later, on the 31st of May, 1692, the inhabitants of Kent Island petitioned, asking that this historic spot, the first settled in Maryland, might again become an independent county and not, as it then was, an appendage to the more rapidly growing settlement on the mainland. At the same time (June 8, 1692) the inhabitants living on the north side of the Chester River petitioned that if Kent Island be separated into a distinct county there might be a reasonable number of inhabitants added from the settlements on the south side of the Sassafras River. The latter petitioned also that this might be done as it was quite a hardship to them to be compelled to transact their county business on the western side of the Bay at the Baltimore County Court, which at that time was held at old Baltimore on the Bush River.

[34] Liber A, p. 54, quoted in Hansen, Old Kent, p. 221.

At the December session of the Legislature of 1704 petitions were presented in the General Assembly from the inhabitants of Kent and Talbot counties. No action was taken beyond referring the question to the next General Assembly. This petition, however, resulted in the enactment of Chapter 3 of the Laws of 1706, which was approved April 18, 1706. The Act ran as follows:

"An Act for the dividing and regulating several counties on the eastern shore of this province, and constituting a county, by the name of Queen Anne's County, within the same province."

From and after the 1st of May, 1707 the bounds of Talbot County shall contain Sharp's Island, Choptank Island, and all the land of the north side of Great Choptank River, and extend itself up the said river to Tuckahoe bridge, and from thence with a straight line to the mill commonly called and known by the name of Swetman's mill, and from thence down the south side of Wye river to the mouth thereof, and from thence down the bay (including Poplar Island) to the first beginning, also Bruff's Island, in Wye river."

By this Act the obscurity regarding the boundary line between Talbot and Kent was finally removed since the territory lying on either side of it was used to constitute Queen Anne's County. One may recognize a portion of the early boundary in that lying along the east bank of the Front Wye River but beyond that nothing appears to indicate the location of the limits intended by the proclamation of 1671. The act really takes the entire territory between the Sassafras on the north and the Choptank on the south and divides the same into three counties well defined by natural boundaries with the exception of the short line which runs from Wye Mills to Hillsboro, separating Queen Anne's and Talbot counties. At least it is assumed that this arbitrary line is the one represented by the clause in the above line wherein Swetman's mill is placed at Wye Mills and Tuckahoe Bridge at Hillsboro. This is contrary to some of the early maps while early records show that a settlement was made by Mr. Sweetman about this time on the banks of Corsica Creek, where the old mill may possibly have been. According to the modern maps and modern usage Tuckahoe Bridge is situated not at Hillsboro, but near the mouth of Tuckahoe Creek. It is therefore possible that the original line was run from near the mouth of Tuckahoe

Creek to the vicinity of Corsica Creek on the Chester River, but this seems hardly probable. Moreover, there is no subsequent law extant which defines the boundary as it is to-day, and thus it is probable that the present line is the same as that of the law of 1706. Talbot County is one of the oldest counties on the Eastern Shore. Since the county was erected almost as soon as any settlement began it never has been under the practical jurisdiction of any other county. With the exception of the early enactments by the Provincial Council and Assembly all laws now extant, as well as all land and probate records, should be on file at Easton. The County Court of Talbot County was originally on the Wye River but subsequently it was moved to Easton.

TALBOT COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 4 election districts.

1799 Ch. 48. Confirms Act of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 4 election districts.

1852 Ch. 258. Erects new election district (No. 5) out of 2d election district the line to be as follows:

"Beginning at the mouth of Harris' creek and running with said creek to the head thereof, thence with the division line between the lands of James Dawson and William Lowe, thence with said line until it intersects the division line between the lands of William Hambleton and said Lowe, thence with said line, until it reaches the head of a cove or creek, called Emerson's creek, and with said creek until it reaches Miles' river, and thence with the river and bay, including Tilghman's, Poplar, and Sharps' Island to the mouth of said Harris' creek."

1876 Ch. 154. County Commissioners authorized to divide election districts into election precincts.

1892 Ch. 572. Changes boundary line between 3d and 1st election districts to be as follows:

"Beginning at the mouth of Trippe's Creek and running up Trippe's Creek and the north branch thereof, thence with said north branch of Trippe's Creek to a point at or near the residence of Mrs. James P. Hambleton, known as Waterloo, from thence, nearly east with the road leading from the said Mrs. Hambleton's residence to a point on the public road from Hambleton to Dover Bridge, at or near Iveytown colored church, thence with said road until it intersects the present dividing line between Easton and Trappe districts, then following the line as now laid to to the Choptank river."

WASHINGTON COUNTY.

Washington County was erected out of the western portion of Frederick County by the Constitutional Convention of 1776, which decided that Frederick County was then so large that it should be divided into three parts by the erection of two new counties, Montgomery and Washington. The limits laid down at the time for Washington County were as follows:

"Beginning at a place where the temporary line crosses the south mountain and running thence by a line on the ridge of said mountain to the river Potomac, and thence with the lines of the said county so as to include all the lands to the westward of the line running on the ridge of the south mountain as aforesaid to the beginning, shall be and is hereby erected into a new county by the name of Washington county."

The settlements of Washington County were made much later than were those in the counties in the tide-water portions of the State, the delay being due to three factors. The presence of the Blue Ridge at its eastern limits with only the gap at the Potomac River served for a long time as the limit of enterprise and exploration. The territory, therefore, with its fertile limestone valleys and picturesque situation was practically unknown and offered in its wildness and isolation little inducement to the early settlers who found abundance of land on the eastern side of the Blue Ridge. Still another factor appears to have been the fear of stirring up the Indians, whose treaties with the whites forbade the settlement of Europeans to the west of the Blue Ridge mountains.

The dying down of South Mountain in Pennsylvania left an easy passage along the fertile plains of the limestone valley for progressive settlement and the running of the "temporary line" between Maryland and Pennsylvania stimulated settlement on the western side of the Blue Ridge so that before the outbreak of the Revolutionary War there were thriving centers of colonization about Hagerstown, Sharpsburg, and Williamsport. At the time of the termination of the treaty with the Indians Fort Frederick was established on the western side of the valley and the security which it brought, together with the highway from

Pennsylvania to Virginia which crossed the Potomac at Williamsport. stimulated the settlement of the territory.

The "temporary line" referred to in the founding of Washington County was a boundary of great importance to the inhabitants of northern Maryland as is evidenced by its use in defining Washington County eight years after the permanent Mason and Dixon line had been accepted. The "temporary line" was run *ex parte* by a group of Pennsylvania commissioners and surveyors who had started with the Maryland representatives to run a line which should serve as a boundary between Maryland and Pennsylvania until their contending proprietors should come to some agreement resulting in a permanent boundary. This temporary line on the east side of the Susquehanna River was about a quarter of a mile south of the present boundary and west of the Susquehanna River an equal distance north of the present boundary. The original surveyors only ran the line to the top of South Mountain, the eastern limit of Washington County, and the westward extension of the line had been accepted by mutual consent. Thus it will appear that at the time Washington County was laid off its northern boundary was defined according to an unofficial, probably rather vaguely located, line when there really existed the recently surveyed and well-marked Mason and Dixon line which had been accepted by the respective proprietors of Pennsylvania and Maryland and approved by the Lord High Chancellor of England. One wonders whether the rather curious wording of the boundaries arose from ignorance, or patriotism which would disregard the acts of the English courts, or from a latent hope in the minds of the Marylanders that if they were successful in establishing a new confederation they might wrest this narrow strip and add it to the Maryland domain.

The original boundaries of the county remained in force but a few years. The success of the Revolutionary War and the issuing of the Revolutionary Grants for land in western Maryland, the prospective opening of the west and the increased security felt in that quarter stimulated settlement in the vicinity of Fort Cumberland where the distance from the County Court imposed a serious hardship on the new settlers. The new conditions led in 1789 to the erection of Allegany County out

of all that portion of Washington County lying west of Sideling Hill Creek. In this way the boundaries of Washington County were finally fixed as they are found to-day.

WASHINGTON COUNTY ELECTION DISTRICTS.

1798 Ch. 115. Divides county into 5 election districts.

1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commissioners appointed to divide county into 5 election districts.

1800 Ch. 59. Line between 4th and 5th election districts closed and completed by a line due north from the head of the head of the Green Spring Furnace Run to Pennsylvania.

1801 Ch. 59. Commission appointed to change lines and report to County Clerk.

1802 Ch. 66. Repealed by 1805 Ch. 97.

1816 Ch. 37. Polling place of 5th election district changed to Hancock.

1819 Ch. 188. County divided into 6 election districts and Boonsborough is new place of election, 2d district elections at Williamsport [not confirmed?]

1820 Ch. 85. County divided into 7 districts, the new voting places being Boonsborough and Cave Town, No. 2, to be at Williamsport.

1821 Ch. 29. Confirms Acts of 1820 Ch. 85.

1821 Ch. 70. Levy Court directed to appoint committee to select election places and lay out election districts, 1st Sharpsburg, 2 Williamsport, 3 Hagerstown, 4 Clear Spring, 5 Hancock, 6 Boonsborough, 7 Cavetown. Report to County Court by July 1822.

1823 Ch. 100. Polling place of 3d election district to be in any house in Hagerstown provided consent of owner or tenant is obtained but not in court house.

1832 Ch. 92. Line between election districts 1 and 6 changed. (Repealed 1835 Ch. 225.)

1833 Ch. 30. Confirms Acts of 1832 Ch. 92. (Repealed 1835 Ch. 225.)

1834 Ch. 114. Erects 9th election district out of parts of 3d and 7th districts.

1834 Ch. 166. Parts of 2d and 3d election districts annexed to 4th election district.

"beginning at a point where the division line between Andrew Summer and John Witmer crosses the Conococheague Creek, thence, with a straight line, to the division line between Samuel and David Gruber, and John S. Miller, thence with that division line to the Hagerstown and Conococheague Turnpike Road, thence with a straight line to and with the division line between Henry Harsh and

George Harsh, thence to and with the division line between George Harsh and George Houer, from thence with a straight line to the Conococheague Creek and thence with said creek to the place of beginning."

1834 Ch. 176. Makes acts of Commission of 1833 Ch. 30 effectual.

1834 Ch. 235. Part of 2d election district annexed to 3d election district as follows:

"Beginning on the Hagerstown and Conococheague Turnpike Road, where the road to George Sprecher's Mill leaves the said turnpike road, running thence to the mouth of Jacob Bovey's Lane, thence to and with the division line between Jacob Bovey and John Baer, thence to and with the division line between Jacob Bovey, Isaac Bear, and Philip Sprecher and Martin Beer, to the Williamsport road, thence with said turnpike road to the place of beginning."

1835 Ch. 17. Confirms Acts of 1834 Ch. 166.

1835 Ch. 225. Repeals Acts of 1832 Ch. 92 and 1833 Ch. 30.

1836 Ch. 148. Commission appointed to lay out additional election district from 3d and 7th subject to confirmation.

1837 Ch. 210. Confirms Acts of 1836 Ch. 148.

1837 Ch. 185. Line between 1st and 6th election districts changed by putting part of 6th in 1st.

"Commencing at Peter Showmans schoolhouse; running thence with the road to Wm. Lewis blacksmith shop and thence with said road to the division line of said election district.

1837 Ch. 186. Judges authorized to locate polling places.

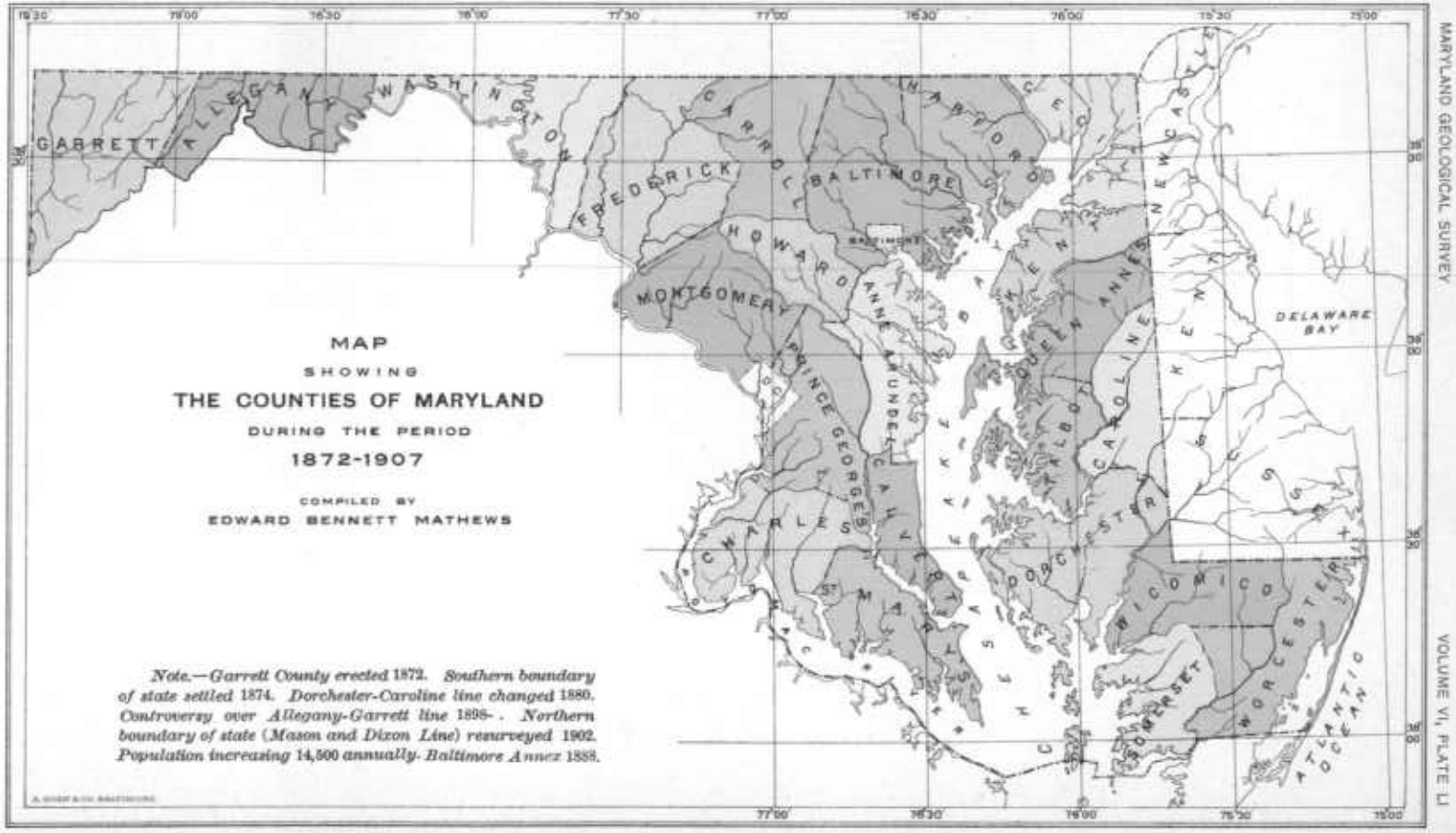
1840 Ch. 160. Changes line between election districts 6 and 7.

"Beginning at the hand-board near Jacob Snaveley's where the Cavetown and Boonsboro' road crosses the Ohr's Gap road, and running northward with the said Cavetown road to where the Blue Rock Run crosses the same, then with said run to its source, and from thence with a due east line to the Frederick county line.

1840 Ch. 257. Refers to possible cession by Congress of part of District of Columbia.

1840 Ch. 264. Changes line between election districts 3 and 9.

"Beginning at the Pennsylvania line, where the Waynesborough road crosses the same, and running with said road to the Paradise School House and from thence with the public road to Frederick Zeigler's mill, and from thence with a straight line to the end of Peter Spessard's lane on the road leading from the Forge Mill to Hagerstown, and thence with said road to the fording at the Forge Mill where it intersects the original location of said ninth district."



MARYLAND GEOLOGICAL SURVEY

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1847 Ch. 164. Commission appointed to lay out, from parts of election districts 3 and 4, Cunningham district No. 10.

1849 Ch. 401. County Commissioners authorized to divide election district No. 3 into two wards or to erect the Funkstown or 10th district.

1852 Ch. 61. Commission appointed to form Sandy Hook election district out of 1 and 8.

1852 Ch. 126. Amends preceding by modification of commission.

1852 Ch. 223. Erects additional election district out of parts of Sharpsburg, Williamsport, and Boonsboro' districts contiguous to each other, commencing for the boundaries of said district, at the college of St. James, then to the mouth of a lane, on the Hagerstown and Sharpsburg road, one mile north of Jones' cross roads, thence east with the division line of district number six and ten, to the Antietam creek, thence with said creek, to a bridge crossed by a road leading from Keedysville to Bakersville, thence with said road to the schoolhouse in Smoketown, thence with the road via John Poffenberger's, to Dorenberger's warehouse, thence with the Potomac river two miles, thence with a straight line to a house on the Williamsport and Sharpsburg road, one-fourth of a mile west of Mount Moriah school house, thence with a straight line to the place of beginning."

1854 Ch. 206. Additional election district erected out of part of the 5th election district.

"Beginning at the mouth of a run emptying into the Potomac river, in election district number five, known as Doctor Jacque's saw mill run, thence to the Pennsylvaula line, near a new bridge across Licking creek, in Pennsylvania, thence east along the Pennsylvania line, to the top of a mountain commonly called Blair's valley mountain, and with the top of said mountain to the turnpike at Fairview, thence with the turnpike to William Kline's, thence with the top of the stone quarry ridge to the Potomac, on the lands of Tobias Johnson, thence to the Potomac river, thence along the bed of said river to the place of beginning."

1856 Ch. 326. Changes polling place of the 7th election district to Smithsburg.

1858 Ch. 47. Erects Cunningham Cross Roads (13th) election district out of parts of the 3d and 4th districts.

1860 Ch. 87. Confirms division of county into 13 election districts and authorizes commissioners to erect new ones as necessary.

WICOMICO COUNTY.

Wicomico County, next to the youngest in the State, is one of the four erected by state conventions, the others being Washington, Montgomery, and Howard. In the constitution of the State adopted in 1867 was a section as follows: (Art. 13, section 2)

"Beginning at the point where Mason and Dixon's line crosses the channel of Pocomoke River, hence following said line to the channel of the Nanticoke River, thence with the channel of said river to Tangier Sound, or the intersection of Nanticoke and Wicomico Rivers, thence up the channel of the Wicomico River to the mouth of Wicomico Creek, thence with the channel of said creek and Passerdyke Creek to Dashield's or Disharoon's Mills, thence with the millpond of said mills and branch following the middle prong of said branch, to Meadow Bridge, on the road, dividing the Counties of Somerset and Worcester, near the southwest corner of farm of William P. Morris, thence due east to the Pocomoke river, thence with the channel of said river to the beginning. . . . . then said parts of Worcester and Somerset Counties shall become and constitute a new County, to be called Wicomico County; and Salisbury shall be the County seat . . . . "

No changes have occurred in the limits of the county. It is, however, of interest to trace the different jurisdictions under which the inhabitants of Wicomico County have been placed in the years since its settlement. In the early days of the Province there were no settlements known prior to the seventh decade of the seventeenth century. Soon after the establishment of Somerset County in 1666 settlements gradually extended up the Nanticoke River and on the shores of the Wicomico. As early as 1684 there were enough settlers in the region between Marshyhope Creek and the main branch of the Nanticoke to occasion controversy between Somerset and Dorchester counties which was settled by an order of Council on October 4, 1684, when it was decided that the main branch of the Nanticoke, and consequently the northern boundary of Somerset County, was the northeastern branch of the river. Subsequent to 1742, when the present Worcester County was erected, that portion of Wicomico County lying west of the railroad from Princess Anne to Delmar was the only part within Somerset County. Prior to that time whatever settlements had been made to the eastward were also in Somerset County and records dealing with land transfers, probate courts, etc., should be looked for in Princess Anne, although transcripts of the majority of the important papers have been made for record in

Salisbury. Records between 1742 and 1867 should be on file at Snow Hill, the county-town of Worcester County.

WICOMICO COUNTY ELECTION DISTRICTS.

Prior to 1867 included in Somerset and Worcester counties.

See Acts of 1798 Ch. 115; 1799 Ch. 48, 50; 1824 Ch. 146; 1825 Ch. 27; 1837 Ch. 356; 1838 Ch. 12; 1841 Ch. 36; 1847 Ch. 246; [1852 Ch. 24; 1853 Ch. 301; 1854 Ch. 312]; 1860 Ch. 165.

1868 Ch. 24. Defines the limits of several election districts.

"District number one, or Barren Creek, shall be and remain as it is now defined by law; district number two, or Quantico, shall be and remain as it is now defined and limited by law; district number three, or Tyaskin, shall also be and remain as it is now bounded by law; district number four, or Pittsburg, shall embrace all that part of the district formerly called Cross Roads, embraced and included within the following limits: beginning; and Pittsburg, formerly Cross Roads, shall be the line of the State of Delaware, thence running by and with said channel to bridge called Givan's bridge, thence with a road to a place called St. James' Chapel, thence with a line drawn due west to the line of Parsons' or Nutters' district, at the head of Nassawango creek, thence by and with the line of Parsons' district to the line of the State of Delaware, thence by and with said line to the beginning where the channel of the Pocomoke river crosses the place of voting for said district. Number five or Parsons' district, shall be and remain as now defined by law. Number six, or Dennis' district, shall embrace all the territory south of Pittsburg district to the line of Worcester and Wicomico counties, and all east of the main branch of the Nassawango creek, and Powellsville shall be the place of holding the elections in said district. District number seven, or Trappe, shall be and remain as now fixed by law, except that part which was taken off by the dividing line of Wicomico from Somerset county and the Trappe, shall be and remain the place of holding the elections. District number eight, or Nutters', shall be and remain as now fixed by law, except that part taken off by the new county line, and that part which was formerly Coulborn's district on the west side of Nassawango creek, which is by this Act embraced within the limits of Nutters' district. Number nine, or Saulsbury district, shall be and remain as now fixed by law. District number ten, or Sharpstown, shall be and remain as now defined by law.

That the Surveyor of Wicomico shall . . . . proceed to lay off and survey the boundary line dividing the districts of Pittsburg and Dennis, heginning at Given's bridge, on the Pocomoke river, thence running by and with the road leading to Saint James' Chapel to said point called Saint James' Chapel, thence a due west line to the line of Parsons' district. And for a division or line between Dennis' district and Nutters' the main branch of the Nassawango creek shall be the boundary."

1874 Ch. 261. Polling place of the 7th district changed to Walnut tree lot.

1896 Ch. 451. Line between election districts 5 and 4 changed to run as follows:

"Beginning on the northeasterly side of the county road leading from Forest Grove to Parsonsburgh at a point in the curve of the said road opposite Puhlic School No. 8 and about 100 feet therefrom; thence running north fifty degrees and thirty minutes east, 434 feet to the centre of the county road leading from Salisbury to Parsonsburg; thence with a street called Pine street so far as it runs, north four degrees, west 1,700 feet to the intersection of the county road known as the Parker road with the county road known as the new county road, by the residence of George W. Farlow."

1898 Ch. 74. Erects additional election district to be known as the 11th election district and to have the following boundaries:

"Beginning at the intersection of the county road leading from Salisbury to Mardella Springs and the county road leading from said road easterly over the Ruark, or Nailor Mill dam, thencc by and with said Ruark or Naylor road to the dam aforesaid; thence up the Ruark or Naylor Mill pond and branch to the mill dam of George W. Leonard of B, and county road leading from Salisbury to Laurel, Delaware; thence by and with said county road to the Delaware line; thencc by and with the Delaware line to Spring Hill lane; thence by and with Spring Hill lane and the county road leading from Salisbury to Mardella Springs to the beginning."

1900 Ch. 426. Erects additional district to be known as the 12th election district and to have the following boundaries:

"Beginning at Shile's Creek at a stone boundary between the lands of J. W. T. Robertson and Jefferson Hughs to Trinity M. E. Church; thence with the centre of said road leading to Tyaskin postoffice to a point where it intersects with a private road leading from said road to the Nanticoke River, about one hundred yards east of the colored school-house; thence with said private road by the house of Henry Jones (colored) and James P. Insleys and E. H. Williams to the Nanticoke River; thence with said Nanticoke River to its confluence with the Wicomico

River; thence with the Wicomico River to the first beginning at the boundaries mentioned herein except the river shall be the new boundaries of the third Tyaskin Election District."

1904 Ch. 133. Erects additional election district to be known as the 13th election district and to have the following boundaries:

"Beginning at the southeast end of the cap-sill of the flood-gates of Humphreys Mill Pond, in Salisbury and thence east by and with Humphreys Mill Pond to a point on the south side thereof in a straight line with the east line of the farm devised by Humphrey Humphreys to Dr. Eugene W. Humphreys, thence to said line and with the same to tho Schumacker road, thence extended in a straight line to the Snow Hill road, thence in a straight liue to a point on the north side of the road leading from Tony Tank to the Snow Hill road, and distant three hundred yards from its intersection with the road from Salisbury to Fook's Mills, thence by and with the north side of Tony Tank and Snow Hill road westward to its intersection with the road leading from Salisbury to Fook's Mills, thence by aud with said road to the north side of the flumeway of Fook's Grist Mill, thence westward by and with Clear Run branch and Tony Tank Mill Pond and creek to the intersection of the said creek with the Wicomico river, thence by and with the channel of the Wicomico river to the south branch thereof, and by and with the south branch thereof to the place of beginning."

1906 Ch. 190. Erects additional election district to be known as the 14th election district out of the 4th election district, and to have the following boundaries.

"Commencing at the Delaware and Maryland line at a point on the county road leading from Bethel Church to Whitesville, Delaware, about two hundred yards west of the residence where Enoch Truitt now resides; by and with the centre of said county road to intersect county road leading from Cobb's Hill to James H. West road at or near Quackinson School House; by and with the centre of said road to intersect the county road known as the Radcliff Farlow road; by and with the center of said county road to old Burnt Mill known also as New Mill; thence a direct line across the lands of William H. Truitt, Washington R. Dennis, William H. Carey and others to the old Rider Adkins mill dam; by aud with the center of the branch to Dennis' Election District line in Wicomico county from Worcester county, and thence north by and with said line to the dividing line between Maryland and Delaware, and thence by and with that line west to the beginning."

WORCESTER COUNTY.

Worcester County, as it was known forty years ago, was erected in 1742 by an Act of Assembly, but more than half a century before that there was a Worcester County erected by order of the Lord Proprietary and even this Act was but the amplification of previous instructions to erect an unnamed county where Worcester now is.

On the 22d of October, 1669, the Council of Maryland, following out instructions received from his Lordship bearing the date of July 28, 1669, ordered

"that from the Hore kill to Mount Scarborough be . . . . erected into a County & called as the Lord Proprietary shall hereafter direct" (Md. Arch., 5: 57).

The limits of the county as here named are the Hore kill or Lewes Creek near Lewes, Delaware and Mount Searborough which, according to Herrman's map of 1670, lay south of Snow Hill, probably near the present town of Searboro. The total elevation above sea-level in this region is usually below forty feet so that it is hard to find any place which might be designated as a "Mount."

His Lordship's instructions at the same time called for the erection of a county, named Durham, which was to extend north of Worcester County along the Delaware from the Whorekill to the 40th degree of North Latitude.

On the 19th of June, in the year 1672, the Proprietary Lord Baltimore through his Governor erected a Worcester County which included practically all of the territory under dispute between himself and the Duke of York (the same having not yet been granted to William Penn). The proclamation runs as follows:

"Beginning at the Southermost Branch of a Bay now called Rehoboth Bay and from thence running Northerly up the Sea Board side to the South Cape of Deleware Bay and thence to the Whore keil Creeke and up the Bay to the fortieth degree Northerly Latitude into a County and do hereby erect the same into a County and it is our will and Pleasure that it shall be a County and called by the name of worcester County in our said Province of Maryland."

According to these limits the Worcester County of 1672 included not only the unnamed county of 1669 but Durham County as well, the lim-

its given conforming more closely with Durham County than with the unnamed since the southern limit in the one case extended to the vicinity of the Calvert-Scarborough line, marking the southern boundary of Maryland but in the later instance only to the south shore of Rehoboth Bay, a little north of the transpeninsular line between Delaware and Maryland.

All of the territory included within these old temporary counties was included within the limits of the original Maryland charter granted in 1632, according to any reasonable and unprejudiced interpretation of the supposed limiting clause *haectenens incluta* found in the preamble of the charter, King Charles I, the grantor, Lord Baltimore, the applicant, and the Duke of York, the subsequent disputant, can all be shown by documentary evidence to have held that any settlements of the Dutch along the Delaware were of no account and should not be respected as granting control away from the English Crown. This view of the English was enforced against the Dutch in 1663-4, when New Amsterdam and the Dutch settlements along the Delaware were captured. When, however, Charles II granted all the territory east of the Delaware River to his brother James, then the Duke of York and Albany, the latter became interested in the settlements upon the western shore and acted on, without actually asserting, the principle laid down by the Dutch ambassadors to Maryland in 1659, viz., that all of this territory had been excluded from the Maryland grant out of regard to the Dutch settlements by the clause in the preamble above cited. Acting on this principle led to assumption of authority and practical occupation by the Duke of York and his representatives, and the land was even granted to William Penn. When the question of ownership arose between the latter and Charles, Lord Baltimore, it was referred to the Privy Council, who were by the circumstances more or less obliged to confirm the title previously assumed by the Duke of York, who had in the meantime become the King, James II. By the decision of 1685 the territory of old Worcester County was decreed to belong to the King and thus it ceased to be a portion of Lord Baltimore's government of Maryland.

The Legislature of 1742 passed an Act (Acts of Assembly 1742,

Chapter 19) upon the petition of certain inhabitants of Somerset County which resulted in the erection of a new county out of the eastern part of Somerset County and called the same Worcester. The line of division through Somerset County forming the western boundary of Worcester County ran, according to the law, as follows:

"up the Westernmost Side of the said [Dividing Creek] and to the Bridges called Denstone's Bridges [on the road from Snow Hill to Princess Anne], and from thence West to the main road called Parahawkin-Road; thence up and with the said road to John Caldwell, senior's, saw-mill [Salisbury?] thence up and with the said road over Cox's Branch, to Broad Creek Bridge [at Laurel, Delaware]."

The enforcement of the order of 1685 taking from him the Delaware portion of his grant had been strenuously resisted by Charles, Third Lord Baltimore, and his successors, although his grandson made an agreement in 1732 conformable to the original order of the Privy Council. This agreement on the advice of his uncle was not fulfilled by the young Lord Baltimore and the Penns had instituted a suit in Chancery for the performance of the agreement, prior to the erection of Worcester County, which was not settled until the decree of the Chancellor in 1750. By this decree the northwestern portion of the Worcester County, then but recently erected, was transferred to Delaware, under whose jurisdiction it has since remained.

No further change was made in the confines or territory of Worcester County until the State Convention of 1867, when Wicomico County was constituted out of the western portion of Worcester and the northern portion of Somerset counties. According to the second section of the 13th article in the Constitution adopted at that time, the territory granted to Wicomico lay west of a line beginning at

"Meadow Bridge, on the road, dividing the counties of Somerset and Worcester, near the southwest corner of farm of William P. Morris, thence [running] due east to the Pocomoke river, thence with the channel of said river to the beginning . . . . [at the point where Mason and Dixon's lines crosses the channel of Pocomoke River]."

WORCESTER COUNTY ELECTION DISTRICTS.

1798 Ch. 115. County divided into 5 election districts.
1799 Ch. 48. Confirms Acts of 1798 Ch. 115.

1799 Ch. 50. Commission appointed to divide county into 5 election districts.

1827 Ch. 50. Divides county into 7 election districts by making 4 districts out of the old 4th and 5th districts.

1828 Ch. 17. Confirms Acts of 1827 Ch. 50 and appoints commission.

1829 Ch. 190. Berlin election district divided into two districts [apparently not confirmed].

1834 Ch. 122. "The divisional line between the 4th and 5th election districts in Worcester County, shall run by and with the northwest side of the plantation w[h]ere Benjamin S. Melson, of Samuel, now lives, and from thence to the northwest side of the plantation where James White of Francis, now lives, until it intersects the line of Delaware, and all that part of the fifth district is now attached to the fourth district."

1835 Ch. 264. Authorizes the division of the 6th election district into two districts.

1836 Ch. 130. Confirms Acts of 1835 Ch. 264.

1836 Ch. 248. Levy Court authorized to select polling place for new district.

1837 Ch. 286. Changes polling place in Costen's and Metter's districts.

1837 Ch. 301. Changes polling place in Berlin district.

1838 Ch. 378. Changes polling place in Salisbury district.

1840 Ch. 151. Changes polling place of 5th election district to Mr. Fish's house in Salisbury.

1841 Ch. 71. Changes polling place of the 7th election district to Stephen Bounds' warehouse.

1843 Ch. 260. Polling place of 1st election district changed to house of Wm. Mason.

1843 Ch. 268. Commission appointed to lay out a new district from the 2d and 3d election districts as follows:

"Commissioners shall commence at the mouth of the creek known as Mill Creek, following the said creek to the head waters thereof, and from thence the most proper route to the head waters of Nine-Pin Branch, and down said branch to the mouth thereof, and for the southern line thereof, commencing at the mouth of the creek leading up to John Tarpen's mill, thence the most proper route to the bridge at Porter's tan yard, thence north of the poor-house from the most proper route to the Pocomoke river. [New Ark district, apparently not confirmed, see 1845 Ch. 35.]

1843 Ch. 344. Polling place of 3d or Berlin election district on Zingle Lot.

1845 Ch. 35. Apparently the same as 1843 Ch. 268 though the latter part is differently worded.

1845 Ch. 144. Repeals section 9 of above calling for confirmation by next General Assembly.

1846 Ch. 275. New district placed in 2d commissioners district.

1852 Ch. 79. Erects additional election district, St. Martins or No. 10, out of Berlin or 3d election district.

"Commencing at the Surf Bank, where the line of this State and Delaware strikes the said surf bank, thence by and with said surf [bank] a south course, until the mouth of St. Martin's river bears northwest, thence a straight line to the said St. Martin's river, and thence running up the middle of said St. Martin's river to Shingle Laundry, thence to the foot of Cooxy Hill road, thence by and with said road to the Pocomoke river, thence by and with said river to the line of Delaware, thence with said line to the first beginning."

1860 Ch. 240. Polling place of the 7th election district changed to Atkinson's Mills.

1860 Ch. 385. Accepts state boundary line of 1688.

1868 Ch. 80. Boundaries of election districts.

"Costen's or Election District number one: commencing at the Pocomoke River at the mouth of Carey's Creek, thence running by and with said creek to Mason's Mills, thence by and with the County Road from Mason's Mills, to a place known by the name of the "Sheep House," and thence in a direct course by survey to the line of the State of Virginia; all of the territory west of said boundary line is included in the boundaries of the said Election District number one. For Snow Hill, Election District number two, the boundaries shall be the same as are now established by law, and shall continue to be the limits of said District. For Berlin, Election District number three, the same boundaries as are now established by law shall continue to be the limits of said District number three. For New Ark, Election District number four, the same boundaries as are now established by law shall continue to be the limits of said district number four. For St. Martin's, Election District number five, the same boundaries as are now established by law shall continue to be the limits of said District number five. For Coulbourn's, Election District number six, the same boundaries heretofore established by law, in so far as they do not conflict with the Election Districts of Wicomico County, or the territory of said County, shall be the limits of said District number six, except as such other additional territory as by this act may be included therein. For Adkinson's, Election District number seven, the same boundaries as are now established by law, in so far as they do not conflict with the Election District of Wicomico County, or the territory of said county, shall be the limits of said District number seven, except as such other additional territory as by this Act may be included therein. For Sandy Hill, Election District number eight, the following shall be the boundaries of said District, namely; all that

territory east of line in the said forty-first Section of this Act mentioned, beginning at the Pocomoke River at the mouth of Carey's Creek, and thence running by and with said creek to Mason's Mills, thence by and with the county road from Mason's Mills to a place known by the name of the "Sheep House," and from thence in a direct line by survey to the line of the State of Virginia.

That so much of the territory and boundaries of the said Election Districts of Worcester County, shall conform to the present boundaries of said Election Districts in such respects as are not altered and changed by the formation and erection of Wicomico County and the special provisions of this Act.

That all that portion of the District heretofore known as Election District number eight, or Nutter's, remaining within the limits and boundaries of Worcester County since the formation of Wicomico County, shall be included in the territory and boundaries of the District known as Adkisson's Election District number seven, except such portion of said District number eight, lying on the east side of the road leading from the furnace known as the Furnace Road, from Salisbury to Snow Hill, which shall be included in Colbourn's, Election District number six, and all the remaining portion and territory of Colbourn's, Election District No. 6, so far as the same remains within the limits of Worcester County, be and the same is hereby established by law as Colbourn's, Election District number eight."

1872 Ch. 111. Changes line between 1st and 8th election districts as follows:

"Beginning on the Pocomoke River at Cottingham Ferry, and running by and with the county road leading from said Ferry, to the county road leading from Snow Hill to Newtown, by way of Davis' Cross Road, thence by and with the county road to a place known by the name of "Sheep House," and thence in a direct course by survey to the line of the State of Virginia."

1872 Ch. 362. Divides county into 8 election districts. There are no changes in Snow Hill, No. 2; Berlin, No. 3; Newark, No. 4; Colbourne's No. 5; and Atkinson's No. 7 except as modified by the separation of Wicomico County in 1867. The bounds of the 1st and 8th election districts are changed to run as follows:

"Commencing at the Pocomoke River, at Cottingham's Ferry, and running by and with the county road leading from said ferry, to the county road leading from Snow Hill to Newtown, by way of Davis' Cross Roads; thence by and with the county road to a place by the name of the "Sheep House," and thence in a direct course by survey to the line of the State of Virginia; all of the territory

west of said boundary line is included in the boundaries of said election district, number one.

For Stockton Election District, number eight; the following shall be the boundaries of said district, namely: all the territory north and east of line in the said forty-first section of this Act mentioned, beginning on the Pocomoke River at Cottingham's Ferry, and running by and with the county road leading from said ferry, to the county road leading from Snow Hill to Newtown, by way of Davis' Cross Roads; thence by and with the county road to a place known by the name of the "Sheep House," and thence in a direct course by survey to the line *to* the State of Virginia."

1872 Ch. 447. Stockton substituted for Sandy Hill as the name of the 8th election district.

1876 Ch. 153. Divides 3d election district into two:

"That all that part of Worcester county known as the third election district of said county, be, and the same is hereby divided into two election districts, to be called respectively the third or East Berlin district, and the ninth or West Berlin district, and described as follows: all that part of said third election district which is east of the public road extending from the northern limit of said district through the town of Berlin, to the southern limit of said district, known as the old stage road, shall be the third election district of Worcester county, and the voting place in which, shall hereafter be in the town of Berlin; and all that part of said district, formerly known as the third election district of Worcester county, which lies west of the public road running through said district known as the old stage road, shall be the ninth election district of Worcester county, the voting place in which, shall be the town of Berlin."

1882 Ch. 377. Changes the line between the 6th and 7th election districts as follows:

"Beginning at the northwest corner of the second election district, thence running with the western line of the second district to Nassawanga creek, thence with the county road, known as the "Salisbury road," to the line of Wicomico county."

1884 Ch. 344. Changes the line between the 6th and 7th election districts to run as follows:

"Beginning at Nassawanga bridge; thence running with the said creek to the Furnace Mill-pond; thence with said mill pond until it intersects Sandy Branch; thence by and with Sandy Branch until it intersects the county road leading from the Furnace Mill-pond to Salisbury; thence by and with said county road until it strikes the line of Wicomico county."

INDEX

MAP OF
MARYLAND
SHOWING THE
GEOLOGICAL FORMATIONS
AND
AGRICULTURAL SOILS

PREPARED BY

MARYLAND GEOLOGICAL SURVEY

WM. BULLOCK CLARK, STATE GEOLOGIST

IN COOPERATION WITH

U. S. GEOLOGICAL SURVEY AND U. S. BUREAU OF SOILS.

SCALE 8 miles = one inch

1907

LEGEND

CRYSTALLINE ROCKS

GEOLOGY.	SOILS.
ACID VOLCANICS. *Fine grained rocks, usually much altered by development of epidote or sericite.*	*Thin clay loam with occasional small boulders; moderately productive; wheat, grass and small crops.*
BASIC VOLCANICS. *Dark colored compact rocks, changed to epidote and chlorite aggregates.*	*Micaceous clay soils with boulders; moderately productive; wheat, grass and small crops.*
GRANITE. *Light grained rocks often with mica in parallel folia.*	*Loam, slightly sandy, good farm lands, wheat, hay, corn and oats.*
DIORITE. *Dark grained rock gray grained rock with much hornblende.*	*Brown clay, somewhat sandy; wheat, corn and grass.*
GABBRO. *Heavy, hard, sometimes coarse grained rocks, weathering into rounded boulders.*	*Heavy reddish clay loam underlain by clay, sometimes stony; wheat, grass and small crops.*
SERPENTINE. *Bright green, gray or reddish brown rock, with characteristic, broken outcrops.*	*Light yellow, thin loam; magnesian, stunted growth of small pines and oaks.*
PRECIPITOUS SLATE. *High grade blue-black roofing slate.*	*Heavy clay loam with rock flakes; seldom farmed extensively.*
CARROLL QUARTZITE. *Finely conglomeratic quartzite.*	*Rocky, sandy soil on hill slopes; forest clad with pine, oak and chestnut.*
PETTILLITE. *Sericite and chlorite schists with numerous quartz eyes.*	*Yellow-brown loam, sometimes sandy or clayey; good farm lands, wheat, oats, corn and hay.*
WISSAHICKON GNEISS. *Mica schists and gneiss usually with much feldspar and carrying garnets, cyanite and staurolite.*	*Yellow-brown loam, micaceous; good farm lands, wheat, corn and grass.*
MARBLE. *Fine and coarse-bedded crystalline marble frequently dolomitic.*	*Heavy clays and meadow lands, fine farm lands, forming lands, wheat corn and grass.*
QUARTZITE. *Micaceous quartz schist or sitrose quartzite, usually carrying black tourmaline.*	*Sandy soil, rather stony; hillside slopes with forest cover.*
BALTIMORE GNEISS. *Highly crystalline gneiss of alternating hornblendic, micaceous and quartzose types, often intruded with pegmatites and granite.*	*Yellow and brown loam with clayey sub-soil; good farm lands, wheat, corn, oats and hay.*
COMPLEX, UNSORTED. *A complex of acid and basic crystallines, calcareous schists and sandstones metamorphosed, in schists.* *Individual members unmapped.*	*Heavy clays, loam and micaceous soils on low lands; rocky thin soils on ridges; good farm lands.*

PALEOZOIC FORMATIONS

	GEOLOGY.	SOILS.
CARBONIFEROUS	CAYUGA (Salina-Shallow). *Red and gray shales and sandstones with thin banded limestone above; 1500 ft.*	*Heavy red loams or sandy loams; fair grass and wheat lands.*
	NIAGARA. *Alternating thin-bedded limestones and shales; 350-500 ft.*	*Yellow clay loam and loams; fair grass and wheat lands.*
	CLINTON. *Fine-colored shales and sandstones with iron ore-bands, 150-300 ft.*	*Shallow loams filled with shale fragments; light grass and grain.*
SILURIAN	TUSCARORA. *Massive white quartzitic sandstone; 150-300 ft.*	*Shallow, grayish, stony, sandy loams; grass mostly forested.*
	JUNIATA. *Alternating thin-bedded red shales and sandstones; 500 ft.*	*Red sandy loams of limited extent; little under cultivation.*
ORDOVICIAN	MARTINSBURG. *Dark slaty shales; 700–1000 ft.*	*Yellow clay loam and loams; fair grass and wheat lands.*
	SHENANDOAH. *Massive bedded blue and white limestones; 1000 ft.*	*Red clay soil; excellent farming lands, wheat, corn, hay and oats.*
CAMBRIAN	ANTIETAM. *Dull brown sandstones grading into shales; 500 ft.*	*Thin, rocky soils; high rounded hills and mountains, unproductive.*
	HARPERS. *Gray, sandy shales with sandstone ledges; 1500 ft.*	*Yellow, sandy soils; pasture lands, grass and mountain ranges.*
	WEVERTON. *White sandstone quartzite and conglomerate; 800-900 ft.*	*Thin, rocky soils; high peaks and ridges; unproductive.*
	LOUDON. *Dark shale with limestones, shales, sandstones and conglomerates; 400-600 ft.*	*Thin, micaceous, sandy soil in low ridges and valleys; grass, pasture lands and mountain ranges.*

	GEOLOGY.	SOILS.
PERMIAN	DUNKARD. *Thin shales and limestones with coal; 100 ft.*	*Yellow sandy and clay loam and thin stony loams; hilly pasture land.*
COAL MEASURES	MONONGAHELA. *Black shales, sandstones, and 4 ft. coal seam; 150 ft.*	*Heavy loams, thin shale soils; pasture land and locally truck crops.*
	CONEMAUGH. *Sandstones and shales with coal and fireclay; 600-700 ft.*	*Yellow shaly loams and thin stony soils with boulders; hilly pastures.*
	ALLEGHENY. *Sandy and carbonaceous shales and sandstones with coal seams; 400-500 ft.*	*Yellow loams and thin stony soils with numerous pasture land and forest areas with some fruit lands.*
	POTTSVILLE. *Massive conglomerates and sandstones with fireclay and coal; 150-300 ft.*	*Thin rocky soils or heavy loams in mountain tops; grass mostly forested.*
CARBONIFEROUS	MAUCH CHUNK. *Red shales and sandy shales and thin sandstones; 800 ft.*	*Red sandy loam on steep hillsides, mostly forested.*
	GREENBRIER. *Gray and brown siliceous limestones; 300-600 ft.*	*Shallow clay loams in narrow bands; grass, wheat and oats.*
	POCONO. *Massive gray coarse sandstone; 350 ft.*	*Shallow, stony and sandy soils; areas forested.*
DEVONIAN	HAMPSHIRE (Catskill). *Alternating red shales and sandstones; 1200-3000 ft.*	*Red sandy loams and loam along ridges; grass, corn and pasture land.*
	JENNINGS-Genesee-Portage-Chemung). *Fine-colored shales and sandstones; 1000-3000 ft.*	*Light yellowish loams; pasture lands.*
	HORNET (Marcellus-Hamilton.) *Dark gray shales and sandstones; 300 ft.*	*Light loams with broken shales; pasture land.*
	ORISKANY. *Calcareous sandstones; 200-300 ft.*	*Shallow gray sandy soil, steep slopes, forested or pasture.*
	HELDERBERG. (Onyx-Lower Pentland-Decrat.) *Thin blue and gray limestones; 50 ft.*	*Stony clay soils, good grass, wheat, oats, rye and timber lands.*

MESOZOIC AND TERTIARY FORMATIONS

	GEOLOGY.	SOILS.
PLIOCENE	LAFAYETTE. *Gravel and sand occurring at higher elevations; 0 ft. Elevation 100-300 ft.*	*Sands and gravels locally hardened; poor farming lands.*
MIOCENE	ST. MARY'S. *Clays, sandy clays and marls; 100 ft.*	*Sands and sandy loams; corn, tobacco, truck and general crops.*
	CHOPTANK. *Clays, sandy clays, sands and marls; 150 ft.*	*Meadow lands and sands or sandy loams; tobacco and truck crops.*
	CALVERT. *Clays, sandy clays, marls and diatomaceous earth; 350 ft.*	*Fine sandy to silty loams; corn, tobacco and general crops.*
EOCENE	NANJEMOY. *Greensands, clays and sands; 150 ft.*	*Light yellow loams and sandy loams; truck crops also wheat, corn and oats.*
	AQUIA. *Greensands, sands and marls; 100 ft.*	*Light yellow loams and sandy loams; truck crops, also wheat, corn, oats and manuring crops.*
CRETACEOUS	MONMOUTH. *Greensand and sand, locally indurated; 75 ft.*	*Sands with sandy subsoils; truck crops and small fruits; chestnuts and oaks.*
	MATAWAN. *Greensand-black, sandy clay, containing green concretions and lignite; 100 ft.*	*Sands with sandy subsoils; truck crops and small fruits; chestnuts and oaks.*
	MAGOTHY. *Sands with dark carbonaceous clays; 50 ft.*	*Sand and sandy loams; tobacco, truck and general crops.*
	RARITAN. *Interbedded sands and clays; 400 ft.*	*Gravelly and sandy loams and sands; medium soil for wheat, corn, hay and truck crops.*
JURASSIC	PATAPSCO. *Variegated clays; 300 ft.*	*Stiff clay; generally very unproductive, often covered with pine thickets.*
POTOMAC GROUP	ARUNDEL. *Interbedded clays with iron ore; 125 ft.*	*Clays and sandy clays; rather poor soil for general crops.*
	PATUXENT. *Interbedded sands and clays; 150-250 ft.*	*Clays and sandy clays; rather poor soil for general crops.*
TRIASSIC	DIABASE. *Narrow dikes or rusty, brown, rounded boulders.*	*Rocky boulders with thin covering of deep red clay.*
	NEWARK. *Red and gray sandstones and shales*	*Red and gray loams; chiefly grass and wheat.*

QUATERNARY FORMATIONS

GEOLOGY	SOILS
PRE-QUATERNARY BELOW TIDE-LEVEL	
SURFICIAL DEPOSITS CHIEFLY IN EASTERN AND SOUTHERN MARYLAND	TALBOT. *Low-lying terrace composed of gravel, sand and clay; 30 ft. Elevation 100 ft.* — *Meadow land, sandy loam and clay; wheat and corn.*
	WICOMICO. *Medium-level terrace, carrying boulders of gravel, sand and clay; 15 ft. Elevation 75-100 ft.* — *Sandy loam and loam with gravel and boulders; wheat, corn, oats and hay.*
	SUNDERLAND. *High-lying terrace composed of loam, sand and gravel; 50 ft. Elevation 75-100.* — *Sandy loam and sands usually in high level patches; tobacco and truck crops.*

A. Hoen & Co. Lith. Baltimore, Md.