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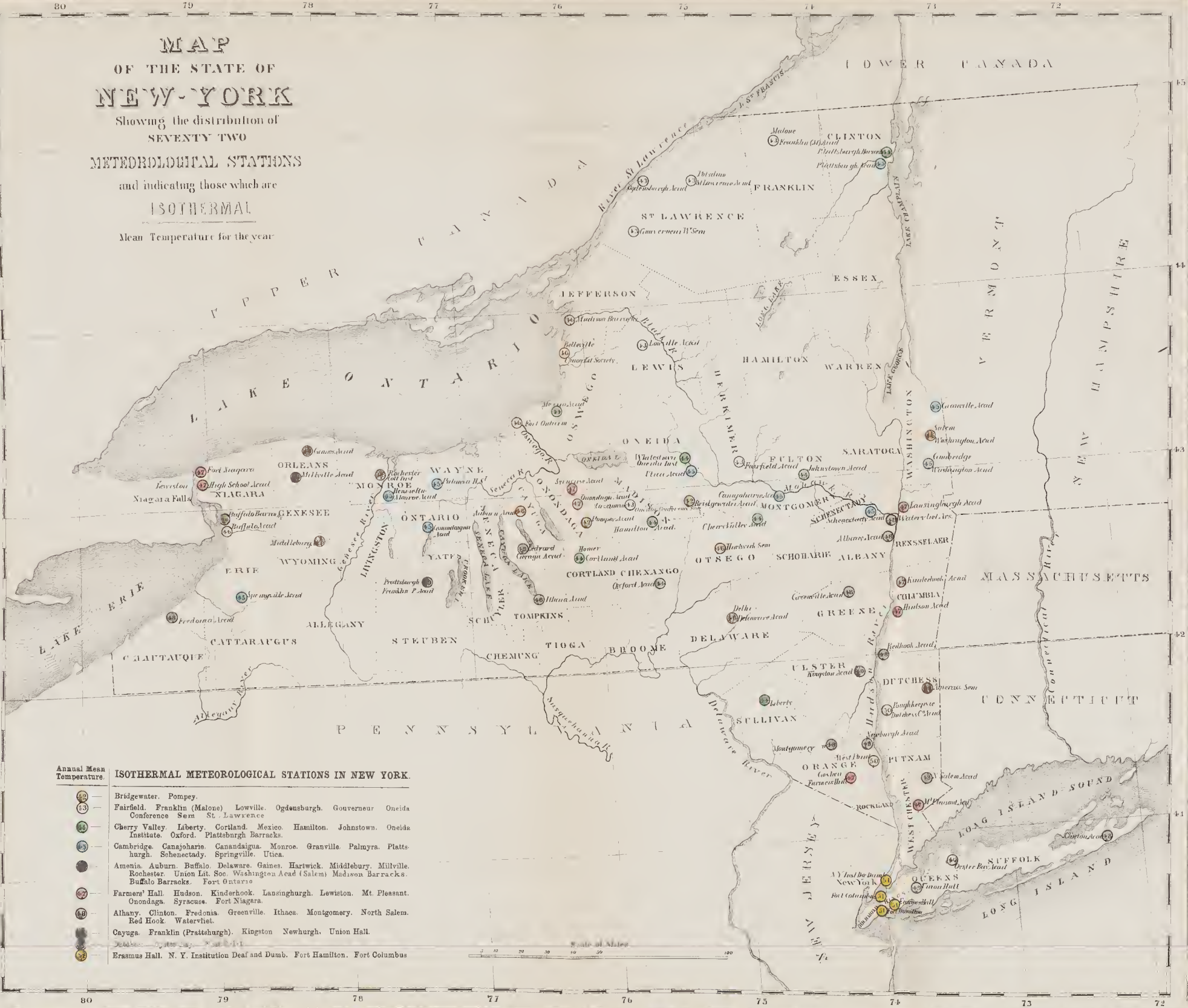
MAP
OF THE STATE OF
NEW-YORK
Showing the distribution of
SEVENTY TWO
METEOROLOGICAL STATIONS
and indicating those which are
ISOTHERMAL

Mean Temperature for the year



Annual Mean Temperature.	ISOTHERMAL METEOROLOGICAL STATIONS IN NEW YORK.
42	Bridgewater. Pompey.
43	Fairfield. Franklin (Malone) Lowville. Ogdensburgh. Gouverneur Oneida Conference Sem St. Lawrence
44	Cherry Valley. Liberty. Cortland. Mexico. Hamilton. Johnstown. Oneida Institute. Oxford. Plattsburgh Barracks.
45	Cambridge. Canajoharie. Canandaigua. Monroe. Granville. Palmyra. Plattsburgh. Schenectady. Springville. Utica.
	Amenia. Auburn. Buffalo. Delaware. Gaines. Hartwick. Middlebury. Millville. Rochester. Union Lit. Soc. Washington Acad (Salem) Madison Barracks. Buffalo Barracks. Fort Ontario
47	Farmers' Hall. Hudson. Kinderhook. Lansinghurgh. Lewiston. Mt. Pleasant. Onondaga. Syracuse. Fort Niagara.
48	Athany. Clinton. Fredonia. Greenville. Ithaca. Montgomery. North Salem. Red Hook. Watervliet.
	Cayuga. Franklin (Prattsburgh). Kingston Newburgh. Union Hall.
51	Erasmus Hall. N. Y. Institution Deaf and Dumb. Fort Hamilton. Fort Columbus

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REPORT

ON THE

MEDICAL TOPOGRAPHY AND EPIDEMICS

OF THE

STATE OF NEW YORK.

SUBMITTED TO THE AMERICAN MEDICAL ASSOCIATION AT ITS ANNUAL MEETING AT NEW HAVEN IN JUNE, 1860.

BY

JOSEPH M. SMITH, M. D.,

PROFESSOR OF MATERIA MEDICA AND CLINICAL MEDICINE IN THE NEW YORK COLLEGE OF PHYSICIANS AND SURGEONS; ONE OF THE PHYSICIANS OF THE NEW YORK HOSPITAL, ETC. ETC.

EXTRACTED FROM VOL. XIII. OF THE TRANSACTIONS OF THE AMERICAN MEDICAL ASSOCIATION.

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REPORT ON THE MEDICAL TOPOGRAPHY AND EPIDEMICS OF NEW YORK.

ANALYSIS.

INTRODUCTION.

IN entering upon the study of medical topography, we are led to inquire, in the first place, what are its objects and purposes? This question, so far as it applies to our own country, in which so many portions of territory are new, or but partially explored, is nowhere, perhaps, so definitely answered as in the letter of instructions addressed by Bv't Brig. General Thomas Lawson, Surgeon General United States Army, to the surgeons attached to the military posts scattered over the Union, in April, 1852. These instructions, designed to direct inquiries relating to military hygiene, and the sources of disease among troops, are no less suited to guide researches concerning the sanitary and morbific agencies, which

affect the general population of our country. The requirements, specified in the letter referred to, are to describe the geographical position of the locality, and "the physical aspect of the surrounding country; the geological formations; its flora; its fauna; the characteristics of climate, the nature and causes of the diseases prevailing at the post and its vicinity, and how far the diseases can be traced to general or local causes, how far to habits and modes of life, to water, diet, &c. &c." It is, moreover, desired that as many facts as possible be collected concerning the vital statistics of the inhabitants in the vicinity, particularly of the Indian tribes, &c., embracing every matter of information calculated to prove useful or interesting to the department and the medical world.[1] In this range of subjects are comprised the topics treated of by Hippocrates in his work on "Airs, Waters, and Localities," a work which has maintained through successive centuries a higher reputation for originality and comprehensiveness of observation than any other of his medical writings.

The ultimate design of the study of medical topography is to discover the general physical agencies which modify the human constitution, and which are especially operative in the production of disease and the preservation of health. In the language of M. Boudin, "Man is not born, does not live, does not suffer, does not die in the same manner on all points of the earth. Birth, life, diseases, and death, all change with the climate and soil, all are modified by race and nationality. These varied manifestations of life and death, of health and disease, constitute the special object of medical geography."[2]

Now, the end we shall aim to accomplish in this report, is to sketch the outlines of the medical topography of the State of New York, and to elucidate the special pathogenetic influences and their effects which are common or occasionally prevalent within her territory. In doing this, the State will be studied in relation to its geography and hydrography, its geology and mineralogy, its flora and fauna, its meteorology and ethnography, and finally its epidemiology. Some of these subjects will be merely glanced at, while

[1] Statistical Report of the Sickness and Mortality of the Army of the United States, &c., p. 3, 1856.

[2] Quoted in the British and For. Medico-Chirurgical Review, July, 1858, from a Treatise on the Medical Geography and Statistics of Endemic Diseases; comprising Medical Meteorology and Geology, &c. By J. C. M. Boudin, Chief Medical Officer of the Medical Hospital du Roule, &c.

those more immediately connected with medicine will receive special attention.

In submitting his report, the writer takes great pleasure in acknowledging the very efficient assistance he has received, in its preparation, from his son Dr. Gouverneur M. Smith.

GEOGRAPHY AND HYDROGRAPHY OF NEW YORK.

The form of the State of New York is nearly triangular; its most southern part, including Long Island, rests on the Atlantic Ocean, and gives it a seaboard of about 130 miles. Its northern and western part is bounded throughout nearly its whole extent by the upper waters of the river St. Lawrence, Lake Ontario, Niagara River, and a portion of Lake Erie. Its remaining frontiers, on the north and the east, are conterminous with Connecticut, Massachusetts, Vermont, and Canada East, and on the south with New Jersey and Pennsylvania. Its territorial area is about 46,000 square miles, the whole lying between 40° 30′ and 45° of north latitude, and between 71° 50′ and 79° 55′ west longitude.

There are few States in the Union which present more diversified aspects of nature than that of New York. In its physical features is recognized almost every variety of configuration of the earth's surface which depend upon mountains, plateaux, terraces, plains, lakes and waterfalls.

The more elevated masses and ridges of earth in the State are parts of the great system of mountains which range northeast and southwest through North America, and which divide the Atlantic slope from the valley of the Mississippi. The chain of the Alleghanies crosses the State about seventy miles from the Atlantic Ocean; and that portion of it through which passes, by a deep gorge, the Hudson River, is called the Highlands, which have an elevation of about 1,529 feet. North of the Highlands, and about twenty miles west of the Hudson, are the Shawangunk Mountains; and still further north are the Catskill and Helderberg Mountains, the former of these reaching to the height of 3,300 feet. On the east side of the Hudson are the Taconic Mountains, running nearly north and south, from Putnam County through Dutchess, Columbia, Rensselaer, and Washington Counties, and then, leaving the State, pass through Vermont into Canada, reaching as far as Quebec. These mountains on the east, and those, just mentioned, on the

west of the Hudson, form the valley of that river. Besides the above, there is the Adirondack system of mountains, consisting of various groups and ranges extending over the northeastern part of the State, among which is Mount Marcy, in Essex County, the height of which, by barometric measurement, is 5,447 feet. To these mountains we shall again refer when treating of the geology of the State.

The hydrographical peculiarities of the State are seen in the development and arrangement of her rivers and lakes, and particularly in their extent, and the courses taken by the former to reach the Atlantic Ocean by estuaries very remote from one another. The State of New York may, indeed, be said to form a high water-shed from which the streams run in various directions. Thus, the Hudson River, with the Mohawk and its other tributaries, empties its waters into the Atlantic Ocean at the port of New York; the Delaware into the bay of that name; the Susquehanna into the Chesapeake Bay; the Alleghany into the Ohio, and thence by the Mississippi into the Gulf of Mexico; and, lastly, the Niagara, Genesee, Oswego, Black, and Oswegatchie Rivers into Lake Ontario and the river and Gulf of St. Lawrence. It is, therefore, by her river system that New York is connected with many States of the Union, and with a vast extent of the Atlantic Ocean; and hence it is, that her position and hydrographical relations enable her to exercise an almost imperial sway over the commercial affairs of the Union.

The State of New York is distinguished no less by the number and magnitude of her lakes and waterfalls, than she is by her other geographical features. With a few exceptions, the lakes have a much greater length than breadth, and extend north and south. Among the more noticeable of these collections of water are lakes Mahopac, Rockland, Saratoga, George or Henricon, Champlain, Schroon, Saranac, Long, Pleasant, Black, Oneida, Skeneateles, Owasco, Cayuga, Seneca, Crooked, and Canandaigua. Besides these there are many smaller lakes in the western part of the State, as Honeoye, Canadice, Hemlock, Conesus, Java, Bear, Loon, and Chautauque Lakes. On glancing over a map of North America, above the latitude of 42°, it will be seen that the lakes of New York are very diminutive compared with those vast bodies of water known as lakes Ontario, Erie, Huron, Michigan, and Superior, and which, with the St. Lawrence River, collectively constitute an expanse of fresh water equal to 72,930 square miles, an amount of

fresh water greater than exists in any area of the same extent in any quarter of the globe.

Of the waterfalls in the State of New York, the most worthy of notice are the Catskill, in Greene County; Glens on the Hudson River; the Cahoes on the Mohawk River; the Trenton on Trenton Creek; the Hector and Taghannuc in Tompkins County; Genesee at Rochester; Medina in Orleans County, and lastly, and the most stupendous of all, a part of the cataract of Niagara.

GEOLOGY OF NEW YORK.

Among the earlier and more distinguished contributors to our knowledge of the Geology of the State, are Dr. Samuel L. Mitchell, who has been styled the father of natural history in New York, Dr. Samuel Akerly, Hon. De Witt Clinton, Dr. T. Romeyn Beck, Prof. Amos Eaton, and Dr. Lewis C. Beck. Of the labors of these eminent naturalists, those of Dr. Mitchell are the more extensive and systematic. Indeed, to him are we mainly indebted for the first comprehensive view of the leading geological features of the State. In addition to his original writings on the subject, he published, in 1818, an edition of Cuvier's *Theory of the Earth*, a work which he enriched with many interesting observations on the *Geology of North America*, embracing important matter relating to the State of New York. In 1820, Dr. Akerly published an *Essay on the Geology of the Hudson River and the Adjacent Regions*, illustrated by a geological section of the country from the neighborhood of Sandy Hook, in New Jersey, northward through the Highlands in New York, towards the Catskill Mountains. With this exception, and that of a geological map of Saratoga County, by Dr. Steel, and of another of the United States, by Mr. McClure, published in Paris, and reproduced, with some variations, in Cleveland's *Mineralogy*, in 1816, there was little or nothing done, in the way of illustrating the subject, until after the legislature, in 1836, authorized by law a survey of the natural history of the State. This important act was passed chiefly through the influence of the able and lucid report of the Hon. John A. Dix, Secretary of State, made to the legislature, in 1836, pursuant to a resolution of that body, passed in the preceding year, directing that officer to report "the most expedient method for obtaining a complete geological survey of the State, which should furnish a perfect and scientific account of rocks

and soils, and their localities, and a list of all its mineralogical, botanical, and zoological productions, and for procuring and preserving specimens of the same, with an estimate of the expense of the undertaking."

The report was so favorably received, that the legislature, in the following April, passed an act, ordering a survey of the State to be made, and appropriated a large sum to carry the same into effect. Other acts relating to the same subject, and making further appropriations of money, were passed in several subsequent years. The plan of the survey was devised by the Hon. Wm. L. Marcy, then governor of the State, a plan which evinced the enlightened views and liberal policy of that statesman. Of this great scientific and economical measure, it has been justly said by one of the able naturalists engaged in the survey, that "the State of New York, which has heretofore established her claim to the dignity of the Empire State, has now added another wreath to her laurels, in becoming the first in the patronage of science, and in the benefits thereby bestowed on her citizens, as she is the first in resources, in commerce and public improvements."

In arranging the details of the survey, the several subjects of inquiry were distributed among gentlemen eminently qualified to investigate them. The department of geology was divided among Mr. Wm. W. Mather, Dr. Ebenezer Emmons, Mr. Lardner Vanuxem, and Mr. James Hall.[1] The spirit and industry with which the work was commenced and prosecuted to its completion, are demonstrated in the pages of the four splendid quarto volumes, printed by the State, and also in the collection of specimens in the cabinet of natural history at Albany.

In order to secure an accordance in their respective reports, the

[1] The following are the districts and counties assigned to the several geologists:—

The first district, embracing the counties of Washington, Saratoga, Schenectady, Schoharie, Delaware, and all east and south of this county, within the limits of the State, to Mr. Mather.

The second district, comprising the counties of Essex, Clinton, Franklin, St. Lawrence, Jefferson, and Hamilton, to Dr. Emmons.

The third district, including the counties of Montgomery, Fulton, Otsego, Herkimer, Oneida, Lewis, Oswego, Madison, Onondaga, Cayuga, Cortland, Chenango, Broome, and Tioga, to Mr. Vanuxem.

The fourth district, comprising the counties of Wayne, Munroe, Orleans, Niagara, Seneca, Ontario, Yates, Livingston, Genesee, Wyoming, Erie, the western part of Tompkins, Chemung, Steuben, Alleghany, Cattaraugus, and Chautauque, to Mr. Hall.

gentlemen employed in the survey adopted, at the outset, by general consent, a tabular view of the systems and groups of the rocks of the State, and followed it, with no important variations. "The names," says Mr. Hall, "have, with few exceptions, been derived from well known places, where the rock is best developed, indicating, in all cases, an important point for the investigation of observers." This plan was eminently conducive to a luminous exposition of the subject. The following are the geological systems and groups arranged in the ascending order.

1. THE PRIMARY, OR HYPOGENE SYSTEM.

This system includes granite, gneiss, sienite, mica-slate, augite, hornblende, talcose slate, steatite, and certain marbles or limestones, &c.

The localities which the primary rocks occupy in the southern part of the State are a portion of Staten Island, a small area at Astoria, on Long Island, and nearly the whole of the counties of New York, Westchester, Putnam, and a part of Dutchess, on the east side of the Hudson River, and of Rockland and Orange Counties, on the west side. In the northeastern part, they occupy about two-fifths of Saratoga, and one-fifth of Washington Counties, and form several mountain ranges in Hamilton, Essex, Franklin, Clinton, and Warren Counties, usually called the Adirondack Mountains. Several of these mountains have received special names, as Mount Marcy, McIntyre, Henderson, and Taylor's Mountains, &c. The name given by the State geologist to these mountains, is the Clinton Range. Besides these, there are other mountains of hypogene rocks in this region of the State, as Mount Seward, and another called White Face, which is said to afford from its summit, "the most imposing mountain view of any in the northern section of the State."

The outcrops of the primitive rocks, in many places, indicate, in the inclinations of their strata, that an immense upheaving force had been exerted to bring them into their present position. It is stated by Dr. Gale, in his geological account of the island or county of New York, that the dip of the strata of the gneiss rocks was taken at eighty-four places, and that of these twenty-nine were vertical, thirty-eight were to the west, and eight to the east. The medium dip to the west was about 85°.

In some of the primary rocks are metalliferous beds and veins.

Of these, the most abundant and valuable are of iron. Extensive masses of the magnetic oxide of that metal occur interstratified with gneiss, and hornblende gneiss, in the Highlands, in Putnam County. The mining operations at this locality, and the smelting of the metal at the Cold Spring Furnace, are on an extensive scale, and annually produce an immense amount of pig iron. Beds of iron ore abound also in the neighboring counties of Westchester and Orange. The mines in this region have long been worked. They furnished the iron of which the first anchor was made in the State of New York, and of which was forged the great chain that was thrown across the Hudson, in the time of the Revolution, to prevent the passage of the British ships above the Highlands. Besides the above localities of iron, there are others in the northeastern part of the State, and especially in the mountainous parts of Saratoga, Washington, Warren, Hamilton, and Essex counties.

Of the primary rocks there are some varieties which are largely employed in architecture, sculpture, and the construction of public works. The more valuable of these varieties for the purposes mentioned, are granite, gneiss, and the marbles. Extensive quarries of granular marble exist near King's Bridge, in the county of New York, and at East Chester, Sing Sing, and a few other localities in Westchester County.

2. THE TACONIC SYSTEM.

This system comprises the rocks of the Taconic Mountains already mentioned. It consists of the, so called, Taconic slates, Stockbridge limestone, of which the New York City Hall is built, magnesian limestone, granular quartz, and various modifications of these deposits. Mr. Vanuxem states that these rocks are found in a few places in the northeastern part of Lewis County. The points in which they differ from the hypogene, or primary, are specially delineated by Dr. Emmons, who was the first to distinguish them. He says: "Much confidence is felt in the correctness of the principles which have influenced me in proposing their separation;" and he thinks "that they possess characters fully sufficient to give them an independent place in the systems of the day." It is said by Mr. Vanuxem that the Taconic system is "a convenient receptacle for deposits which belong neither to the Primary or the New York system."[1]

[1] In regard to the rocks in question, the writer is not prepared to state to what extent the geologists of the present day approve their separation. Mr. Lyell re-

Agreeably to this view of the subject, the formation of the Primary rocks completed the first period of geological time, and the formation of the Taconic, the "*intermediate period.*" Down to this last epoch, the combinations of the elementary principles of the earth were governed by physical attractions and repulsions. It was within, or toward the close of this period, that the principle of life was introduced upon the earth's surface; or, in other words, it was then that the earth assumed a condition which rendered it a fit residence for those animated forms which, by Divine appointment, were the forerunners of the progressively higher and more complicated organisms which appeared, with the successive geological formations, anterior to the creation of man. Dr. Emmons says that in the Taconic "rocks we have, for this country at least, the true *palæozoic base*, and that in them exists those organic forms which are strictly entitled to the designation *protozoic.*"

The time, therefore, which intervened between the deposits of the Primary and New York systems is one of peculiar interest. It divides the age of our planet into two grand parts; the first embracing the period of the exclusive operation of physical agencies, and the inorganic combinations of matter, a period of sterility and desolation; the second, the period of the operation of a vital principle, producing organic combinations of matter or living forms, endowed with the power of reproducing their kind, and with instincts and capacities fitting them to fulfil the purposes of their creation.

3. THE NEW YORK SYSTEM.

The rocks of the New York system occupy a part of the valley of the Hudson and the whole of the central and western parts of the State. Of this system, Mr. Mather remarks that the name given to it is a "geographical one; not that the rocks are confined to New York, for they really occupy a very large proportion of North America, and probably more than one-half the land of the temperate zones of the earth; but because they are in New York better developed and are so situated that their superposition and fossil and mineral characters can be more easily studied than in any other part where these rocks have been examined."

The New York system comprises most of the *Cambrian system* of

marks that the predominant rocks of the Taconic Mountains "would, in the ordinary nomenclature of geology, be called primary." (*Travels in North America*, vol. i. p. 195.)

Sedgwick, the *Silurian system* of Murchison, the *Devonian system* of Phillips, in a word, the *Transition system* of Werner, though this last term, it is said, has been found too objectionable to be retained. The rocks of this extensive system are composed chiefly of coarse and fine grits, conglomerates, varieties of limestone, and shales and slates of various colors. They are distinctly stratified, and though in some parts they maintain their original or horizontal position, yet in many others their strata are inclined, undulating, or dislocated, and in others, again, "upturned on their edges, overturned, folded and wrinkled in various ways."

The numerous varieties of strata of the New York system are arranged by the State geologists into five divisions, and are distinguished by the following terms, viz., *Champlain*, *Ontario*, *Helderberg*, *Erie*, and *Catskill*.

These names, as before stated, are derived from well known places, where the rock is best developed. Each of the *divisions* is divided into groups, which, though they closely resemble each other, have physical characters by which they are, for the most part, readily distinguished. The strike or bearing of their outcrops through the greater part of the State is east and west, and their inclination or dip to the south. The following are the groups of the divisions in their ascending order, or, in other words, in the order of their superposition, according to Mr. Vanuxem:—

1. Champlain Division: 6 *groups*, viz., Potsdam sandstone, calciferous group, Black River limestone, Trenton limestone, Utica slate, Hudson River group. These groups are the lowest in the series of sedimentary fossiliferous rocks.

2. Ontario Division: 5 *groups*, viz., Gray sandstone, Medina sandstone, Oneida conglomerate, Clinton group, Niagara group. In this division are the more remarkable waterfalls in the State, as those of Medina in the sandstone group of that name, and of Rochester and Niagara in the Niagara group.

3. Helderberg Division: 9 *groups*, viz., Onondaga salt group, Water-lime group, Pentamerus limestone, Catskill shaly limestone, Oriskany sandstone, Cauda-galli grit, Schoharie grit, Onondaga limestone, Corniferous limestone. This division is distinguished by the value and abundance of its mineral products. The more important of these occur in the Onondaga group, so called from being

in the county bearing that name, a group comprising extensive and accessible masses of sulphate of lime or gypsum, and also the saline fountains which furnish immense supplies of salt, an article which yields a remuneration to the manufacturer, and a revenue to the State. The Onondaga salt group is thin near the Hudson River, but its outcrop deepens and widens in its western progress, till, in the counties of Madison, Onondaga, and Cayuga, its breadth averages about ten miles.

4. Erie Division: 7 *groups*, viz., Marcellus shales, Hamilton group, Tully limestone, Genesee slate, Portage group, Ithaca group, Chemung group. The varieties or groups of this division of rocks are, in an economical point of view, among the most valuable in the State. They consist of stratified, sometimes fissile, and indurated, gray, greenish-gray, olive, black and brown colored sandstones, frequently called *graywacke*, and also of similarly colored slates and shales. The foundation and a part of the Catskill Mountains are composed of the rocks of this division, and also a part of the summit of the Helderberg Mountains. The same groups extend from the Delaware River to Kingston and along the west side of the Hudson River to Albany County, and thence to the northwest and westward on the south side of the Mohawk valley, spreading over the region between the Erie Canal and the State of Pennsylvania.

The Erie division of rocks is the more interesting, as from it is obtained flagging and building stone of a superior quality. Quarries in these rocks have been opened in different localities, especially in the counties of Sullivan, Ulster, Albany, and Greene. The popular names of the flagging stones are derived from the names of the places which produce them. It may here be not uninteresting to remark that much of the flagging and curb-stone used in the city of New York is brought from the Bolton and Haddam quarries in Connecticut.

5. Catskill Division: Mr. Hall regards this division as a distinct system, and in his order of arrangement places it after the New York system, under the name of the *old red system* or sandstone, while Messrs. Vanuxem and Mather regard it as the terminal member of the New York system. Though there seems to be no solid objection to the arrangement of Mr. Hall, yet the position given to the system by the latter gentleman is perhaps the right or preferable one.

The lithological characters of the system in question are somewhat various. Some of the rocks consist of red shale or slate, and fine grained red sandstone, others of dark colored shale and slate, and sometimes of hard greenish gray sandstone. These rocks compose a large portion of the Catskill Mountains, and the same formation extends from these mountains into the counties of Sullivan, Ulster, Greene, Albany, Schoharie, Delaware, Chenango, Otsego, Broome, and Tioga, and a part of the western territory of the State. It is noticeable, that where traces of coal appear, the old red sandstone underlies the conglomerate on which that material is superposed.[1]

4. CARBONIFEROUS SYSTEM.

Though coal does not occur in a notable quantity in the State of New York, yet as there are rocks which are usually associated in age and position with the great coal measures, it has been deemed proper to apply to them the term Carboniferous System. "All the workable coal seams of the country," says Mr. Hall, "are confined to this formation," and he further says, but "a single member, the lowest of the series, occurs in the State; unless it may be in the counties of Delaware and Sullivan. This member, the conglomerate (or equivalent of the mill-stone grit of England), forms numerous outliers in the fourth district." It consists of pebbles of white quartz and coarse sand. The quadrangular forms in which this silicious conglomerate is broken up into large masses, and the mode in which they are exposed and arranged on the surface of the earth, give to them so strong an architectural resemblance as to occasion some of their groups to be called *Ruined Cities*, *Rock City*, *&c.* In some situations the conglomerate passes into sandstone; but in neither of these forms is the rock remarkable for fossil remains; when these are found it is usually in the sandstone. The palæontological features of these deposits are more manifest in their extension beyond the boundaries of the State. The localities in which the conglomerate of the carboniferous system is mostly found, are the southern border counties of Chemung, Allegheny, and Steuben. As the rock in question is found in Pennsyl-

[1] In regard to the old red sandstone, no one can hesitate to adopt the sentiment of Mr. Hall, that, "it is to be hoped, that some one with powers of investigation and description like Mr. Miller, of Glasgow, will one day give us a work upon the old red sandstone of the Catskill Mountains, similar to his upon the same rock in Scotland."

vania, Ohio, and other States, to underlie the coal measures, and as no coal has been found where this relation does not exist, and moreover, as no coal has been found above or reposing upon the same, where it occurs in New York, it is reasonably inferred that no coal fields exist in the State. It is true, very thin interstratifications of coal of a few feet in length and an inch thick have been found in a few places and in connections different from those just described, but such examples do not fall within the range of the coal formations, as will be shown hereafter.

5. THE NEW RED SANDSTONE AND TRAP.

It is remarkable that the rocks constituting the New York system are nowhere overlaid by rocks more modern than the coal formation, except in a few limited districts, where the newer secondary rocks or those of the cretaceous group succeed the latter. As an instance of the occurrence of such a newer secondary rock, where there is no coal, is the new red sandstone, in the first geological district, or southeastern part of the State. This rock occurs exclusively in the counties of Rockland and Richmond, underlying the trappean rocks to be noticed hereafter. From the former county it extends into New Jersey, and to the States further south as far as North Carolina. In many localities where the trappean rocks do not rest upon it, its superposed materials are generally drift and alluvial deposits. The rock varies in color; instead of being always brick red it is sometimes brown; it also, as Mr. Mather says, "varies from pebbly conglomerate, through common sandstone, fissile and micaceous sandstone to shale; and in composition from perfectly silicious, to an argillo-calcareous marl." Of the same lithological varieties as those of New York are the red sandstones of Nova Scotia, Connecticut, Lake Superior, and the Rocky Mountains. The red variety is much used in architecture, and the gray and red conglomerate sandstone in constructing the hearths of iron furnaces.

Superimposed on the new red sandstone are the trappean rocks. These, like the former, are limited to small portions of Rockland and Richmond counties. In the former county, they appear on the left bank of the Hudson River, and extending south along the same to Hoboken, present a bold, perpendicular wall, varying in height from 150 to 800 feet. This continuous and elevated range of trap rocks is composed of materials which, it is thought, closely ally it with the columnar basalt of other countries.

The trappean rocks vary in their lithological character, in the course of their range from Staten Island, or Richmond County, through New Jersey, and along the Hudson, to their northern limit in Rockland County. In the former county, they consist of serpentine and greenstone, and its usual associates, magnesian minerals; but they are wanting in the precipitous and columnar features which characterize the rocks on the Hudson River. The volcanic origin of the trappean system is indicated not only by its mineralogical and metamorphic characters, but by the appearance of the new red sandstone on which it reposes, an appearance recognized by geologists as due to heat.

The serpentine hills of Staten Island occupy about seven square miles, and occur mostly in the towns of Richmond, Tompkinsville, and New Brighton. Their elevation above tide-water is about 307 feet. They form a striking feature in the scenery of the noble bay of New York; and the grandeur of the views on the lower part of the Hudson River is mainly due to the elevation and extent of the mural precipices of the trappean rocks. North of these rocks, or, as they are called, the *palisades*, the magnificent river scenery depends upon the altitude, rugged surfaces, and escarpments of the Highlands and the Catskill Mountains.

6. THE TERTIARY SYSTEM.

The development of the tertiary system is confined, for the most part, in the State of New York, to the first and second geological districts; and it is chiefly to Mr. Mather and Dr. Emmons, that we are indebted for our knowledge of its geographical relations. Mr. Mather states that the only tertiary deposits in the first geological district, which have been found, are on the island of New York, Staten Island, Long Island, and Gardner's, Plum, Shelter, and Governor's and Bedloe's Islands, but he says they "undoubtedly exist beneath the drift deposits of most of the islands in Long Island Sound, as Gull Islands, Fisher's Island, Hart's Island, Brothers', City Island, Barn Island, and Riker's Island. It is usually covered by a mantle of the drift, or of the quaternary or alluvial deposits. It is supposed to underlie the whole of Long Island, except that part near Hurlgate, at the west-northwest extremity of the island, where the drift is superimposed directly on the primary rocks." The materials of which the tertiary deposits consist, are chiefly blue, yellowish-brown, and greenish clays, and sands of various colors.

Dr. Emmons, in describing the formations in the second geological district, states "that the valley of Lake Champlain, and the basin of the river St. Lawrence, support a formation composed of clay and sand, to which the name tertiary has been applied." The colors of these materials in their ascending order are, of the clay, blue, and yellowish-brown, and of the sand, yellowish-brown. In regard to the extent of the tertiary of Lake Champlain, Dr. Emmons says, that commencing at Whitehall, at the head of the lake, "it may be traced continuously, not only the entire length of the lake, but also to Quebec; and, as it also appears, far towards the Gulf of St. Lawrence. It also lines the shores of the St. Lawrence River, as far as Ogdensburgh. From Whitehall, south, clay beds, whose characters conform perfectly with those upon the lake, extend indefinitely. In Albany County, it becomes an important mass, and there is great probability that it is contemporaneous with the tertiary of Lake Champlain, though as yet fossils have not been discovered in it, to complete its identity; it is, however, to be remembered that a large part of the clay upon Lake Champlain, is also destitute of fossils, and here the dissimilarity is not so great as at first may appear." Mr. Hall, in noticing the tertiary formation in his account of the fourth geological district, says it is principally embraced within the first and second geological districts; "though the clays and sands extending along the valley of Lake Ontario are in nowise distinguishable in their lithological aspect from those which contain organic remains in the valleys of the St. Lawrence and Champlain. From a comparison of these deposits, there is no difference which would justify a reference to different epochs."

Upon the whole, it may be said that the tertiary system occupies but a small portion of the surface of the territory of New York, or, in other words, there are but few, if any localities, which afford notable examples of its eocene, meiocene, or pleiocene deposits. But though of very limited occurrence in New York, it is, as Prof. St. John remarks, continuous from Martha's Vineyard southward, along the whole extent of the Atlantic coast of the United States.[1]

7. THE QUATERNARY SYSTEM.

This system is spread over almost the entire area of New York; and, as there is neither coal nor any of the rocks of the cretaceous, wealden, oolitic, or, as they are called, the newer secondary

[1] Elements of Geology, 1851, p. 204.

formations in the State, it rests immediately upon the groups of the Primary, Taconic and New York systems. The exceptions to this arrangement are in the limited localities in which it reposes upon the outliers of the conglomerate, or lower member of the carboniferous system, the new red sandstone, and the trappean and tertiary formations already noticed. The system is divided into two parts, 1st, the *Drift* or *Diluvium;* and, 2d, the *Alluvium.*

1st. *Drift.*—This division of the quaternary system lies beneath the alluvium, and greatly exceeds it in the depth and extent of its outspread. The materials of which it is composed are sand, gravel, clay, pebbles, boulders, blocks, and irregularly-formed masses of various mineralogical characters, and are derived from the disintegration or breaking up of the superficial, or exposed portions of the previously existing rocks. These detrita are mingled together, in a great variety of proportions, and in some situations are compacted by an argillaceous cement, in which form they have received the name of *Hardpan.* In some places, the sand and gravel form with lime a variety of sandstone, or conglomerate.

The *drift* deposit is, in a geological, agricultural, and medico-topographical point of view, especially interesting. Its source is manifestly foreign to the situations in which it now reposes. The characters of the fragmentary matters of which it is composed, afford evidence of its being derived from more or less distant places; in some instances from the rocky formations of neighboring districts, and in others from formations more remote. That such is the case, is apparent from the fact that its materials correspond in composition and character with such rocks as occur within the range of various distances from their present position.

The power exerted in the transportation of the drift materials is generally regarded as that of floods of water, and masses of floating or moving ice. The direction in which the boulders and rocky masses have been carried forward, is, it is thought, indicated by the scorings and grooves produced by their friction on the subjacent rocks. These phenomena are distinctly observable in some localities. Examples of rocks, furrowed by such means, are seen on the road from Greenwich, Connecticut, to the city of New York, in Rye, New Rochelle, West Farms, and Westchester. These, says Mr. Mather, are "very striking and obvious." In most instances, the rocky formations which furnish the drift materials, are found in the direction indicated by the course of the scorings and grooves in question. In the eastern part of the State, the drift lies in posi-

tions southeasterly from the rocky formations from which it was detached; on Long Island, south; and in the western part, somewhat west of south. The distances over which it has been transported varies from a few miles to several hundred miles.

Now while the grand geological features of the State are due to the development of lofty mountains and extended valleys, the more immediate, minute, and diversified irregularities of its surface, depend, for the most part, upon the disposition of the diluvium; this latter being so distributed as to produce hills and glens, ridges, undulations, terraces, and plains; or, in other words, to give to each county, town, and village, its peculiar topographical or surface conformation. The elevation of the diluvium above the rocks on which it reposes varies from a few feet to several hundred feet, and it is remarkable that in some places the greater part of the drift consists of sand and gravel arranged in strata which are horizontal, inclined, contorted, curved, or folded. In other cases they are thrown confusedly together, the fragmentary masses being frequently rounded, forming pebbles and boulders, and varying in weight from a pound or two to several tons. Such are the varieties of the drift deposits in the maritime region of New York, and especially on Long Island. "This low island," says Mr. Lyell, "is everywhere covered with an enormous mass of drift or diluvium, and is the most southern point in the United States where I saw large erratic blocks in great numbers."[1] The drift, of the character of that of Long Island, formerly deeply overlaid the primary rocks of the southern part of the island of New York; but much of its superficial and higher portion has been removed for the purpose of filling up depressions of the surface, and making new ground along the shores of the Hudson and East Rivers, and thus levelling and extending the area of the metropolis of the State.

It is worthy of note that our knowledge of the geological characters of the diluvial portion of the quaternary system has been greatly advanced by the multitude of channels and defiles made through it for canal and railroad purposes.

2d. *Alluvium.*—The upper portion of the quaternary system, or *alluvium*, consists of fluviatile, lacustrine, marine, and infusorial deposits. The *fluviatile* is composed of sand or shingle, and is derived from the disintegration of the higher rocky formations. It is usually mingled with more or less organic matters. It is found

[1] Travels in North America. Lyell, vol. i. p. 189.

distributed in patches and belts in many parts of the State, and especially along the shores of rivers. It forms no inconsiderable portion of the banks of the Harlem River, and of the flats bordering on the Hudson, and the streams flowing into that river. It occurs, also, in the valleys of the Highlands and Catskill Mountains, and on the shores of the Delaware and Susquehanna rivers. Among the more remarkable of the alluvions of New York, supposed to be of lacustrine origin, is that called the bog meadows or drowned lands in the argillite region of Orange County, through which flows the Wallkill River. The area of these lands is said to comprise from 30,000 to 40,000 acres. As groups belonging to this variety of the quaternary system, are the bog ores, peats, marls, &c., materials in which have been found the remains of the Mastodon. The *marine alluvium* usually called salt meadows or marshes, is peculiar to that part of the State within the range of the tidal sea water. It is made up of sand, thrown up by the sea and washed down from the higher land, mixed with various organic matters and bearing on its surface a plant denominated salt or marsh grass. The principal localities in which this alluvium occurs are along the shores of Long Island, Staten Island, and New York and Westchester Counties. It is estimated that in Suffolk County it covers an area of 55 square miles; in Queen's County, 40; King's, 12; Richmond, 9; Westchester, 9; New York, 3; which give a total of 128 square miles, or 82,000 acres. Many of those marshes, like those in Holland, admit of being dyked, and brought into a condition suited to the purposes of agriculture. Deposits of the silicious shells or coverings of the *infusoria* have been discovered in many parts of our country, and particularly in the primitive region of New York and New England. The natural history of these fossils has been minutely investigated by the late Prof. J. W. Bailey, of the United States Military Academy at West Point. In some situations their accumulation is very abundant, forming deposits of considerable depth. They are mostly found at the bottom of stagnant waters, of ditches, ponds, and marshes. Many interesting localities of infusoria exist in the Highlands.

Regarded in a scientific point of view, no department of the natural history of New York is more interesting than that of its palæontology. A few remarks on this subject may not, perhaps, in this connection, be inappropriate.

The number and variety of the fossils of the State are scarcely less remarkable than those of its geological formations. Of these

fossils some belong to the protozoic rocks, and some to later geological periods, and the more recent formations. Among these latter the more remarkable are the remains of the *Mastodon giganteus*, already mentioned. So long ago as between 1790 and 1800, portions of several skeletons of this animal were discovered in Orange County.

Of late the study of palæontology has taken a high rank among geological investigations; and for the reason that the age and kind of strata are in many cases more readily determined by their fossiliferous than by their lithological diagnostics. It is true, as Mr. Vanuxem remarks, that "there is yet some scepticism as to the value of fossils as a character to determine the position of rocks; and sufficient attention is not paid to the obvious fact, that the value of the character increases as the knowledge of these bodies increases with the one who uses it," and he pertinently adds, that "fossils are of two kinds: those whose range is limited to one rock, mass, or short period; and those whose range extends through two or more, their value depending upon their range being also limited, though several rocks or simple groups or formations be embraced within their range."[1] To these observations may be subjoined a remark by Mr. Hall, whose studies in fossiliferous geology render his opinions especially interesting. He says: "The territory of New York, from possessing the most complete series, and abundance of fossils, together with the undisturbed position of the strata, offers the most interesting field of investigation and reference, and will be found the best point of departure for the geologist who is making more extended researches."[2]

MINERALOGY OF NEW YORK.

Although the numerous objects treated of in the department of Mineralogy are comprehended in that of Geology, yet there is, for the most part, between these branches of natural history a well defined difference. The former contemplates the mineral *masses* which form the crust of the earth, and especially their general structure, geographical distribution, localization, arrangement and relative positions, whilst the latter studies their generic and specific characters and their chemical composition, in a word, their intimate

[1] Geology of the Third District, by Lardner Vanuxem, p. 26.

[2] Geology of the Fourth District, by James Hall, p. 24.

differential diagnosis. The study of mineralogy should, indeed, precede that of geology. Of him who has acquired a knowledge of the former science only, it has been said by Haüy, as quoted by Cleaveland,[1] "*Il n'a pas encore vu la nature, mais il a reçu des yeux pour le voir.*"

It was with such enlarged views of the objects of these kindred sciences, that in the plan of survey of the natural history of New York, mineralogy was made a distinct branch of research, a branch expressly prescribed to embrace "the examination, scientific description, and chemical analysis," of the mineral products of the State, with notices of their uses in the arts and agriculture. This department, as already stated, was assigned to Dr. Lewis C. Beck; and the volume in which he has given a record of his labors is an admirable digest of the subject. As was due to those who went before him in the same field of inquiry, Dr. Beck gives a brief account of what they had done. He especially mentions the early and elaborate contributions to natural science of Dr. Samuel L. Mitchell, published in the *New York Medical Repository*, in 1798–99, under the title of "A Sketch of the Mineralogical History of the State of New York." He also notices the establishment, in 1799, of a Mineralogical Society in the city of New York, the first instituted in the United States. Among the more zealous of those engaged at that time, and for several years subsequently, in studying the mineralogy of the State, were the Hon. S. M. Hopkins, George J. Warner, Esq., Rev. David Warden, and Dr. Samuel Akerley. In 1810, Dr. Archibald Bruce commenced a periodical in the city of New York, called the *American Mineralogical Journal.* Several other publications served as repositories for the knowledge accumulated in relation to the mineralogy of the State. Among these were the *Transactions of the Society for the Promotion of Useful Arts*, Cleaveland's *Mineralogy*, Phillips' *Elementary Introduction to Mineralogy*, edited, with additions on American minerals, by Dr. Mitchell, Silliman's *American Journal of Science and Arts*, commenced in 1818, the volumes and papers published by the Lyceum of Natural History of New York, an institution founded in 1818, and of a similar lyceum in Albany, established in 1823, and of a few other scientific societies in different parts of the State. The number and variety of mineralogical specimens collected and deposited in the cabinet of natural history at Albany, and in the Albany Academy,

[1] An Elementary Treatise on Mineralogy and Geology.

and some other public institutions of the State, illustrate the extent to which the mineral resources of the commonwealth have been explored.

The stores of knowledge thus accumulated, and the labors of those who had more recently occupied themselves in studying the mineralogy of the State, were carefully reviewed by Dr. Beck; and these, with his own extensive researches, he brought together, analyzed and arranged, pursuant to the principles which govern the classification of minerals, in the volume to which we have referred.

In treating the subject in its various relations, Dr. Beck first divides it into two parts, viz., 1. *Economical,* and, 2. *Descriptive Mineralogy.* It is chiefly in the former of these departments we find the matters which immediately connect the subject, or identify it with medicine. It is, therefore, in relation to some of the more interesting topics in this department, that we propose to confine our observations.

Of the metallic ores in the State, that of iron exists in great abundance. Large ferruginous deposits in the form of the magnetic oxide are distributed in beds or veins, in the primary rocks, as already mentioned, and in some of the rocks of a later geological period. Magnetic iron sand is found on the sea-coast of Long Island, and on the shores of the Hudson, and some of the tributaries of that river, and also on the shores of the great northern lakes. The specular oxide of iron occurs chiefly in the primary formations; and the lenticular or argillaceous iron ore in the western part of the State, where it abounds. The hydrous peroxide of iron (hydrated sesquioxide of iron), or limonite is the most important, and one of the most abundant and extensively distributed of the iron ores, and is the one from which is obtained a large portion of the iron manufactured in the State.

Disseminated, in small quantities, over the northeastern and southern counties of the State, are various other metallic ores. Copper, lead, and zinc ores occur in Columbia, Dutchess, Herkimer, Orange, St. Lawrence, and Ulster counties. Copper is also found in Erie, Jefferson, Niagara, Rockland, and Warren counties, and lead and zinc in Lewis, Monroe, Montgomery, and Oneida counties, and lead in Washington County. Arsenic occurs in Columbia, Putnam, and Essex counties, and titanium in Jefferson, Orange, St. Lawrence, Essex, Montgomery, and New York counties. Cerium has been found in Monroe and Orange counties, and native silver at Sing Sing, in Westchester County. A locality of sulphu-

ret of silver, or, as it is otherwise called, vitreous silver, is said to occur in Columbia County, and, it is thought, probably, also, in Sullivan County. Magnesian minerals are met with in many localities, in the form of green-stone and dolomite, from the latter of which may be obtained, by sulphuric acid, Epsom salt. Numerous localities furnish materials for the manufacture of bricks, pottery, and porcelain. The mineral wealth of the State is further enhanced by extensive masses of gypsum, limestones, marbles, and hydraulic, or water limestone, marls, and tufas.

There is no part of the mineralogy of the State more interesting than that concerning the materials which form the immediate superficial covering of the earth. These materials constitute the *soils* of the State, of which Dr. Beck, in accordance with the classification of David Low, Esq., Professor of Agriculture in the University of Edinburgh, makes five varieties, viz., 1. *Silicious,* or *Sandy;* 2. *Aluminous;* 3. *Calcareous;* 4. *Magnesian;* 5. *Ferruginous.*

Soils are composed of mineral matters, consisting of certain oxides and saline compounds, mingled with more or less decomposing organic matters, in which sulphur and phosphorus are frequently present. The quality of a soil is determined by the kind of mineral which predominates in its composition; and it is to the differences of soil thus produced, are due, in no small degree, the differences in the fertility, and, we may add, salubrity of rural districts. In regard to the different soils in the State of New York, it will be observed, in the following notice of them, that each one is spread over a widely extended surface.

1. The *silicious*, or *sandy soil*, prevails over a large portion of Long Island, and also extensively over Staten Island, New York, Westchester, Columbia, Albany, Schenectady, Montgomery, Saratoga, Warren, Essex, Lewis, Clinton, Franklin, and St. Lawrence counties. The fertility of this kind of soil is greatly improved by mingling with it certain composts, consisting in part of decomposing organic matters. On Long Island, a species of fish, taken in immense quantities from the neighboring waters, is largely used as a manure.

2. The *aluminous*, or *argillaceous soil*, occurs in those parts of the State where the rocky formations are slates, shales, and graywackes, from the disintegration of which, it is supposed, is due its distinctive character. It prevails in the Hudson River counties, and also in some of the northern and western parts of the State.

3. The *calcareous soil* occupies a wide area of central and western

New York, and is remarkable for its fertility, and especially for producing heavy crops of the cereals. "The soil, in its natural state," says Dr. Beck, "contains small proportions of carbonate of lime, resulting from the pulverized fragments of limestone and tufa, with which the western counties are so abundantly supplied. The great quantities of marl and gypsum which are there found, no doubt also contribute to the productiveness of the soil. These deposits of carbonate and sulphate of lime, often occupying the summits and slopes of the hills, by the agency of rain, yield their fertilizing and renovating influence to the valleys."[1]

As carbonate of lime occurs in extensive masses in the northern and southern parts of the State, and as the soil of these parts is much less fertile than the calcareous soil of the western counties, Dr. Beck gives the following exposition of the circumstances or conditions on which the difference depends. "I have thought," he says, "that this difference might arise from the difference in the state of aggregation or division of the various limestones and calcareous matters. It is well known that the fertility of soils depends, in a good degree, upon the ingredients which compose them being in a state of minute division. Now this condition appears to be more fully attained in those limestones which belong to the transition or secondary classes, and especially in those which contain a certain proportion of clay. Indeed, the frequent occurrence of calcareous tufa in the western counties seems to be a sufficient evidence of the ease with which the western limestones are dissolved by water, and consequently of the minute state of division of which its particles are susceptible by ordinary atmospheric agencies."

"On the contrary, those limestones which belong to the primary class possess a highly crystalline structure, and disintegrate into grains which often have the appearance of coarse sand, and which, indeed, in some cases are more or less mixed with silicious particles. Such are the dolomite limestones of the counties of Westchester, Putnam, Dutchess, Jefferson, Franklin, and St. Lawrence. Not unfrequently patches of this sandy or granular limestones are entirely destitute of vegetation; a circumstance which is, I think, to be chiefly ascribed to the mechanical constitution of the materials which compose them."

The above exposition of the difference between the western limestones and those of the eastern and southern counties of the State,

[1] Natural History of New York: Mineralogy, by Prof. L. C. Beck, page 90.

naturally suggest the inquiry whether the greater solubility of the former in the waters used for drink, does not account for the disturbance of the stomach and bowels which they so frequently produce in those unaccustomed to their use.

4. The *Magnesian* soil is formed from the detrita of the dolomitic limestone and steatitic and serpentine rocks. That from the first of these rocks may or may not be fertile, according to the degree of minuteness of the division of its particles. That from the two latter rocks is, perhaps, generally favorable to vegetation. It is said that the soil of many localities in the neighborhood of magnesian limestones and ridges of serpentine are remarkably fertile. Such a soil is said to occur in Madison, Onondaga, Erie, and some of the counties in the northern and eastern part of the State.

5. The *Ferruginous* soil is nowhere remarkably developed to any considerable extent in New York. Though iron abounds in the State, it is, for the most part, so disposed in beds or interstratified with the primary rocks, as to scarcely admit of its being widely diffused, in notable quantities, over the surface of the earth. A ferruginous soil, however, occurs in some of the localities in Dutchess, Putnam, Westchester, and Orange counties, where hematite exists, and also in some parts of the western and northern counties, where lenticular or bog iron ore is abundant.

Though such is a classification of the soils of the State, it cannot be said that they anywhere, or but in a few localities, exist in as definite forms as the description of them might lead one to suppose. They occur under so many modifications, arising from their admixture with one another, that to specially characterize them would require terms compounded of the various denominations used at present to designate them. "Moreover," as Dr. Beck well observes, "the nature of these soils is continually undergoing changes in consequence of the various modes to which they are subjected. This renders it exceedingly difficult to present analyses of soils which shall be of practical utility."

To the above notice of Dr. Beck's account of the soils of New York, it is proper to add that it differs from that given by Dr. Emmons, in his able contribution to the natural history of the State, relating to agriculture. In reference to husbandry, Dr. Emmons divides the State into six districts. 1st. The Highland District, northern and southern; 2d. The Eastern District; 3d. The Mohawk and Hudson Valleys; 4th. The Western District; 5th. The Southern District; and 6th. The Atlantic District. This classification is

founded upon a geological basis. "Each district," says Dr. Emmons, "is underlaid by rocks unknown in the others, and which in each case have something peculiar. Thus, the Highland District is underlaid by primary rocks; the Eastern District, by the Taconic rocks; the Third District, by rocks of the Champlain division; the Western, by the Ontario and Helderberg divisions; the Southern, by the shales and sandstones of the Erie division; the Atlantic, by sea sands. In each, there enters some geological element, and this modifies the respective productions of the district." In his analysis of the soils of the commonwealth, Dr. Emmons found that they are composed, for the most part, of varying quantities of silex, silicates, carbonate of lime, alumina, carbonate of magnesia, oxide of iron, sulphate of lime, phosphate of alumina and iron, potash, soda, and organic matter. In some soils, several of these principles are entirely wanting. "Silex," he says, "composes the greatest bulk of the soil; it is the base or support of the mineral kingdom; it is here, what carbon is to the vegetable kingdom." Though the essential character of the soils is, with some exceptions, derived from the debris of the underlying or neighboring rocks, yet they are more or less modified by an intermixture with the drift materials derived from distant localities.

In regard to the term calcareous, used by Dr. Beck to designate a particular soil, Dr. Emmons thinks it is not appropriate to any soil in the State. He says, "In New York, calcareous soils are unknown, notwithstanding large areas of limestone exist." Dr. Beck was aware that the soil he denominates calcareous, contains a comparatively small quantity of lime. He says, "It is somewhat remarkable that none of our calcareous soils contain so large a proportion of carbonate of lime as many of the foreign ones." In the respective districts into which Dr. Emmons divides the State, are found the kinds of soil best suited to particular agricultural products; thus, the soil of the Western District, or that of the lake country, is distinguished by its pre-eminent adaptation to the growth of wheat, as is that of the Eastern, and especially that portion of it embracing the counties of Dutchess, Columbia, Rensellaer, and Washington, to the production of Indian corn; and of certain others, to grazing, &c. In regard to the general agricultural character of New York, Dr. Emmons remarks, that "probably few States possess a greater range of soils, or are so well adapted to so great a variety of productions. In fact, taken as a whole, it would be difficult to mark out upon the terrestrial globe a spot as

large as New York, whose capabilities of production come up to her standard; whose general relations are so important; where there are so many great centres of business; where there are so many and such large channels of wealth, and all flowing to one metropolis; or, in fine, whose natural resources can come up to the full measure of this commonwealth."

But though rich in so many natural productions, New York is mostly destitute of those combustible minerals with which the middle and western States are abundantly supplied, viz., anthracite and bituminous coal. There are, in fact, as already stated, no coal fields in the State. It is true, there are localities in which coal is found; but it occurs in such small quantities as not to make the labor of procuring it remunerative. Its absence, however, is compensated for by the immense quantity of peat or turf which exists in many localities associated frequently with marl. This article will no doubt hereafter be extensively used as a combustible.

Besides the foregoing there are other forms of mineral matter which are specially interesting in a medical and topographical point of view. I refer to *liquid* and *aeriform* minerals. The first comprise springs of salt and mineral waters; and the second springs of combustible and nitrogen gases. The number, variety, and value of some of the former have given to New York a high rank among the countries which boast of their medicinal waters. The springs are arranged by the State mineralogist into six classes, viz:—

1. *Brine Springs*, or *Salines*.—Of these there are about thirty or more, scattered principally over the central and western part of the State. The more important of them occur in Onondaga, Oneida, Oswego, Madison, Cayuga, and Wayne counties. As sources of common salt (chloride of sodium) these springs are of immense value. The strength of the brine of some of the springs greatly exceeds that of sea-water, or that of any of the salt springs of the United States. While 350 gallons of sea-water, at Nantucket, afford only a bushel of salt, and while 50 gallons of the brine spring of Muskingum, Ohio, the strongest of any in the Union, out of New York, give also only one bushel, 30 to 35 gallons of the new wells at Syracuse, Onondaga County, yield the same quantity. It would be supererogatory, in this place, to recount the extent and modes in which the brine springs are contributive to the interests of the community, and to the revenues of the State.

2. *Carburetted Hydrogen*, or *Gas Springs*.—These springs occur in several counties, particularly in Albany, Oneida, Yates, Monroe

Niagara, and Chautauque. In this last county, the springs are especially remarkable for the quantity of carburetted hydrogen evolved from them. The combustion of the gas on coming in contact with flame, as it escapes from the springs, affords a striking phenomenon. The issuing of the gas from springs and fissures in rocks has been supposed to indicate the existence of coal beneath the surface of the locality, but heretofore no discoveries have rendered such indications worthy of confidence.

3. *Nitrogen Springs.*—That nitrogen should be evolved from waters springing from the earth, is a remarkable and curious fact. Several such springs occur in the State. One at Lebanon, in Columbia County, is especially worthy of notice. It is about four feet deep, and ten feet in diameter. The water is nearly pure, containing only 1.25 grains of saline matter in a pint, and its temperature is invariably 73°. It is, therefore, a thermal water, and as such, is much used for bathing. The gas issues from crevices in the rock at the bottom of the spring, and being not absorbable by the water, rises to the surface, and escapes into the atmosphere. A pint of the water affords about five cubic inches of the gas. According to Prof. Dauberry, of Oxford, the gas consists of 89.4 parts of nitrogen, and 10.6 of oxygen. The water flowing from this spring is sufficient to turn several mills. There are also nitrogen springs in Rensselaer, Seneca, and Franklin counties.

4. *Acidulous*, or *Carbonated Springs.*—These springs receive their name from the large quantity of carbonic acid gas which they contain, and which gives them an acidulous taste, and a sparkling character. The more remarkable of these waters are in Saratoga County, and are generally known as the Ballston and Saratoga Springs. Their history and analysis by Mr. Samuel Tenny, Drs. Valentine Seaman, Steel, Profs. J. F. Dana, Dauberry, and Dr. Emmons, have been published and widely circulated in medical and other scientific works and journals. The waters of the Saratoga Springs have acquired great celebrity, and their medicinal properties have caused them to be numerously resorted to by the valetudinary of our own and other countries; and it is observable that, whilst exerting on such their salutary influences, they serve, in the warmer months, as centres around which congregate multitudes of the gay and fashionable. The springs are designated by particular names, as Congress, Columbian, Hamilton, High Rock, Low Rock, Walton, Union, Empire, &c.

"The springs are mostly situated," says Mr. Mather, "in a low

marshy valley, near a ridge of limestone, and rise from a bed of blue marly clay that underlies the valley and the sand plains of the vicinity. The water sometimes rises from the clay, sometimes from a fissure or seam in the underlying limestone, and sometimes from a layer of quicksand. At the depth of thirty or forty feet, the clay is underlaid by a stratum of boulders." The following are the analyses of some of the waters of the Saratoga Springs. The first is by Prof. Dana and Dr. Steel, and shows the composition of a pint of the water.

Congress Spring (Analysis).

	DANA. Grains.	STEEL. Grains.
Chloride of sodium	54.30	48.13
Hydriodate of soda		0.44
Carbonate of soda	2.00	
Bicarbonate of soda		1.12
Carbonate of magnesia	4.00	
Bicarbonate of magnesia		11.97
Carbonate of lime	18.00	12.26
Carbonate of iron		0.63
Silica	trace, with iron	0.19
Hydrobromate of potassa		trace
	78.30	74.74
	Cubic inches.	Cubic inches.
Carbonic acid gas	39.10	39.00
Azote	0.90	
Atmospheric air		0.87
Gaseous contents	40.00	39.87

The temperature of this spring is 51° F.

Walton, or Iodine Spring (Dr. Emmons' Analysis).

	Grains.
Chloride of sodium	23.37
Carbonate of magnesia	9.37
Carbonate of lime	3.25
Carbonate of soda	0.25
Carbonate of iron	0.12
Hydriodate of soda	0.48
	36.84
	Cubic inches.
Carbonic acid gas	41.25
Atmospheric air	0.50
	41.75

Such is the general composition of the waters of the Saratoga Springs. Some contain a larger amount of carbonic acid gas than others. The Union exceeds the others in the quantity of its saline contents, and the Columbian in the quantity of its iron.

A few miles from Saratoga Springs, are the *Ballston Springs*. Of these the most worthy of notice are the, so called, *United States*, *Fulton*, *Chalybeate*, and *Franklin Sulphur*. The following is Dr. L. C. Beck's analysis of one pint of the water of the United States Spring:—

	Grains.
Chloride of sodium	53.12
Carbonate of soda	2.11
Carbonate of magnesia	0.72
Carbonate of lime, with a little oxide of iron	3.65
Sulphate of soda	0.22
Silica[1]	1.00
	60.82

Carbonic acid gas, 30.50 cubic inches.
The temperature of this spring is 50° F.

Besides the acidulous, or carbonated springs, of which the number is about eighteen or twenty in Saratoga County, there are others belonging to the same class in other parts of the State, particularly in Washington, Albany, Oneida, Rensselaer, Essex, and Greene counties. The following is the analysis of one pint of the Albany mineral water, by Drs. L. C. Beck and Meade:—

	DR. MEADE. Grains.	DR. L. C. BECK. Grains.
Chloride of sodium	63.00	59.00
Carbonate of soda	5.00	5.00
Carbonate of lime	4.00	4.00
Carbonate of magnesia	2.00	1.50
Carbonate of iron (with a little silica)	1.00	1.00
Chloride of calcium		0.50
	75.00	71.00
	Cubic inches.	Cubic inches.
Carbonic acid gas	28.00	
Gaseous contents		26.00

5. *Sulphuretted*, or *Sulphureous Springs*, abound in the State, nearly one hundred or upwards are known to exist in about thirty

[1] "This water probably contains both iodine and bromine in some form of combination, but the quantity upon which I operated was too small to admit of separating them, and determining their relative proportions."

counties. "Indeed," says Dr. Beck, "there is scarcely a single county in which they are not found." The sulphur is usually simply combined in the waters with hydrogen, forming sulphuretted hydrogen, which readily escapes into the atmosphere; but in some instances this gas is held in solution, in combination with lime, and consequently is not readily evolved on boiling the water. The most remarkable and valuable of these springs are in the towns of Sharon, in Schoharie County, Richfield, in Otsego County, and West Avon, in Livingston County. These springs are much resorted to by invalids, and deservedly so, on account of their therapeutic action in various forms of disease. They are thought to be scarcely, if at all, inferior in their medicinal properties to the more celebrated sulphur waters of Virginia. The constitution of these waters is shown in the following analysis, the quantity in each case being a pint.

Sharon White Sulphur Spring.

ANALYSIS BY DR. J. R. CHILTON.

	Grains.
Sulphate of magnesia	2.65
Sulphate of lime	6.98
Chloride of sodium	0.14
Chloride of magnesium	0.15
Hydrosulphuret of sodium, Hydrosulphuret of calcium, Extractive matter	0.14
	10.06

Sulphuretted hydrogen gas, 1 cubic inch.

There is another spring in the town of Sharon, which, in addition to the ingredients above mentioned, contains, according to the analysis of Prof. Reed, bicarbonate of magnesia, and hence is called the *Magnesia Spring.*[1]

Among the sulphur springs in *Otsego* County, there is one which has a reputation scarcely lower than the sulphur waters of Sharon. It bears the name of the town in which it occurs, and according to Prof. Reed, the composition of one gallon of the water is as follows:—

[1] See Analysis of Sharon Waters, Schoharie County; also of Avon, Richfield, and Bedford Mineral Waters, &c., by Sebastian F. Fonda, M. D.

Richfield Sulphur Spring.

	Grains.
Bicarbonate of magnesia	20.
Bicarbonate of lime	10.
Chloride of sodium and magnesium	1.5
Sulphate of magnesia	30.
Hydrosulphate of magnesia and lime	2.
Sulphate of lime	90.
Solid contents	153.5
Sulphuretted hydrogen	20.6 inches.

The only other sulphur springs in the State which here claim special notice, are those at West Avon, in Livingston County. Of these, there are three which have attracted general attention. One is called the *Avon New Spring*, and one pint of the water contains

	Grains.
Carbonate of lime	3.37
Sulphate of lime	0.44
Sulphate of magnesia	1.01
Sulphate of soda	4.84
Chloride of sodium	0.71
	10.37

Sulphuretted hydrogen, 3.91 cubic inches.

Another is called the *Middle Spring*. Its temperature is 51° F., and, according to Prof. Hadley's analysis, one pint of the water contains the following:—

	Grains.
Carbonate of lime	1.00
Sulphate of lime	10.50
Sulphate of magnesia	1.25
Sulphate of soda	2.00
Chloride of sodium	2.30
	17.05
	Cubic inches.
Sulphuretted hydrogen	12.00
Carbonic acid	5.60
Gaseous contents	17.60

The composition of the third, or, as it is called, the *Lower Avon Spring*, is similar to the above. It is said to discharge a large quantity of water, not less than fifty-four gallons in a minute. The water has a strong sulphurous odor and saline taste. There is another sulphur water at Avon, called the Sylvan Spring, the composition of which does not materially differ from the others.[1]

[1] See the American Jonrnal of Sciences and Arts, March, 1859, p. 248.

6. *Petrifying Springs* are found in several localities in the State, particularly in Schoharie, Herkimer, Cayuga, Tompkins, and Livingston counties; but as they are not recognized as having any relations to health and disease, they have no claim to our further notice.

Besides the above liquid minerals, there is another which a few years since attracted general attention, namely, a water containing *sulphuric acid.* Springs of this acid are rarely found in nature, except in volcanic localities. The spring here referred to is in the town of Byron, in Genesee County. The acid, says Dr. Beck, is produced from a hillock, "covered with vegetable matter, which has been charred by the action of sulphuric acid, and which though no water flows from it is always quite damp. This vegetable matter has an intensely sour taste. About two miles east of the preceding, there is a spring consisting of dilute sulphuric acid which issues from the earth in considerable quantity."

The following is an analysis of the Byron Acid Spring near Batavia, by Dr. George Hand Smith, of Rochester, late assistant in the State Laboratory at Albany.[1]

Represented in parts out of 100,000, viz:—

Free sulphuric acid	59.397
Proto-sulphate of iron and alumina	32.022
Sulphate of magnesia	13.515
Sulphate of lime	12.928
Silica	13.025
Organic matter	4.585
From one quart of water, grains	135.472

FLORA OF NEW YORK.

The vegetable productions of New York attracted attention at an early period in her colonial history. But little or nothing, however, was done in studying them as matters of science, until Governor Colden, a ripe botanist of the Linnæan school, investigated the botany of a locality, in Orange County, called after him Coldenham. The treatise, in which he described and generalized the flora of that place, bears the title of *Plantæ Coldenhamiæ*; and its publication in the Acts of the Royal Society of Upsal, in 1744, forms an epoch in the botanical history of the State. Subsequently, Kalm (afterwards

[1] See Transactions of the Medical Society of the State of New York, 1850, p. 161.

a Bishop), and Dr. Wangenheim, a Hessian surgeon, in the military service of England, during the American Revolution, studied the plants of New York, as did also, at later periods, MM. Michaux, father and son, Drs. C. W. Eddy, Pursh, so well known by his *Flora Americæ Septentrionalis*, Major J. Leconte, who gave a catalogue of no less than 468 species of plants indigenous and naturalized, growing on the island of New York. In 1814, Prof. J. Green published a list of the native plants of the State, and in 1817, Dr. Torrey prepared a catalogue of plants growing within thirty miles of the city of New York. It comprised 1,300 species. In 1818, Prof. Eaton published a *Manual of Botany*, which went through several editions. In this work much labor was bestowed on the botany of New York. In 1823 and 1824, Dr. Torrey published the first volume of his *Flora of the Northern and Middle States.* This work, in a detailed form, was abandoned before the completion of a second volume, but in its place the author published a compendium of the subject in 1826. In 1833, appeared Prof. L. C. Beck's *Botany of the Northern States;* and, in 1836, Prof. Hall and Dr. J. Wright sent to the press a list of plants growing in the neighborhood of Troy. Besides these there are other names connected with contributions to our botanical knowledge of the State which have a claim to historic notice. Of these the more deserving of mention are those of Mr. David Thomas, Prof. Dewey, Dr. Samuel B. Mead, Mr. W. V. S. Woodworth, Dr. Thompson, Dr. Kneiskern, and Dr. Gray. Besides the additions made by these distinguished naturalists to the botanical literature of our country, another appeared, entitled the *Flora of North America*, being the joint production of Prof. Torrey and Dr. Gray; and it is to the former of these gentlemen that we are indebted for an elaborate work on the special botany of New York, a work undertaken and completed by appointment under the authority of the commonwealth, and which is published as a part of the survey of the natural history of the State, under the title of *A Flora of the State of New York*, comprising full descriptions of all the indigenous and naturalized plants hitherto discovered in the State, with remarks on their Economical and Medicinal Properties.

With a view to illustrate the geographical range and distribution of plants, as determined by the characters of the geological formations and varieties of climate, Dr. Torrey divides the State into four Floral Districts, viz.: 1st. The Atlantic Region; consisting exclusively of Long Island. 2d. The Hudson Valley Region. 3d. The

Western Region. 4th. The Northern Region. "We can boast," he says, "of but few plants that are unknown out of the limits of our Flora." He names two or three that are so. He informs us, also, "that on the shores of the great lakes there are certain plants the proper station of which is the immediate neighborhood of the ocean, as if they had constituted part of the early Flora of those regions when the lakes were filled with salt water, and have survived the change that has taken place in the physical conditions of their soil."

According to the researches of Prof. Torrey, the Flora of New York comprises "nearly as many species as that of the whole of New England." Of flowering plants there are about 1,450 species, of which 1,200 are herbaceous, 150 ornamental, 250 are woody, including 80 of the size of trees, and about 150 (native and naturalized) which are regarded as medicinal. The number of naturalized plants in the State is upwards of 140 species. "Many of them," says Prof. T., "have been introduced from Europe with grain and other agricultural products; and among them are to be found most of our troublesome weeds. Indeed, throughout the northern States, almost all the plants that are injurious to the farmer are of foreign origin. Many useful species, likewise, have become so thoroughly naturalized and widely spread, that they everywhere spring spontaneously from the soil. The grasses of our meadows, parks, lawns, and roadsides, are, with few exceptions, naturalized European species;" the native grasses being supplanted by exotics.

In thus noticing the botanical labors of Prof. Torrey, we cannot withhold the remark that in the record he has made of them in two noble quarto volumes, characterized by classic terseness and scientific accuracy, and in the collection and arrangement of an herbarium consisting of 50 folio volumes, deposited in the Cabinet of Natural History at Albany, he has performed an important service to his country, and established for himself a claim to be ranked among the first naturalists of the age.

In 1848, Prof. Charles A. Lee published "A Catalogue of the Medicinal Plants, indigenous and exotic, growing in the State of New York, with a brief account of their Composition and Medical Properties." In preparing this catalogue the author tells us he drew "largely from the recent 'Flora of the State of New York,' by Dr. Torrey; without which, indeed, the work would not have been accomplished." Dr. Lee says: "We have 75 natural orders containing medicinal plants, including 1,020 species, a part of which

only are yet known to possess remedial properties. We have also 51 orders, which include no very active medicinal plants, embracing 442 species. Many of these, however, as the grass and cypress tribe, embrace genera of a medicinal character."

To these contributions to the Flora of the State must be added several others which have appeared in the *Transactions* of the Medical Society of the State. In the second volume, 1835, of that publication, Drs. J. S. Douglass and J. Babcock give a report on the Medical Botany of Hamilton, Madison County. In the third volume, 1836–37, Dr. Bacon publishes a catalogue of the Medicinal Plants of Tompkins County; and in the fifth volume, 1841–42–43, Dr. N. S. Davis enumerates those of Broome County. In 1851, a catalogue of the plants found growing without cultivation in the vicinity of Amenia Seminary, Dutchess County, appeared in the Annual Report of the Regents of the University of the State.

Prof. Torrey, as already stated, regards 150 of the 1,450 species of plants in the State as possessing medicinal properties. In the estimate of Prof. Lee the former number is more than doubled. Now, as there are, perhaps, few plants which might not be found to produce either nutritive or medicinal effects, some acting on the nervous, vascular, secreting and excreting systems, or on other parts of the body, it is difficult, in the present state of our knowledge, to fix the number of plants which may be admitted into the list of therapeutical agents. The number of this class is already cumbersome, and the writer does not hesitate to express the opinion, that whilst it should be the aim of organic chemistry to enlarge the boundaries of science by revealing the proximate and ultimate principles of every known plant, it would promote the interests of clinical medicine if the number of plants employed in our therapia was greatly reduced, leaving us those only the properties and action of which are well known, and which can be readily and intelligently applied by the practical observer. Such a retrenchment would not preclude valuable additions to the Materia Medica; but no article, unless fitted to supply some manifest desideratum, or possessed of properties superior to others of their kind, can be added advantageously to our present list of remedies of acknowledged value. The physicians of the present day would scarcely abridge their success in practice—nay, would they not enhance it? by adopting the sentiments of Huxham, in regard to polypharmacy, expressed, in his Essay on Fevers, more than a hundred years ago. "When a physician," he says, "knows whether stimulants or

anodynes, relaxants or astringents, attenuants or incressants, are indicated, he can be at no great loss how to serve himself, of proper drugs, out of the vast materia medica which we at present abound with. He should select a few of the most effectual for his use, of each sort, and stick to them, and not run into the immense *farrago* which some are so fond of. By so doing, he will soon be acquainted with their real virtues and effects, and readily distinguish between the symptoms of the disease, and those caused by the medicines; which is a thing many times of no small importance."

FAUNA OF NEW YORK.

Aiming to accomplish the enlightened purpose of exploring every department of nature which might be made contributive to the improvement and happiness of our race, the State of New York, as already mentioned, ordered its zoology to be investigated contemporaneously with the other branches of its natural history. The labor bestowed on that department by the gentleman, Dr. De Kay, to whom the task was assigned, and the ability with which he executed the work, are shown in the four large printed volumes bearing the title of *Zoology of New York*, or the *New York Fauna.*

A glance at the researches of Dr. De Kay must suffice on this occasion. As the elevations and depressions of the surface of the State, and its diversities of soil are considerable, and consequently, as these circumstances determine the distribution of the Fauna, Dr. De Kay finds grounds to divide the State into four zoological districts, viz: 1st, the Western; 2d, the Northern; 3d, the Hudson Valley, and 4th, the Atlantic.

De Kay notices the interesting fact that the Atlantic district, or Long Island, forms the natural geographical boundary of the migratory movements of certain birds north and south. "Here," he says, "we find the extreme southern limits of the migrations of the arctic species, and the northernmost terminations of the wanderings of the birds of the Torrid Zone. It seems also to be the boundary between the fishes and other classes of the northern and tropical seas, and occasionally furnishes specimens from either extremity." These facts mark the Atlantic district of New York as holding a geographical, or, it may be said, a central position between the torrid regions of the south on the one hand, and the frigid of the north on the other, a position which, on the eastern coast of North

America, corresponds in respect to the range of certain animals, according to Dr. Suckley, with the situation of the Territories of Washington and Oregon, on the western coast. In these territories "we find," says Dr. S., "the northern limit of southern types, and the southern boundary of those particularly confined to the north."[1] These lines of contact between the northern and southern Fauna differ remarkably in latitude, the one on the Pacific coast being several degrees north of that on the Atlantic, a fact due to the greater mildness of the climate on the former than on the latter coast, as is well illustrated in the Isothermal charts of Mr. Blodget.[2]

Dr. De Kay describes the various species of native animals found in the State, beginning with the Mammalia. A few of the larger of this class of quadrupeds are especially interesting and deserving of notice; and the more so for the reason that their number is gradually decreasing and that in some parts they are no longer found. Such is the case with the American Black Bear, *Ursus Americanus*, though once common to all the zoological districts, it is now rarely met with, except in the uninhabited or newly settled and mountainous parts of the State. Of the flesh of this animal, we are told that "it was so common an article of food in the city of New York, as to have given the name of *Bear Market* to one of the principal markets in the city." It is now a matter of history worthy of notice, that both the name of Bear Market and bear meat have long since disappeared from the metropolis.

The Wolf, *Lupus occidentalis*, both the gray and black varieties, once numerous in the southern counties, is no longer seen in these parts. Vanderdonk, an early Dutch writer, states that the number of wolves was one of the objections to keeping sheep in the colony. Their extirpation in the older counties has been chiefly effected by the bounties offered in sums from ten to twenty dollars for each one destroyed, an expenditure divided between the State and the county and town which were rid of the animal.

The American Deer, *Cervus virginicus*, the flesh and hide of which are so highly esteemed, was formerly widely spread over the State; but its number is greatly reduced in the southern and more populous districts, and though in some places its destruction in the breeding season is prohibited by law, there is reason to believe that it will, if not domesticated, become extinct.

[1] See Report on the Medical Topography of Washington Territory, by George Suckley, M. D., in the Trans. of the Am. Med. Association, vol. x.

[2] See Army Meteorological Register, Washington, 1855.

But there is no mammal whose number is becoming more rapidly reduced than that of the Beaver, *Castor fiber*. The range of this animal formerly extended over the State; but the few which remain are found chiefly along the banks of solitary streams in Hamilton, Essex, St. Lawrence and the neighboring counties. At an early period in the history of the colony, the skins of the beaver were in such request, and held in such high estimation, that the animal received a place in the armorial bearing of the colony. Indeed, the skins had a definite value affixed to them, and were used as a circulating medium.

Besides those above mentioned, many other animals, natives of the State, of the class mammalia, are annually decreasing in number. Of such, in the more populous districts, are the fox, panther, skunk, and lynx, or wild cat. As an example of the total disappearance from the State of a mammal peculiar to this continent, may be mentioned the Buffalo, *Bison Americanus*. There is good authority for stating that this animal once inhabited not only New York, but the countries on the Atlantic slope as far south as Mexico. At present it is not found east of the Mississippi, though on the west side of that river it occurs in vast numbers, roaming over the prairies, sometimes in herds of 50,000. A memorial of its former habitat, in New York, exists in the name it gives to one of the most flourishing cities in the State.

In these facts, to which might be added many others of the same import, we discover a proclivity in the native animals of America to become extinct wherever culture and the arts of civilization transform the face of the country. But while such seems to be the destiny of no inconsiderable portion of the Fauna of the State, it is observable, that as the native animals disappear, other races are introduced and naturalized. Of these the more worthy of noticing are the following.

The ox, *Bos taurus*, of which the first variety was a Dutch breed, was introduced into New Amsterdam from Holstein. A remnant of this stock may still exist in some part of the State; but the varieties, common at present, are mostly of English extraction.

The sheep, *Ovis aries*, first imported, were from Holland; but the varieties now spread over many parts of the State, have a large admixture of Spanish or Merino and Saxon blood.

The horse, *Equus caballus*, originally from Asia, is now distributed over most parts of the earth, being alike the companion of the barbarous and civilized tribes of our race. This noble animal was

introduced into New York at an early day, from Utrecht. But the characters of the old Dutch stock are now rarely recognized, being merged in the English and Arabian breeds, which in their crosses, constitute the greater number of the present varieties found in the State.

The hog, *Sus scrofa, var. Domestica*, was introduced into New York by the first Dutch immigrants; and we are told by Dr. De Kay, that "traces of the large limbed Dutch breed of hogs may still be found in some districts, which have been known to weigh more than a thousand pounds. Our common breed of hogs has been much improved of late years, by crossing with the English, Berkshire, and Chinese varieties. The former is more particularly in request, on account of the flavor of its meat and as producing large litters." Besides these domesticated animals, many varieties of fowl, and most of the varieties of the dog, of which the number recognized by naturalists is upwards of thirty, have been introduced into the State, to say nothing of some of the smaller animals which, notwithstanding every effort made to exterminate them, have established themselves in and about human habitations.

METEOROLOGY OF NEW YORK.

The chief sources of information, concerning the climatology of the State of New York, are, 1st, the meteorological observations collected by the Medical Bureau of the United States Army; 2d, the annual reports to the legislature, of the Regents of the University of the State of New York; and 3d, the publications issued by the Smithsonian Institution, in co-operation with the Patent Office, at Washington. A few historical remarks relating to these meteorological repositories will, perhaps, be not uninteresting.

1st. In 1818, the Hon. John C. Calhoun, then Secretary of War, recommended to Congress the creation of the office of Surgeon General of the United States Army, and the measure being promptly adopted by that body, Dr. Joseph Lovell, then Hospital Surgeon, was appointed to fill the place. Under his direction the medical department of the army was organized, but not fully so, until 1821. Among the duties required of the surgeon of every military post was "to keep a diary of the weather, and to note everything of importance relating to the medical topography of his station, the climate, diseases prevalent in the vicinity, &c."

The first record under this requirement was filed in the Surgeon General's Office in 1819; and from time to time, since that period, valuable reports relating to the subject have emanated from that Bureau. Among these may be classed the work of Dr. Forry, on the climate of the United States, and the more elaborate one entitled "Army Meteorological Register for twelve years, from 1843 to 1854 inclusive, compiled from observations made by the officers of the medical department of the army, at the military posts of the United States." This work was prepared in accordance with instructions given by Brevet Brigadier General Thomas Lawson, the present Surgeon General U. S. A., by Assistant Surgeon Richard H. Coolidge, M. D., a work of voluminous proportions, in which are arranged and generalized the prominent features of the general climate of the United States, as exhibited in the distribution of temperature and rain. The talent, industry, and good judgment devoted to the production of this work, are apparent in every part of it. The volume comprises the meteorological returns from the nine military stations in the State, within the period over which the reports extend.

2d. The special study of meteorology in the State of New York may be said to have had its commencement in the last quarter of the eighteenth century. The first inquiries on the subject are said "to have begun under an impulse which that science received in 1780, from the Meteorological Society of the Palatinate (in Germany), under the patronage of the Elector, Charles Theodore." Simeon De Witt, who appears often in the Memoirs of this Society as a friend of science, published in 1792, a "Plan of a Meteorological Chart for Exhibiting a Comparative View of the Climate in North America, and the Progress of Vegetation." From that time meteorology received the attention of numerous scientific observers, and many private thermometrical and hygrometrical records were given to the public through the periodical press. Valuable essays on the subject appeared also, prior to 1814, in the Transactions of the Society for the Promotion of Agriculture and the Useful Arts, published in Albany. But it was not until several years later that the study of meteorology in the State became an object of special attention. Its importance was so apparent, that "in March, 1825, the Regents of the University of the State, on the motion of Mr. De Witt, adopted the system in pursuance of which many of the academies have since that time made daily observations upon the weather and the winds, together with notices of the progress of

vegetation and the occurrence of remarkable atmospherical phenomena." The instructions to the academies relating to the subject, bear date March 1st, 1825. Since that time, now over a quarter of a century, many of the academies have made meteorological returns to the Board of Regents, and of which brief summaries have been given by that body to the public in their annual reports to the legislature. In 1849 the system of observation was changed, and new instruments were furnished to the academies by the legislature to meet the demands of the advances in meteorological science. This change of system was made at the instance of the regents of the University, with a view to conform to the system of observation adopted by the Smithsonian Institution, and to this institution the academies were required subsequently to report.

In view of the mass of meteorological observations made by the academies, and communicated to the regents of the University, prior to 1850, and which being, for the most part, unreduced and unarranged, was, consequently, useless, Dr. Franklin B. Hough, the eminent statistician, submitted to the Board of Regents a proposition to collect and generalize the records in question. With their wonted zeal and promptitude, the regents not only approved of the proposition, but expressed the belief that the results of such a generalization would be of the highest interest to science. In the following year, the subject was introduced to the consideration of the American Association for the advancement of Science, at its meeting in Albany, and, after discussion, was referred by that body to its Meteorological Committee. This committee commended it to the patronage of the legislature, "and appointed a sub-committee, consisting of Dr. T. Romeyn Beck, of Albany, Prof. E. Loomis, of New York, and Prof. Guyot, of Cambridge, Mass., to examine the relative merits of the several classes of records that had been made by academies, and to decide upon what portions the proposed results should be based, and what parts, if any, should be omitted as unimportant."[1] With a due impression of the importance of the subject, the legislature, in 1854, empowered the regents of the University to publish the meteorological returns of the academies, and at the same time appropriated for that purpose the sum of three thousand dollars. The task of preparing the work for publication was confided to Dr. Hough, under whose able superintendence the work appeared in 1855, in a quarto

[1] New York Meteorology, p. 4.

volume of upwards of 500 pages. To this work, and a few of the more recent reports of the regents, we are largely indebted for the materials of which most of the following tables are constructed.

3d. The establishment of the Smithsonian Institution by the Government of the United States, in August, 1846, forms an epoch in the practical study of natural history in our country. Within its plan are embraced researches relating to every department of physical knowledge. Among these departments, few, perhaps, have received more attention than that of climatology. Through its agency, and especially since 1855, at which time it united with the Patent Office, a Bureau of the Department of the Interior, in the same work, an immense number of meteorological phenomena have been collected and reported to the Institution by observers dispersed over the United States; and such have already been the valuable results deduced from them, that there is good reason to believe that under the auspices of that Institution, the subject will receive an elucidation more complete, than if it were left to be accomplished by individual and independent meteorologists.

It is stated in the interesting "Report of the Special Committee on Government Meteorological Reports," submitted to the American Medical Association at its last session, that the Committee, through its members resident in Washington, "conferred with Prof. Henry (the Secretary of the Smithsonian Institution) as to the mode and manner in which this Association could cooperate in this field of labor with the greatest benefit to the interests of the medical profession, and to the advancement of science," with that Institution, and that they were able to state that the plan and suggestions which they submitted to the Association for collecting meteorological observations received his approval and sanction; and also that the Smithsonian Institution would, upon due notice, furnish to observers in the different counties of the State, printed instructions, free of cost, with a "double series of blank forms, one for recording the observations when taken, to be retained by the observer, the other for a copy to be carefully collated from the original and transmitted monthly to the 'Commissioners of Patents, Washington, D. C.,' for the Smithsonian Institution."

Animated with the true spirit of a philosopher, Prof. Henry, in an able paper on "Meteorology in its Connection with Agriculture," presents "some of the physical laws on which meteorology depends, the general principles at which it has arrived and their application to the peculiarities of the climate of the United States." Adopting

the sentiment that *truth* belongs to mankind in general, and our hypotheses belong to ourselves, he aims to reach the former by endeavoring "to confine his statements to the exposition of such principles as are generally recognized at the present day." Of his comprehensive view of meteorological phenomena he has given an expression in his beautiful reference to the powerful influence of the great central luminary of our astronomical system. He says: "One of the most important general truths at which science has arrived by a wide and cautious induction, and which is the foundation of meteorology, is that nearly all the changes which now take place at the surface of the earth are due to the action of the sun. The forces which pertain to the earth itself, such as gravity, chemical affinity, cohesion, electricity, magnetism, &c., are forces of quiescence; they tend to bring matter to a state of rest at the surface of the globe, from which it is only again disturbed by the solar emanation." "If, therefore, the solar impulses were suspended, all motion on the surface of the planet would cease: the wind would gradually die away; the currents of the ocean would slacken their pace, and finally come to rest; and stillness, silence, and death would hold universal reign." Prof. Henry studies the phenomena referable to the rays of heat from the sun under two heads. 1st. The effects of varying astronomical conditions. 2d. The effects of other than astronomical conditions such as those belonging to the globe. The results of his inductive researches are already such as cannot fail to attract attention, and especially those in his essay to which we have before referred.

In no part of the Union, it is believed, is the plan now generally adopted to advance the science of meteorology, in more efficient operation than in the State of New York. As the design is to ascertain the general characters of the climate of the State, it has been deemed important that the places of observation should be so distributed that, as far as practicable, every portion of the commonwealth should be meteorologically represented. That such a distribution is essential to the accomplishmeut of the design is evident from the fact that the surface of the State is remarkably diversified by mountains and valleys, by low and elevated table lands, ~~and~~ lakes, &c., and consequently there ~~must be~~ localities and regions are which differ in their climatological characters.

In regard to the question of the distribution of stations, the State of New York has had the good fortune to receive instruction and aid from an eminently learned and practical student of nature, Pro-

fessor Guyot. This gentleman, in his report to the regents of the University, on the various meteorologieal stations established under their direction, dated February 18th, 1851,[1] says: "It will be easily understood that the seleetion of the stations eould not always depend upon merely scientifie reasons, but that it was limited by the presence or the absenee of aeademies, or by the diffieulty of finding observers in the most suitable plaees. I have already stated that, as far as possible, two objects were kept in view, the study of the barometrical waves and of the law of storms, and that of the speeial climate of the different regions of the State, as regards temperature, humidity, &c. The first would require, as the most appropriate, a distribution of the stations at equal distances. For the second we must take into aeeount all physieal eireumstanees, sueh as the eonfiguration of the surfaee of the eountry, the relative elevation above the surrounding places, the absolute elevation above the oeean, the neighborhood of mountains, of large forests, of the sea-shores, or of large sheets of fresh water, the exposure to eertain winds, &e."

Large traets of the State are uninhabited; and it is only in the more settled and cultivated distriets, and, indeed, mostly in the eities and villages that the meteorological stations are established. Nine United States military posts in the State have made meteorologieal returns to the Army Medical Bureau at Washington. But the greater number of stations are conneeted with the academies and other literary institutions under the direction of the regents of the University. From these stations, distributed over forty-two of the sixty eounties of the State, the regents had received sixty-two reports in 1850; and these, added to the one reeeived from Liberty, in 1857, and to the nine military stations, make a total of the places of observation seventy-two, a number whieh, though by no means sufficient to meet the demands of medieal meteorology, is enough to show the general eharaeter of the elimate of the State.[2]

[1] Sixty-fourth Annual Report of the Regents of the University.

[2] It appears from the Annual Report of the Smithsonian Institution, for 1858, that there were in New York only thirty-five stations distributed over twenty-two counties, which reported to that Institution. Of these stations the latitude, longitude, and height are stated, but connected with them are no meteorological returns. These returns it is hoped will be made available to the public hereafter. The counties here referred to, are included in the number of those mentioned in the body of this report, excepting five, viz., Alleghany, Putnam, Seneca, Saratoga, and Tioga Counties.

In selecting the positions for the meteorological stations, regard has been had to the varieties of climate depending upon the configuration of the surface, and hydrographical relations of the State, and to the existence of institutions in which they could be placed, in the charge of competent observers; and perhaps no better distribution of them can be made than exists at present. It was with a view to such a localization of the stations that Prof. Guyot in his communication to the regents of the University, before referred to, divides the State into five physical regions, of which the following are the respective outlines, and of which we shall have occasion to speak more particularly in the sequel.

1st. *The Southern or Maritime Region.*—This embraces Long Island, Staten Island, the city and county of New York, a part of Westchester County, in a word, most of the territory of the State south of the Highlands. North Salem in the last named county is about the interior limit of the immediate influence of the Atlantic Ocean.

2d. *The Eastern, or the Region of the Hudson Valley.*—This region extends from Putnam County, or the Highlands, to Lake Champlain, and occupies a tract of country of considerable breadth on both sides of the Hudson. The valley widens above the Highlands. It is hilly in the southern part, and also on its eastern border; but much of it, especially on the eastern side of the Hudson, is spread out into low table lands and plains, with here and there alluvial bottoms along its watercourses. The region embraces most of what are usually called the river counties. Its elevation above tide-water varies from one to two hundred feet. The winter climate throughout this region is much more rigorous than that below the Highlands, owing doubtless to the northern winds blowing down the valley from Canada. There are several important meteorological stations distributed over this region.

3d. *The Western Region, or the high Table Lands between the Hudson Valley and Lake Erie.*—In this extensive region there is, to use the words of Prof. Guyot, "a depression of the surface, and the change of direction of the general slopes, well expressed by the course of the two main branches of the Susquehanna, seem to indicate a natural division of it into two parts of almost equal extent, the eastern or middle table land, and the western plateau. These are separated by the deep valleys of Cayuga and Seneca lakes, which cut the whole mass through almost from north to south." Of these plateaux, it is at present sufficient to say that their eleva-

tion varies from about 1,000 to upwards of 2,000 feet. The general slope of the eastern plateau is toward the southwest, whilst the western inclines to the north. In the southwest part it makes in the course of a few miles a rapid descent down to Lake Erie. The meteorological stations in this region vary considerably in their elevation. Some are in valleys and in situations sheltered from winds, and others on heights and freely exposed to atmospheric currents. The climate of those parts of this region which are adjacent to the larger lakes, as those of Cayuga and Seneca, is remarkably ameliorated by these collections of water. Mr. Hall states "that the effects of frost upon vegetation bordering them is not observed so soon by many days as on the higher grounds."

4th. *The Region of the Great Lakes.*—This comprises the tract of land extending from the eastern extremity of Lake Erie and the Niagara River, along the southern shore of Lake Ontario as far as Oneida Lake. It forms a broad plain, or rather a series of terraces. In its western part it abruptly declines to the lake shore, while in its eastern part its descent to the lake is gentle. Its surface above the sea varies from 400 to 600 feet, and above Lake Ontario from 150 to 300 feet. The great mass of waters forming Lake Ontario protects the region in question from the intemperature of climate experienced in some countries within the same parallels, and which are remote from large bodies of water. The returns from the meteorological stations in this region have largely contributed to elucidate its general climatology.

5th. *The Northern Region.*—This embraces the entire group or system of the Adirondack Mountains, and the extensive table lands which spread out from them. Its boundary, on the east, south, and west, is Lake Champlain, the Mohawk Valley, and Lake Ontario, from which it rises rapidly; and its limit on the northwest and north, is the river St. Lawrence and the frontier line of Canada, from which the ascent is gradual. The elevation of the plateau varies from 1,500 to 1,700 feet, and that of some of the mountains is, as has already been stated, over 5,000 feet. The table land is divided by the Black River Valley, which is from 700 to 800 feet below its general surface, and about the same above tide water. The mountains of this region have an alpine character; and from them and the higher plateaux, flow the waters which form the Hudson River, and also those poured into Lake Champlain by the rivers Au Sable, Saranac, and Big Chazy, and also into the St. Lawrence by the rivers Chateauguay, Salmon, St. Regis, Racket, Oswe-

gatchie and a few others. Beyond the influence exerted by Lake Champlain, the river St. Lawrence, and the eastern end of Lake Ontario on the meteorology of their borders, there are no internal collections of water in this region of sufficient magnitude to materially affect its climate; and, accordingly, it is here that the rigorous severity of a northerly New York winter occurs in its highest degree.

In glancing over a map of New York, it will be seen that the regions above described are well defined, and that they are well suited to facilitate inquiries into the climate and epidemiology of the State. The number of meteorological stations in the State to which we shall limit our attention, as before stated, is seventy-two, nine military, and sixty-three academic; the former of these have no connection with the latter in the New York system of meteorological investigation. We shall here, however, introduce them, as their records afford many interesting facts which are not found in the academic returns to the regents of the University.

In presenting a few of the general summaries of the meteorological phenomena of the State, in the usual statistical forms, it would perhaps be most proper to classify the stations of observation according to the regions in which they are distributed. There is reason, however, to prefer the alphabetical arrangement, and accordingly we shall adopt it in regard to the State academies, whilst in respect to the military stations, we shall notice them in the order they are arranged in the United States Army Meteorological Register.

The following tables are compiled from the returns of the meteorological observations made at the nine United States military posts, and at sixty-three Literary Institutions in the State. They embrace also a notice of the latitude, longitude, and elevation of the meteorological stations above the sea.

TABLE I.

Showing the Latitude, Longitude, and Altitude of the U. S. Military Stations in New York; also, the Mean Temperature of the months, and of certain hours of the day, of particular years, together with the Range of Temperature above and below the Monthly Mean.

STATIONS.	North lat.	West long.	Altitude.	Mo'ths and years.	Mean Temperature.					Range.			
					Sunrise.	9 A. M.	3 P. M.	9 P. M.	Mean.	Max.	Min.	Above mean.	Below mean.
			Feet.	1854									
Fort Hamilton, N. Y. Harbor.	40° 37′	74° 2′	23	Jan.	28.00	31.38	35 83	20.74	31.49	50	12	18.5	19.5
				Feb.	26.82	30.35	35.00	31.64	30.95	48	15	17.1	15.9
				March	33.70	37 25	41.64	38.22	37.70	62	22	24.3	15.7
				April	41.33	45.23	49.90	45.63	45.57	70	28	24.4	17.6
				May	55.19	58.45	66.67	57.16	59.37	78	35	18.6	24 4
				June	63.20	68.23	75.66	67.66	68 69	87	54	18.3	14.7
				July	71 67	77.64	84.00	75.38	77.17	95	64	17.8	13.2
				Aug.	69.16	74.03	81.90	73.58	74.67	91	62	16.3	12.7
				Sept.	62 46	67.10	72 80	65.90	67.06	87	48	19.9	19.1
				Oct.	51.90	55.51	62.16	55.03	56.15	79	33	20.7	17.3
				Nov.	40 93	44 93	47.20	42.93	43.90	66	29	22 1	14 9
				Dec.	25.09	28.09	31.19	28.87	28.31	44	4	15.7	24.3
				1854									
Fort Columbus.	40° 42′	74° 1′	23	Jan.	26.38	28.45	31.77	28.25	28 71	50	11	21.3	17 7
				Feb.	25.32	26.82	31.64	28.92	28.17	46	14	17.8	14 2
				March	32 29	35.00	41.41	36 00	37.17	66	19	29.8	17.2
				April	40.40	43 90	52 83	43.23	45.09	72	26	20.9	19.1
				May	54 22	59.54	67.32	58 77	39.96	80	34	20.0	26.0
				June	62.60	68.23	76.60	66.53	68.49	88	51	19.5	17.5
				July	70.64	76.32	82 58	74.00	75.89	93	62	17.1	13 9
				Aug.	67 32	72.61	79.89	71.77	72.88	90	58	17.1	14.9
				Sept.	62.13	65.60	72 53	65.13	66.35	90	47	23.7	19.3
				Oct.	51 41	54.80	61 61	55.03	55.71	76	36	20.3	19.7
				Nov.	40.93	42 83	47.60	43.33	33.67	66	31	22.3	12 7
				Dec.	25.41	26.41	30.71	27.58	27.52	43	5	15.5	22 5
				1854									
West Point.	41° 23′	74° 00′	167	Jan.	24.70	28.16	31.77	28.25	28.74	50	11	21.3	17.7
				Feb.	22.89	28.14	31.21	27 35	27.40	17	7	19.6	20.4
				March	31.16	37.70	40.61	35.93	36.35	63	18	26.7	18 3
				April	39.16	47.93	54.93	44 63	45.91	76	25	30.4	29.9
				May	54.23	62.74	66.09	59.25	60.57	78	34	17.4	26.6
				June	62.20	69.23	74.20	66.63	68.06	83	51	15.0	17 0
				July	69.45	76.45	81.96	76.51	75.59	97	62	21.4	13.6
				Aug.	65.64	74.32	79.87	71.16	72.75	94	55	21.3	17.7
				Sept.	58.73	63.33	71.26	63.66	64.25	90	43	25.8	21.2
				Oct.	48.58	53.09	59.90	53.19	53.69	76	32	22 3	21.7
				Nov.	40.00	42.63	45.93	41.30	42.39	67	30	24 6	12.4
				Dec.	23.70	24.77	27.87	25.67	25.50	46	—1	20.5	26.5
				1854									
Watervliet Arsenal, on the Hudson, near Albany.	42° 43′	73° 47′	50?	Jan.	17.83	21.66	24.96	23.00	21.86	48	—10	26.1	31.9
				Feb.	15.85	18.60	22.45	21.28	19.54	38	—4	18.5	23.5
				March	24 25	32.42	37.45	32.09	31.55	53	10	23.4	21.6
				April	35.60	42.60	47.26	39.63	41.27	66	22	24 7	19.3
				May	50.86	57.12	59.67	51.90	54.89	74	30	19.1	24.9
				June	60.66	68.96	74.90	63.90	67.10	83	46	15.9	21.1
				July	70.48	78.22	84.22	75.77	77.17	96	58	18.8	19.2
				Aug.[1]	59.48	71.58	79.16	68.84	69.77	86	54	16.2	15.8
				Sept.	54.00	63.67	68.33	59.77	61.44	86	40	24.6	21.4
				Oct.	41.10	49.64	56.93	45.06	48.18	66	26	17.8	22.2
				Nov.[1]	33.86	39.86	42 66	38.30	38.67	68	18	29.3	20.7
				Dec.[1]	15.09	19.03	23.09	20.30	19.38	40	—12	20.6	41.4

[1] Inaccurate.

TABLE I.—Continued.

STATIONS.	North lat.	West long.	Altitude.	Mo'ths and years.	Mean Temperature.					Range.			
					Sunrise.	9 A. M.	3 P. M.	9 P. M.	Mean.	Max.	Min.	Above mean.	Below mean.
			Feet.	1851									
Plattsburg Barracks.	44° 41′	73° 25′	186	Jan.	14.48	18.00	23.70	18.29	18.62	47	—16	28 4	34.6
				Feb.	20.85	23.14	28.35	24.46	24.20	48	—18	23.8	42.2
				March	24.61	29.16	37.77	30.64	30 28	59	1	28.8	29.2
				April	37.70	41.53	49.10	41.50	42 08	60	25	18.0	17.0
				May	45.93	51.93	60.97	52.83	52 91	71	34	18.1	18.9
				June	55.17	61.20	69.37	60.87	61.65	85	43	23.4	18.6
				July	59.32	66.03	75.32	67.19	66.96	88	48	21 0	19.0
				Aug.	57.19	65.03	74.32	68 93	66.37	85	48	18.6	18.4
				Sept.	51.23	58.96	69.16	58.23	59.39	92	33	32.6	26.4
				Oct.	45.77	51.35	59.45	49.70	51 57	74	27	22.4	24.6
				Nov.	27 83	30.30	33.93	29.90	30.49	51	15	20.5	15.5
				Dec.	16.87	17.83	21.70	19.87	19.07	41	—13	21.9	32.1
				1851									
Madison Barracks, Sackett's Harbor.	43° 57′	76° 15′	262	Jan.	19.22	21.00	26.48	22.54	22.31	46	—17	23.7	39.3
				Feb.	25.46	28.00	32.00	27.75	27.80	56	—9	28.2	36.8
				March	29.12	35.03	40.58	32.61	34.34	66	12	31.7	22.3
				April	37.66	43 46	46.46	40.13	41.93	60	24	18.1	17.9
				May	47.16	55.45	69.29	53.58	54.12	74	32	19.9	21.1
				June	55.70	63 36	68.90	60.06	62.01	88	39	26.0	23.0
				July	62.06	70.77	75.38	65.87	68.52	88	50	19.5	18.5
				Aug.	57.87	68.03	72.74	63 16	65.45	85	38	19.6	27.4
				Sept.	51.03	62.66	66.76	56.26	59.18	84	29	24.8	30.2
				Oct.	45.48	52.64	55.90	48.38	50.60	76	28	25.4	22.6
				Nov.	28.66	32.96	36.36	31 06	32 26	48	12	15.7	20.3
				Dec.	19.16	22.45	26.09	22.45	22.49	47	—16	24.5	38.5
				1852									
Fort Ontario, Oswego.	43° 20′	76° 40′	250	Jan.	16.87	17.67	22 45	19.29	19.07	41	—4	21.9	23.1
				Feb.	22.24	24.06	29.51	24.10	24.98	48	3	23.0	22.0
				March	26.19	32.83	34 64	29.03	30.67	52	5	21.3	25.7
				April	33.23	40.20	41 46	34.90	37.49	51	24	13 5	13.5
				May	46.30	54.63	66 66	50.46	53.26	89	36	35.7	17.3
				June	54.86	66.00	69.50	59.46	62.46	84	40	21.5	22.5
				July	63.70	72.96	76.35	65.41	69.60	96	54	26.4	15.6
				Aug.	60.58	69.64	76.29	63.87	67.59	95	52	27 4	15.6
				Sept.	51.96	59.90	67.30	57.86	59.26	92	37	32.7	22.3
				Oct.	44.93	51.38	55.41	49.22	50.24	68	30	17.8	20.2
				Nov.	32.26	35.90	38.06	34.56	35.20	51	8	15.8	27.2
				Dec.	30.03	32.54	24.58	31.12	32.07	58	10	25.9	22.1
				1852									
Fort Niagara, Mouth of Niagara River.	43° 13′	79° 8′	250	Jan.	20.12	20.29	24.25	22.06	21.68	43	—5	21.3	26.7
				Feb.	23.62	26.24	31.34	26.68	26.97	43	9	16.0	18.0
				March	29 90	31.19	34.42	29.77	30.57	53	13	22.4	17.6
				April	33.63	38.66	43.16	38.66	38.53	54	25	15.5	13.5
				May	46.42	55.26	60.26	50.77	53.18	84	35	30.8	18.2
				June	57.36	66.36	72 80	62.90	63.10	90	44	26.9	19.1
				July	61.54	72.32	77.00	66.61	69.37	93	48	23.6	21.4
				Aug.	62.48	69.71	76.90	67.61	69.17	90	55	20.8	14.2
				Sept.	54.16	61.40	67.50	59.87	60.73	85	44	24.3	16.7
				Oct.	47.45	53.22	56.64	50.29	51.90	64	36	12.1	15.9
				Nov.	34 83	37.27	39.53	36.53	37.04	52	26	15.0	11.0
				Dec.	32.27	34.16	36.91	34.84	34.54	50	19	24.5	15.5
				1854									
Buffalo Barracks.	42° 53′	78° 58′	660	Jan.	20.10	23.12	25.28	21.10	22 40	45	1	22.6	21.4
				Feb.	23.31	27.03	32.22	27.08	27.38	43	2	15.6	25 3
				March	29.20	33.21	39.11	31.26	33.19	58	20	24.8	13.1
				April	43 10	52.21	60.12	48.11	50.88	78	16	27.1	34.8
				May	49.80	58.87	62 58	54 67	56.48	82	36	25.5	20 4
				June	57.20	68.30	73.76	62.20	65.36	83	40	17.6	25.3
				July	62.16	71.29	76.25	67.61	69.33	85	46	15.7	23.3
				Aug.	59 48	70.12	75.61	61.67	66.72	87	48	20.3	18.7
				Sept.	53.76	63 10	69.96	58.53	61.34	80	33	18.7	28.3
				Oct.	39.41	46.77	52 12	43.54	45.46	68	24	22 5	21.5
				Nov.	32.76	36.83	41.23	36.30	36.78	54	20	17.2	16.8
				Dec.	28.16	30.16	32.87	29.16	30.09	44	10	14.0	20.0

TABLE II.

Showing the Mean Temperature of the Seasons at the Military Posts in New York.[1]

STATIONS.	Spring.	Summer.	Autumn.	Winter.	Year.	No. of yrs.
Fort Hamilton	46.73	71.35	55.79	32.29	51.54	12
Fort Columbus	48.74	72.10	54.55	31.38	51.69	33
West Point	48.72	71.33	53.19	29.69	50.73	31
Watervliet Arsenal	46.19	70.92	50.55	24.64	48.07	31
Plattsburg Barracks	42.34	66.76	46.67	20.22	44.00	11
Madison Barracks	44.26	67.77	49.34	24.16	46.38	16
Fort Ontario	43.70	66.92	50.39	24.73	46.44	9
Fort Niagara	44.83	68.41	50.59	27.81	47.91	14
Buffalo Barracks	42 73	66.93	47.92	27.42	46.25	4½

[1] This table is constructed from observations made between the years 1822 and 1854. In some years, the observations were incomplete. (See *Army Meteorological Register.*)

TABLE III.

Showing the Mean Monthly and Annual Measurements of Rain, in inches, at the Military Posts in New York.

STATIONS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.	
Fort Hamilton	2.98	3.57	3.65	3.42	4.62	3.65	3.55	4.44	3.38	2.80	3.75	3.84	11.69	11.64	9.93	10.39	43.65	1839 to 1854
Fort Columbus	2.78	2.92	3.44	3.33	4.78	3.46	3.17	4.70	3.31	3.40	3.59	3.93	11.65	11.33	10.30	9.63	42.23	1836 to 1854[1]
West Point	3.50	3.44	3.71	4.55	6.18	4.79	5.50	5.15	3.89	4.34	4.39	4.71	14.44	15.44	12.62	11.65	54.15	1836 to 1854[2]
Watervliet Arsenal	2.07	2.08	2.19	2.92	3.55	3.78	3.51	3.10	3.24	3.00	2.93	2.33	8.66	10.34	9.17	6.38	34.55	1836 to 1854[3]
Plattsburg Barracks	1.38	1.20	2.18	2.55	3.63	3.51	3.22	3.30	3.72	3.67	2.66	2.37	8.36	10.03	10.05	4.95	33.39	1840 to 1852[4]
Madison Barracks	2.49	2.47	3.05	2.66	3.23	2.75	4.51	2.97	3.78	5.13	3.60	3.14	8.94	10.23	12.51	8.10	39.78	1840 to 1852[5]
Fort Ontario	2.02	2.07	1.93	1.98	2.27	3.17	2.22	2.24	2.31	4.85	3.11	3.21	6.18	7.63	9.77	7.30	30.88	1844 to 1854
Fort Niagara	2.25	1.89	2.12	2.30	2.55	3.28	3.49	3.04	3.95	2.37	2.36	2.27	6.87	9.81	8.68	6.41	31.77	1841 to 1854[6]
Buffalo Barracks	3.33	1.54	3.08	2.59	2.83	2.77	3.05	3.41	4.94	4.72	3.88	2.66	8.50	9.28	18.54	7.53	38.80	1842 to 1845

[1] The observations under this head, from Jan. 1837 to Sept. 1839, were made at Fort Wood, New York Harbor.

[2] A remarkable difference occurs in the records of the annual mean at this station in different periods of time. While the annual mean for the 19 years mentioned is 54.15, that of the last 12 years of this number is only 46.53.

[3] This series is generally incomplete in measure of water falling as snow. A series of 20 years' observation at Albany gives 40 inches as the mean annual fall of water.

[4] Mean of 18 years' observation at Burlington, Vermont, 33.9 inches (Prof. Thompson).

[5] The last years of this record appear over-measured, by comparison with other stations and with previous summers here.

[6] Observations on 12 days only, in May, 1850. (*Army Meteorological Register.*)

TABLE IV.

Showing a comparative view of the Mean Monthly Temperature and Quantity of Rain for various series of years from 1826 *to* 1850 *inclusive, and for* 1857, *so far as reported by* 63 *Academies to the Regents of the University of the State of New York, with the Latitude, Longitude, and Altitude above tide-water of the Academies, and the general Annual Mean for the whole*

STATIONS.	COUNTIES.	North latitude.	West longitude.	Altitude.	No. of years.	Mean Monthly Temperature, and									
						January.	February.	March.	April.	May.	June.	July.	August.	September.	
		° ′	° ′	Ft.											
Albany	Albany	42 39	73 44	130	24	24.37	24.72	35.03	44.74	60.06	68.12	72 24	70.17	61.38	1
						2.91	2.62	3.02	2 88	4.04	4.50	4.09	3.44	3.47	
Amenia	Dutchess	41 48	73 36	540	1	21.79	20.12	35.56	41.54	56.66	66.55	69.34	67.86	57.76	2
Auburn	Cayuga	42 55	76 38	650	22	24.37	24.63	33 47	45.26	54.39	63.56	69.84	68.18	59.44	3
						2.50	2.04	2.13	2 22	3.45	3.57	3.13	3.23	3.20	
Bridgewater	Oneida	42 55	75 17	1286	4	20.64	21.87	29.88	42.29	52.98	59.58	66.63	62.90	55.44	4
						4.26	2.84	3.01	4.26	3.47	5.36	4.82	2.74	2.55	
Buffalo	Erie	42 53	78 58	623	2	23.43	21.13	35.48	40.70	55.26	67.44	71.54	69.99	59.89	5
Cambridge	Washington	43 01	73 23		14	22.44	21.45	32.69	44.19	55.27	64.82	68.88	66.09	58.29	6
					13	3.36	2.61	2.12	3.36	3.65	4.66	3.91	3.98	3.27	
Canajoharie	Montgomery	42 53	74 35	284	3	20.97	19.61	30.46	47.29	58.33	64.06	70.34	67.36	58.69	7
Canandaigua	Ontario	42 50	77 15	145[1]	10	23.34	21.09	31 84	45.94	55.92	65.70	69.48	66.81	57.32	8
						2.94	3.13	2.31	2.68	4.53	3 89	3.22	3.12	2.81	
Cayuga	Cayuga	42 43	76 37	447	14	28.69	28.18	36.91	46.59	56.55	66 15	72 27	70.71	62.96	9
					7	1.93	1.60	1 64	2.09	3.73	3.75	3.88	3 37	3.11	
Cherry Val.	Otsego	42 48	74 47	1335	15	22.03	21.66	30 30	43.64	53.84	63.47	67.01	65.58	57.82	10
					14	3.13	2.62	2.99	3.09	3.67	4.56	4.41	3.19	3.92	
Clinton	Suffolk	40 55	72 18	16	17	30 13	30.75	36.36	44.43	53.18	62.79	69.68	68.51	62.54	11
					16	3.22	2.50	2.68	3.58	4.13	2 99	2.93	3.06	3.26	
Cortland	Cortland	42 38	72 18	1096	18	23.87	22.43	31.17	43.15	54.03	62.07	66.18	64 74	57.28	12
Delaware	Delaware	42 16	74 58	1384	2	24.42	30.05	34.85	39.93	55.79	70.33	69.77	65.15	56.00	13
						2.32	2.65	3.02	1.45	5.87	7.18	4 79	3.41	1.96	
Dutchess	Dutchess	41 41	73 55	..	16	26.67	26.40	36.25	50.12	59.88	68.19	73.87	72.10	63.92	14
					14	3.20	2.07	2.94	2.72	3.24	3.36	3.68	4.10	2.44	
Erasmus Hall	Kings	40 37	73 58	40	24	31.49	31.37	40.16	49.14	59.55	67.36	72.68	71.40	64.28	15
						3 08	2.88	3.62	3.49	3.61	3.88	3 63	4.12	3.11	
Fairfield	Herkimer	43 05	74 55	1185	19	19.86	20.44	29.58	41.72	53.53	62.54	66.07	65.64	57.82	16
					17	2.69	1.79	2.36	2.53	3.09	4.29	4.21	3 65	3.08	
Farmers' Hall	Orange	41 20	74 11	425	11	25.65	26.31	36 54	47.41	56 22	64.73	68.69	67.64	59.76	17
					8	2 59	2.55	2.61	2.05	3.44	3.27	2.95	2.66	2.79	
Franklin	Franklin	44 50	74 23	703	3	18.24	26.14	31.42	45.07	53 00	60.22	66.90	65.44	55.17	18
						1.73	2 23	2.04	2.04	2.97	3.38	3.89	1.57	2.75	
Franklin	Steuben	42 34	77 20	1494	10	24 47	24.21	32.99	46.15	52.75	61.27	66.78	65.88	57.54	19
					9	1.96	1.82	2.41	2.64	3.15	4 04	3.32	2.51	3 25	
Fredonia	Chautauque	42 26	79 24	144[2]	18	28.66	27.41	35.32	46.45	56.64	65.36	70.86	68.81	61 27	20
					16	2.04	1.82	1.99	1.93	3.32	3.83	3.34	3.28	4.46	
Gaines	Orleans	43 17	78 15	192[3]	4	25.36	28.38	34.46	46.54	54.48	62.99	71.76	66.38	59.83	21
						2.59	1 72	3.49	2.64	2.47	3.74	3.79	2.45	3.12	
Gouverneur	St. Lawrence	44 25	75 35	400	12	19.74	18.64	30.93	44.53	54.89	63.59	68.86	67.23	58.18	22
					9	2.54	1 87	1.68	1.94	2.44	2.89	2.34	2.21	2.59	
Granville	Washington	43 20	73 17	..	14	20.67	20.09	31.29	43.63	56.15	66.49	70.82	68.35	58.72	23
						2.08	1.42	1.74	2.13	3.47	3.21	3.62	2.97	2.67	
Greenville	Greene	..	..	..	1	30.27	27.48	33.77	40.18	62.51	66.77	68.87	68.72	61.73	24
Hamilton	Madison	42 49	75 34	1127	18	22.90	22.95	31.80	45.43	54.97	63.08	67.36	65.86	58.28	25
						2.25	2.65	2.27	1.93	2.93	3.48	3.79	2 70	3.68	
Hartwick	Otsego	42 38	75 01	1100	17	24.23	25.22	33.89	44.42	56.47	65.07	68.25	66.72	58.75	26
					14	2.66	2.15	2.59	3.10	3.35	4.05	4.24	2.91	3.09	
Hudson	Columbia	42 15	73 45	150	17	25.02	25.74	34.89	47.46	58 87	67.53	71.45	70.31	61.56	27
					16	2.68	2.33	2.77	2.54	3.13	3.48	3.66	2.98	2.73	
Ithaca	Tompkins	42 27	76 30	417	17	28.14	27.04	34.62	46.98	57.52	65.13	70.59	68.64	60.32	28
					13	1.82	1.64	2.15	1.84	3.22	3.43	3.35	2.64	3 32	
Johnstown	Fulton	43 00	74 23	688	14	21.28	22.11	31.50	43.08	55.66	65.16	69.00	67.80	58.24	29
						3 30	2.77	3.62	2.99	3.45	4.20	4.01	3.14	2.87	
Kinderhook	Columbia	42 22	73 43	125	17	22 89	23 33	33.74	46.29	57.26	65.44	70.15	68.47	60.30	30
						2.21	1.53	2.48	2.97	3.41	4.55	4.35	3.35	3.94	

[1] Above Canandaigua Lake. [2] Above Lake Erie. [3] Above Lake Ontario.

TABLE IV.

number of those years; and, also, the Highest and Lowest Degree and Extreme Range, Mean Monthly Range, and Mean Annual Range of the Thermometer, and the Mean Results of Winds at the same places. (The numbers in the lines opposite the names of the places, and under the names of the months, denote the temperature, and the numbers under these, the quantity of rain.)

	Quantity of Rain.			Annual mean.	Thermometer.					Mean Results of Winds.							
	October.	November.	December.		Highest degree.	Lowest degree.	Extreme range.	Mean monthly range.	Mean annual range.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.
1	49.48	39 16	28.40	48.43	97	—23	120	67.5	100	4.11	1.98	0.60	1.63	9.64	2.13	3.02	7.34
	3.56	3 30	2.98	40.93													
2	46.99	45.15	28.24	46.46	96	—16	112	45.5	112	5.71	3.04	0.46	2.54	6.46	4.50	1.25	6.46
3	48.22	47 75	29 54	46.62	96	—14	110	68.0	96	3.19	1.10	0.38	2.26	6.98	5.91	2.32	8.33
	3.38	2 85	2 72	34.52													
4	44.66	31.42	23 67	42.66	94	—31	125	70.5	112	1.38	0.38	1.20	1.19	8.07	4.56	9.70	4.36
	4.37	2.12	4.35	44.02													
5	48.75	37.21	22.85	46.14	92	—22	114	55.5	114	0.69	4.02	2.58	2.85	2.75	10.69	3.42	3.71
6	46.76	35.56	28.51	45.39	98	—36	134	74.2	116	6.83	1.60	0.17	0.61	7.08	5.94	4.03	4.79
	3.60	3 29	2.29	40.14													
7	49.06	37.87	25.26	45.77	97	—36	133	62.0	118	0.13	0.02	3.79	6.08	0.85	1.67	7.94	9.66
8	47.85	36.14	26.68	45.73	94	—11	105	62.0	96	1.12	0.50	0.59	1.24	7.91	4.22	10.89	4.09
	3.26	2.77	2 36	37.15													
9	50.52	40.59	29.80	49.16	96	—10	106	63.2	94	5.85	0.67	0.52	1.58	9.49	2.89	3.87	5.59
	3.20	2 03	2.12	33.10													
10	45.80	34.36	35.34	44.27	98	—30	128	73.0	105	1.46	1.96	1.71	0.89	3.96	6.10	10.17	4 25
	3.64	3.17	2.73	41.14													
11	52.19	42.27	33.45	48.74	95	— 8	103	61.5	88	2.17	3.51	3.67	3.08	3.77	4.70	3.55	3 88
	3.63	3.63	3.07	38.60													
12	46.02	36.16	26.70	44.67	95	—28	123	71.5	105	0.07	0.10	0.12	2.30	4.93	8.89	1.56	12.46
13	44 71	38.19	30.75	46.66	93	—17	110	59.0	110	1.95	1.27	1.00	0.95	5.60	8.47	6.54	4.72
	4.18	3.39	1.65	~~2 49~~													
14	51.97	41.33	30.00	50.61	102	—22	124	73.0	106	5.81	3.38	0.62	4.85	4.85	5.01	2.19	3.72
	3.88	3.38	3.14	38.13													
15	53.47	44.15	35.16	51.62	96	— 4	100	59.5	87	2.15	4.82	0.61	2.88	2.51	6.67	3.02	7.77
	3 89	3.79	3.73	42 74													
16	45.94	34.19	23 04	43.26	96	—26	122	72.3	105	0.27	0.33	5.03	4.84	0.65	1.39	8.27	9.96
	3 55																
17	48.44	38.78	28.01	47.56	98	—30	128	69.8	102	1.07	5.85	1.14	1.12	2.75	8.89	6.22	3.48
	3.13	2.34	3.44	33.94													
18	46.91	32.85	31.22	43 54	94	—24	118	65.0	109	1.69	2.94	0.63	1.44	3.35	6.71	9.73	4.01
	2.92	1.44	2.09	29.07													
19	45.93	35.21	28.22	44.42	100	—19	119	71.0	106	1.96	0.80	0.52	0.94	6.33	3.77	5.41	11.08
	2 86	2 41	2.60	32.98													
20	50.55	41 34	30.82	43.28	97	—12	109	65.8	93	2.49	1.88	1.19	1.75	4.66	5.36	10.64	2.41
	4.31	3.27	2.96	36.68													
21	47.69	35.25	28.45	46.71	94	— 7	101	57.5	94	1.41	3.27	1.78	2.73	1.24	6.29	3.64	9.99
	1.65	3.01	2.83	33.50													
22	47.02	33.79	19.97	43.95	100	—40	140	79.8	123	3.50	3.18	0 64	1.34	3.85	8.50	4.62	4.76
	3.20	2 16	1.67	27.61													
23	47.70	35.81	24.79	45.39	102	—31	133	74.5	117	10.24	0.91	0.23	1 08	7.50	7.77	1.26	1.43
	2.90	2.88	2.59	31.69													
24	51.26	36.96	28.13	48.05	91	—17	108	51.5	108	0 71	2.95	1.08	9.46	0.95	1.62	1.95	11.67
25	45.88	35.63	26.35	44 82	96	—34	130	77.5	112	1.73	0.90	0.29	1.21	5.45	6.69	3.02	11.07
	3.12	2.54	2.78	34.52													
26	48.46	38 61	26.94	46.54	96	—30	126	71.0	104	1.32	0.87	0.49	1.15	11.16	2.76	4.23	8.50
	3.54	3.20	2 54	37.38													
27	49.82	38.67	27.93	47.84	99	—24	123	67.8	102	6.95	1.66	0.73	4.68	7.75	1.09	1.64	5.94
	3.98	2.59	2.89	35.96													
28	48.69	39.03	30.69	48.38	98	—18	116	70.5	101	2.94	0.95	0.59	2.58	5.85	3.95	3.59	10.88
	2 56	2.86	1.96	30.39													
29	46 59	34 39	23.61	44.91	96	—30	126	72.3	112	0.19	2.39	4.99	1.58	0.37	2.55	16.12	2.25
	3.28	3 33	2.87	39.82													
30	47.54	38.28	25 30	47.00	102	—30	134	74.2	109	12.20	0.45	0.36	0.92	11.23	0.95	0.61	3.71
	3.25	2.69	2.75	35 81													

TABLE IV.—Continued.

STATIONS.	COUNTIES.	North latitude.	West longitude.	Altitude.	No. of years.	Mean Monthly Temperature, and									
						January.	February.	March.	April.	May.	June.	July.	August.	September.	
		° ′	° ′	Ft.											
Kingston	Ulster	41 55	74 02	188	20	27.36	26.65	35.09	49.37	59.52	58.90	75.21	70.90	62.01	31
					19	3.26	2.21	2 97	2.53	3.70	3.84	4.09	2 68	2.24	
Lansingburg	Rensselaer	42 47	73 40	30	20	27.75	24.56	34.19	47 60	59.15	67.84	71.75	70.20	61 83	32
						2.29	2.07	2.16	2.40	2.78	3.92	3.55	2.52	3.02	
Lewiston	Niagara	43 09	79 10	280	18	27.23	26.92	34.80	46.32	56.73	64.73	71.25	69.56	61.79	33
					13	1.40	1.11	1.39	1.51	1.98	2 46	2.34	1.96	2.59	
Liberty	Sullivan	41 46	..	1467	1	10.90	24.90	..	35.30	50.00	60.00	67.40	63.90	56.50	34
						3.60	2.24	..	8.76	7.17	5.55	7.10	4.34	2.94	
Lowville	Lewis	43 47	75 33	800	19	20.11	20.68	29.67	44.28	54.15	62.98	67.41	65.23	57.17	35
					18	2.34	2.38	1.78	1.90	2.79	3.42	3.67	2 84	2.82	
Mexico	Oswego	43 27	76 14	331	11	22.68	22.16	31.12	42.29	51.91	62.72	66.48	65.69	58.47	36
						2.27	2.06	2.26	1.40	2.77	2.38	2.75	2 12	2.79	
Middlebury	Wyoming	42 49	78 10	800	18	26.27	26.29	33.96	45.58	56.10	63.89	68.75	66.91	59.14	37
					17	1.46	1.77	2.26	2.46	2.92	3.40	3.30	2 81	2.83	
Millville	Orleans	43 08	78 20	..	8	26.00	26.36	32 28	45.55	54.68	63.23	68.24	67.73	59.50	38
					6	2.46	1.88	1.68	2.11	2.13	2.65	2.34	2.09	3.75	
Monroe	Monroe	43 02	77 42	600	3	26.85	22.72	36.98	48.51	57.17	64.72	68.21	63.87	57.91	39
					2	1.66	1.81	1.06	3.21	1.84	3 47	1.53	3 01	3.42	
Montgomery	Orange	41 32	74 18	..	13	25.36	27.02	36.63	47.63	58.36	65.99	72.34	70.31	62 51	40
						2.72	2.23	2 25	2.94	2.78	4.07	3 92	2 86	2.38	
Mt. Pleasant	Westchester	41 09	73 47	125	12	27.96	29.39	38.03	48.34	57.87	67.68	71.21	71.12	62.49	41
						2.15	1.50	2.55	3.67	3.63	3.14	4.46	4.12	3.10	
Newburg	Orange	41 31	74 05	150	..	27.81	26.88	35.96	48.19	59.13	67.76	72.25	70.95	63.33	42
						2.73	2.09	2.26	1.99	4.09	3.52	3.17	3.00	3 19	
N. Y. Deaf & Dumb Inst.	New York	40 45	74 02	..	5	31.76	29.45	37.28	47.93	57.68	68.07	73.10	71.50	63.94	43
					3	3.22	4.54	4.99	1.88	6.67	1.77	4.64	3.98	2.88	
North Salem	Westchester	41 20	73 38	361	19	27.13	25.71	35.81	46.68	56.96	66.02	71.25	69.39	60.71	44
					18	3.07	2.27	3.11	3.01	4.19	3.46	4.23	3.01	3.08	
Ogdensburg	St. Lawrence	44 43	..	..	1	24.75	12.33	32.94	39.81	52.54	66.53	71.66	68.31	59.22	45
						2.36	0.97	1.18	0.40	4.81	3.57	1.88	2.55	1.01	
Oneida Conference	Madison	42 55	75 46	..	18	21.58	21.16	30.33	43.33	53.33	61.68	66.47	64 88	57.48	46
					19	2.46	2.12	2 60	2.78	3.76	4.50	4.10	3.58	3.55	
Oneida Inst.	Oneida	43 08	75 14	..	7	19.68	20.85	29.08	43.74	56.48	64.53	71.41	65.99	58.50	47
						2.74	1.41	1.34	2.19	2.75	3.39	3.39	2.96	2 54	
Onondaga	Onondaga	42 59	76 06	1260	16	25.28	25.66	33.81	45.96	58.01	65.49	68.90	68.05	59.75	48
						2.52	1.48	1.79	2.02	2.77	3.69	3.41	3.19	2 67	
Oxford	Chenango	42 28	75 32	961	17	22.24	22.24	31.56	44.79	55.26	63.44	68.08	66.02	57.70	49
						2.64	1.98	2.25	2.66	3.41	4.08	4.03	3.62	3.25	
Oyster Bay	Queens	40 50	73 30	..	2	27.48	34.11	38.94	49.31	57.58	67.17	72.57	70.30	64 02	50
					1	1.92	1.67	2.67	4.89	7.08	4.97	6.45	2.10	4.83	
Palmyra	Wayne	43 05	77 16	450	1	25.93	20.37	30.68	42.84	56.20	64.46	67.96	64.00	54.39	51
						1.22	0.85	1.65	4.00	0.98	5.61	4.19	4.08	3.27	
Plattsburg	Clinton	44 42	73 30	..	5	21.67	19.91	30.66	40.45	56.13	65.31	69.43	68.86	59.55	52
					3	3.05	3.28	4.63	2.81	2.35	3 74	2.53	2.81	3.31	
Pompey	Onondaga	42 56	76 05	1300	17	20.94	20.72	29.78	41.05	52.50	61.71	65.97	64.23	55.19	53
					15	1.87	1.30	1.19	1.56	2.76	4.38	4 11	3.37	3.09	
Redhook	Dntchess	42 02	73 56	..	12	24.66	26.06	35.83	49.13	58.00	67.02	71.88	68.64	61.61	54
					10	2 72	1.54	2 43	3.16	3.09	4.15	4.26	2.96	2.61	
Rochester	Monroe	43 07	77 42	516	19	26.25	25.92	32.90	45.57	56.05	64.62	69.76	67 71	60.11	55
					18	1.91	1.37	1.83	2.01	3.08	3.31	2.98	2.66	3.15	
St. Lawrence	St. Lawrence	44 40	75 01	394	21	18.41	18.78	29.96	43.75	55.02	63.97	68.39	66.74	57.37	56
					20	1 40	1.06	1.48	1.70	3.02	3.31	4.03	2.81	3.11	
Schenectady	Schenectady	42 48	73 55	..	3	21.74	19.94	29.58	44.74	58.15	66.62	68.77	66.80	59.82	57
					2	7.16	4.52	2.14	4.62	3.07	3 85	3.11	1.92	2.59	
Springville	Erie	42 30	78 50	500[1]	8	24.88	25 95	30.75	45.45	53.14	61.62	67.51	64.18	57.62	58
					2	1.18	2 37	1.83	2.95	2.16	3.95	3.60	3.64	4.59	
Syracuse	Onondaga	43 01	76 15	400	1	30.90	20.56	26.14	45.51	58.30	66.66	71.24	71.48	64 28	59
						2.46	1.83	3 63	1.63	1.10	3.00	2.19	2.15	4.68	
Union Hall	Queens	40 41	73 56	..	25	29.44	29.34	37.63	47.24	56.99	64.91	71.23	70.58	61.99	60
						2 50	2.23	2.83	3.05	3.54	3 69	3.94	4.09	3.38	
Union Lit. So.	Jefferson	43 45	76 10	..	9	23.73	22 91	32.64	48.18	56 50	64.68	69.59	66.13	60.04	61
						1.98	1.83	1.48	1.86	2.45	2.48	2.96	2.60	2.91	
Utica	Oneida	43 06	75 13	173	22	23.27	23 35	32.28	44.71	56.45	64 22	68.55	66.74	58.43	62
					19	2.92	2.61	2.75	3.17	3.34	4.60	4.53	3.70	3.55	
Washington	Washington	43 15	73 30	..	10	22.43	22.75	32.57	45.65	57.03	65.94	69 29	69.55	60.06	63
					7	1.89	1.36	2.88	1.75	2.33	3.52	4.39	3.09	3.31	

[1] Above the canal at Buffalo.

TABLE IV.—Continued.

	Quantity of Rain.			Annual mean.	Thermometer.					Mean Results of Winds.							
	October.	November.	December.		Highest degree.	Lowest degree.	Extreme range.	Mean monthly range.	Mean annual range.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.
31	50.67	41.09	30.51	49.37	100	—30	130	71.0	104	1.70	7.09	0.88	2.77	2.89	6.60	2.28	6.51
	3.11	3.40	3.34	37.53													
32	49.65	38.56	27.12	47.97	101	—28	129	74.0	114	3.98	0.94	0.22	2.07	7.83	3.21	6.61	5.46
	3.19	2.82	2.59	33.47													
33	49.70	39.11	29.74	47.88	97	— 6	103	65.3	92	2.37	2.58	1.59	1.60	4.57	10.75	4.07	2.89
	2.67	1 68	1.11	22.23													
34	46.40	34 90	30.10	44.60													
	3.76	2 30	4 32	52.80													
35	45.87	34 09	23.83	43.62	100	—40	140	79.0	120	5.31	0.64	0.46	3.73	6.83	2.45	3.87	7.00
	3 28	2.94	2 22	32.69													
36	44.04	34 61	25.44	44 08	99	—24	123	72 0	106	2.07	0.89	1.52	4.88	3.75	2.86	9.69	4.87
	3.94	3.07	3.09	30.78													
37	48.00	37.21	29.17	46.77	100	—20	120	78.0	103	2.31	1.68	0.36	0.54	1.49	14.90	5.41	3.74
	2.88	2.56	1.79	30.47													
38	46.62	37.75	28.99	46.11	95	—12	107	65.0	99	1.65	3.71	1.63	2.90	2.32	8.92	3.25	6.05
	3.14	2.75	1.95	28.94													
39	49.58	33.40	26.89	45.84	96	— 9	105	60.0	97	3.29	1.47	1.78	1.40	6.82	7.07	5.06	3.39
	3 98	1.38	0.38	26.75													
40	49.23	39.47	29.03	48.60	104	—33	137	77.5	109	3.25	3.23	0.91	1.45	4.66	4.48	7.02	5.44
	3.55	2 87	2 36	34.93													
41	50 63	40.29	30.25	47.41	97	— 8	105	58.8	93	4.28	2.72	0.67	2.79	6 21	4.02	1.49	8.23
	3.22	2.28	2.44	36.19													
42	51.83	40.83	29.84	49.67	105	—15	120	69.0	100	2.85	5.72	0.64	1.88	4.18	6.93	3 85	4.36
	3.61	3.11	2.25	35.58													
43	52.19	44 31	34.95	51.01	92	— 2	94	49.0	84	1.13	5.90	0.53	4.03	0.90	4.59	5.63	7.39
	3.26	4.96	4.27	46.26													
44	49.21	39.45	28.92	48.06	102	—31	133	74.0	105	1.65	3.29	1.42	3.72	2.78	6.44	3.52	7.59
	4.50	2.29	3.30	42.41													
45	44.58	29.74	19.43	43.49	92	—10	102	44.0	102	1.71	5.88	0.62	0.67	3,41	10.58	4.50	3.04
	2.73	2.07	1.08	24.61													
46	47.63	35.15	24.19	43.65	97	—28	125	74 0	109	0.88	0.51	0.56	1.82	5.27	5.83	5.64	9.92
	3.58	3.00	2.77	38.30													
47	47.09	34.57	23.97	44.83	98	—33	131	71.8	115	1.39	0.63	6.55	1.76	2.73	2.76	11.53	8.08
	3.27	2.11	1.96	30.06													
48	48.26	36.54	29.12	47.18	99	—22	121	72 8	106	1.56	0.76	1.17	2.15	7.91	2.23	8.19	6.38
	3.29	2.48	1.95	31.39													
49	45.73	34.80	24.88	44.74	98	—36	134	76.3	114	5.39	2.34	0.34	0.49	3.99	6.74	7.10	6.04
	3 44	2 45	2.25	36.05													
50	54.00	43.26	33.96	50.81	95	3	92	48.2	90	0.87	6.58	0.73	3.27	2.23	7.88	1.62	7.23
	2.00	2.24	1.47	42.29													
51	51.78	39.82	25.50	45.33	93	— 9	102	54.0	102	1.83	2.25	0.79	6.04	1.58	6.79	4.92	6.21
	5.06	1.96	0.93	33.80													
52	46.34	39.51	26.38	45.17	100	—20	120	63.0	108	6.62	1.39	0.45	2.49	9.45	1.09	3.12	5.82
	4.53	2.43	2.63	38.09													
53	44.65	32.47	23.85	42.83	91	—18	109	66.0	109	0.37	0 88	0.19	3.11	4.75	7.69	6.50	7.42
	2.90	1.65	1.24	29.46													
54	50.41	39.58	27.58	48.36	98	—28	126	68.0	102	8.97	2.42	1.39	2.12	9.78	1.17	1.32	1.84
	2.89	2.53	2.48	34.73													
55	47.83	38 39	28,62	46.79	102	— 9	111	67.0	95	2.16	2.75	1.12	2.09	2.12	5.80	6.79	7.51
	3.46	2.90	2.06	30.71													
56	44.99	33 72	22 11	43.61	96	—34	130	78.3	114	1.83	4.75	0.25	0.99	4.26	11.04	2.49	4.85
	3.34	1.93	1.44	28.62													
57	46.78	37.45	29 19	45.82	91	—16	107	55.3	101	1.39	1.62	1.18	4.76	3.90	1.33	7.73	8.51
	2.76	2 77	2 28	47.88													
58	46.23	37.49	28.13	45.32	95	—20	115	69.2	102	1.81	2.33	1.29	1.70	1.87	6.98	8.91	4.96
	5.82	3.03	2.30	37.44													
59	47.72	32.80	32.12	47.30	94	— 3	97	45.0	97	0.33	0.75	2.29	4.33	3.00	3.25	10.37	6 08
	5.41	2.83	2.12	~~32.80~~													
60	51.85	41.72	32 51	49.87	100	— 7	107	64.2	92	2.20	3.89	1.34	2.55	2.93	5.92	2.81	8.19
	3.48	3.49	2.85	39.07													
61	48.98	37.77	25.93	46.51	98	—35	133	74.5	112	2.54	3.27	1.18	2.61	5.92	4.95	6 32	3.32
	4.00	2.86	2.12	20.55													
62	47.38	36.23	26 79	45 68	97	—27	124	75.0	104	0.14	0.15	6.30	2.39	1.90	2.35	15.12	1.25
	2.78	3 43	3.19	40.09													
63	46.63	38.55	28.31	46.47	100	—40	140	73.8	119	5.39	3.61	0.21	0.80	4.92	10.31	2.20	2.99
	3.28	2.46	2.54	32.83													

But little attention, comparatively, has been given to the barometrical phenomena in New York. This neglect will doubtless, in future, be avoided, by following the system of meteorological registration recently adopted. The following are the results of barometrical observations made at a few of the stations in the State.

TABLE V.

Showing the Annual Mean Height, &c. of the Barometer at sundry places in New York.

ACADEMIES.	Year.	Annual mean.	Highest.	Lowest.	Range.
North Salem . .	1846	29.459	29.930	28.280	1.650
Syracuse .	1846	29.537	30.140	28.400	1.740
Fredonia	1846	29.610	30.150	28.920	1.230
N. Y. Deaf and Dumb Inst.	1846	29.946	30.510	28.780	1.730
Oneida Conference .	1846 10 mos.	28.620	. .	. .	.
Rochester . .	1850	29.440	. . .	. . .	1.300
Rochester .	last 10 y'rs	29.550	.	. . .	
Albany . .	1850	29.866	. . .	. . .	. . .
Albany .	1851	29.894	30.792	28.981	1.811
Albany .	1852	29.848	30.643	28.914	1.729
Albany . . .	1853	29.890	30.638	28.717	1.921
Spencertown .	1855	29.291	30.067	28.247	1.820
Liberty . . .	1856	28.374	29.018	27.606	0.846

In examining the above meteorological summaries, we arrive at a knowledge of the prominent features of the climate of New York. It must be observed, however, that, for medical purposes, the number of meteorological stations is as yet by far too small. To serve the end of public hygiène, throughout the commonwealth, as contemplated in these inquiries, the number of stations should be multiplied tenfold. Indeed, every rural district, every city and village, should have its meteorological record; and nothing short of such a multiplication of stations of observation will supply the data necessary to elucidate the atmospheric agencies concerned in producing the salubrity or insalubrity of particular localities. It must also be remarked that, in regard to many places in which numerous observations have been made, relating to the temperature, rains and winds, but little or no attention has been given to another class of meteorological facts. We refer, especially, to those conditions of the air depending on the presence of aqueous vapor, and which are indicated by the hygrometer. The light already thrown on this subject, as we shall have occasion to show, abundantly proves that no system of medical meteorology can be complete, which does not embrace full details in that branch of natural science.

To what extent electricity, in its statical condition, is influential,

as an atmospheric element, in determining the salutary and hurtful properties of the air, is a question to which no successful research has been directed. Its agency can scarcely be regarded as nugatory, or neutral, in relation to vital phenomena. Among its conditions, may be one or more which, in combination with certain states of the atmosphere, is widely exerted in promoting the health of animals and plants, or, on the contrary, in causing them to sicken and perish. With respect to magnetism, there seems no room to controvert the statement of Prof. Henry, that "Terrestrial magnetism has not been shown, in any case, to affect meteorological phenomena; it is a force which never produces translation, but merely direction of the needle. The air, in its natural condition, is not magnetic, in the proper sense of the term, any more than a piece of steel wire is so before the power has been developed in it by the magnet."[1]

It appears from the above tables, that whilst the highest degrees of heat, both in the lower and higher latitudes in New York, vary but little, the lowest degrees in both are widely different; for example, at Fort Hamilton, in the harbor of New York, the highest degree of heat in January, 1854, was 50°, and at Watervliet, on the Hudson River, above Albany, was 48°, a difference of only two degrees, whilst, in the same month and year, the lowest degree at the former place, was 12°, and at the latter — 10°, a difference of 22 degrees. So, also, at Union Hall, in the maritime region, on Long Island, near New York city, in the year 1848, the highest temperature was 92°, and at Lowville, in the northern region of the State, it was 94°; and in the same year, the lowest temperature at the former locality, was 5°, and at the latter, — 27°. It thus appears that at Lowville, the thermometer rose 2° higher, and sunk 32° lower, than at Union Hall. It seems, therefore, that in summer, heat is more equally distributed over the State than it is in winter, and that, in some years, the heat of a New York summer is greater at its northern than at its southern limit.

The annual mean temperature of the localities in the State, from which returns of thermometrical observations have been made, ranges generally between 42° and 51°, the differences depending more on latitude than altitude. The altitude of the meteorological stations varies from 16 feet to upwards of 1400 feet above tide-water. Of the former altitude is Clinton Academy, on Long Island, and of

[1] Patent Office Report for 1856, page 474.

the latter, is Liberty, in Sullivan County. The elevations of the intermediate stations are very numerous. Moderate heights have some effect upon temperature, but it is only at a comparatively few places that the temperature is very sensibly or appreciably affected by their greater altitudes, and hence the chief variations of temperature in the State are due mostly to differences of latitude, and the influences of the Atlantic Ocean, and the great northern lakes.

The annual mean temperature at the equator is estimated at 82°, and it is generally known that it gradually decreases in a northerly and southerly direction, as the latitude increases. The want of uniformity of the decrease in these opposite directions from the equator, is mainly ascribable to the irregularities of the earth's surface. Now, the geological elevations and depressions in the State of New York are not as remarkable as in some other parts of the globe, but they nevertheless have an influence in disturbing the uniformity of the gradual decrease of the mean temperature. Though the following table may not illustrate to what extent the gradual decrease of temperature is interrupted or varied by geological conformation, yet it shows the extent of that decrease along the meridian, passing through the extreme length of the State of New York, between the latitudes of 40° 37′, and 44° 41′. It also shows how remarkably the decrease of the mean temperature in this State accords with the observed mean annual temperature of the valley of the Mississippi, on the meridian passing through New Orleans, between the 40th and 45th parallels of north latitude, as given by Prof. Henry, in a table illustrating the difference between the astronomical and observed temperature in that valley.

TABLE VI.

LOCALITIES.	Latitude.	Spring.	Summer.	Autumn.	Winter.
Fort Hamilton .	40° 37′	46.73	71.35	55.79	32.29
Fort Columbus . . .	40 42	48.74	72.10	54.55	31.38
West Point	41 23	48.72	71.33	53.19	29.69
Watervliet Arsenal . .	42 43	46.19	70.92	50.55	24.64
Plattsburg Barracks .	44 41	42.34	66.76	46.67	20.22

This table reveals the interesting fact that the differences in the mean temperature of the seasons, between Fort Hamilton, in the south of the State, and Plattsburg, in the north, increase in the order of the seasons. Thus, the difference between the mean temperature of the *spring*, at the former place, and at the latter place, is 3°.39; of the *summer*, 4°.59; of the *autumn*, 9°.12; and of the

winter, 12°.7. These facts show how much more nearly the temperature is the same, in the northern and southern parts of the State, in the warm than in the cold months. These degrees of difference, added together, amount to 29°.17, which is, within 2°.83, the difference of the mean annual temperature, namely 32°, between Union Hall, on Long Island, and Lowville, in Lewis County. That the difference between these two latter places should be greater than between the two former, might have been inferred *à priori*, from the fact that Plattsburg, which is north of Lowville, and, therefore, *cæteris paribus*, should be colder, has its climate softened by the influence of Lake Champlain.

The Hudson, or as it is otherwise called, from its course, the North River, is locally regarded as marking, by the duration and extent of its congelation, the mildness or severity of the winter of the country through which it flows. Indeed, it may be said to be a fluviatile thermometer, indicating, by its progressive freezing from its sources to its mouth, a reduction of the temperature below 32°. In some years, its congelation extends southerly many leagues further, and continues longer, than in other years. These variations have so intimate a relation with the internal navigation, and, consequently, with the commercial interests of the State, that the regents of the University have carefully preserved records of them in their annual reports to the legislature. In the records referred to, are noticed the *terms* during which the navigation of the river was interrupted by ice at Albany. The observation of these phenomena commenced in 1785–86, and, with a few exceptions, have been annually continued from that period to the present time. The time during which the river, at Albany, has been obstructed by ice, has varied from 50 to 136 days. Such differences mark great variations in the character of the New York winters. The earliest day of the closing of the river by ice at Albany, has been the 23d of November, and the latest day of its opening, the 13th of April.

Instead of attempting to trace isothermal lines over so comparatively small a territory as the State of New York, it may be well to exhibit, in a tabular form, the localities in which the mean annual temperature is the same, or very nearly so. In doing this, the fractions of degrees are omitted.

TABLE VII.

Isothermal Meteorological Stations in New York.

Annual mean temperature.	
42°.	Bridgewater. Pompey.
43°.	Fairfield. Franklin (Malone). Lowville. Ogdensburg. Gouverneur. Oneida Conference. St. Lawrence.
44°.	Cherry Valley. Liberty. Cortland. Mexico. Hamilton. Johnstown. Oneida Institute. Oxford. Plattsburg Barracks.
45°.	Cambridge. Canajoharie. Canandaigua. Monroe. Granville. Palmyra. Plattsburg. Schenectady. Springville. Utica.
46°.	Amenia. Auburn. Buffalo. Delaware. Gaines. Hartwick. Middlebury. Millville. Rochester. Union Lit. Soc. Washington. Madison Barracks. Fort Ontario. Buffalo Barracks.
47°.	Farmers' Hall. Hudson. Kinderhook. Lansingburg. Lewiston. Mount Pleasant. Onondaga. Syracuse. Fort Niagara.
48°.	Albany. Clinton. Fredonia. Greenville. Ithaca. Montgomery. North Salem. Redhook. Watervliet.
49°.	Cayuga. Franklin (Plattsburg). Kingston. Newburg. Union Hall.
50°.	Dutchess. Oyster Bay. West Point.
51°.	Erasmus Hall. N. York Institution Deaf and Dumb. Fort Hamilton. Fort Columbus.

In thus grouping together the places in which the annual mean temperature is the same, we show how irregularly the isothermal localities in the State are distributed, in respect to longitude and latitude; and also how widely they are separated from one another —localities which it would not be worth the attempt to connect together by lines, such as are usually drawn in isothermal charts. But while the above grouping is that deduced from the preceding tables, it must be specially noted, that the degrees of mean temperature given in the last table are not constant, and consequently the isothermal localities vary in their geographical position in different years, though their number in the State is probably nearly always the same.

It is generally conceded that in temperate latitudes the atmospheric temperature is reduced one degree at every elevation of about 333 feet above the sea. Assuming this to be true, it will be found on calculation that the number of isothermal localities in the State will be increased; and that places distant from each other in the same latitude will be found to agree, or nearly so, in their mean temperature; for example, the mean temperature at Clinton Academy, on Long Island, in latitude 41°, and elevated 16 feet above the sea is 48° and a fraction, whilst the mean temperature at Franklin Academy, in Steuben County, in latitude 45°.34, and elevated 1494 feet, is a fraction over 44°. Now, if we reduce the

altitude of Franklin Academy to that of Clinton Academy, we must add about four degrees to the actual mean temperature of the former place, that is, one degree for every reduction of 333 feet of elevation, which addition will of course equalize the mean temperature of Franklin and Clinton Academies. By the same formula the mean temperature of the meteorological stations at Cherry Valley, viz: 44°, and that of Middlebury, 46°, are also elevated to nearly the same mean temperature as that at the academies just mentioned. Such reductions of altitude with a view to determine the geographical range of *isothermalism* in the State, would be interesting and curious; but it is questionable whether the results would, apart from their scientific relations, have any value for medical or agricultural purposes. A knowledge of topographical conditions and meteorological phenomena is what is wanted to disclose the true and intimate relations of health and disease to locality and climate.

The method above adopted to show the distribution of temperature over the State, may be employed to exhibit the distribution of rain over the same area. But in order to do this with succinctness and precision, we shall invoke the aid of a few novel terms, such as, it is thought, will supply desiderata in the vocabulary employed in treating of hyetographical phenomena.

It is a general fact that the quantity of rain diminishes in advancing from the equator to the poles. Thus, while the quantity at the equator is about 95 inches, in Italy it is only 45, in England 30, in the North of Germany 22½, and at St. Petersburg 17 inches. There are, therefore, in the circuit of the globe, many regions and localities remote from one another in which the mean annual quantity of rain is the same, and there are others in which it is widely different; in some it is copious or excessive, and in others small or moderate. Now, in order to express these facts in concise terms, the writer proposes, 1st, that the countries and localities in which the average annual quantity of rain is the same, be denominated *isohyetal;* 2d, those in which the quantity is excessive *hyperhyetal*, as the equatorial or intertropical regions; and 3d, those in which the quantity is moderate or small, *hypohyetal*, as certain portions of the central territory of North America. These terms may likewise be conveniently employed in speaking of the relative qualities of rain in particular parts of a continent, kingdom, or state; thus, while the globe has its *isohyetal*, *hyperhyetal*, and *hypohyetal* regions, so have its geographical and political divisions and subdivisions.

Now, owing to the geographical position and superficial con-

figuration of the State of New York, the annual mean quantity of rain within its limits is nearly intermediate between that of the intertropical and the arctic regions. It differs, in fact, but little from that in Italy; and though the quantity is very unequally distributed over the State, there are many localities which are *isohyetal*, as is shown in the following table. The fractions of inches are omitted, as were the fractions of degrees in the table of isothermal localities. The quantities of rain stated are the annual means of ten years, with a few exceptions of longer and shorter periods.

TABLE VIII.

Meteorological Stations in New York which have distinctive quantities of rain, and those which are isohyetal.

Annual mean quantity of rain.		
22	inches.	Lewiston.
24	"	Ogdensburg.
26	"	Monroe.
27	"	Gouverneur. Buffalo.
28	"	Millville. St. Lawrence.
29	"	Franklin (Malone). Pompey. Union Lit. Soc. (Jefferson County).
30	"	Ithaca. Mexico. Middlebury. Oneida Institute. Rochester. Fort Ontario.
31	"	Granville. Onondaga. Fort Niagara.
32	"	Lowville. Washington. Franklin (Prattsburg).
33	"	Cayuga. Farmers' Hall. Gaines. Lansingburg. Palmyra. Syracuse. Plattsburg Barracks.
34	"	Auburn. Hamilton. Montgomery. Red Hook. Watervliet Ars.
35	"	Hudson. Kinderhook. Newburg.
36	"	Fairfield. Fredonia. Mount Pleasant. Oxford.
37	"	Canandaigua. Hartwick. Kingston. Springville.
38	"	Clinton. Dutchess. Oneida Conference. Plattsburg. Buffalo Barracks?
39	"	Johnstown. Union Hall. Madison Barracks.
40	"	Albany. Cambridge. Schenectady. Utica.
41	"	Cherry Valley. Delaware.
42	"	Erasmus Hall. North Salem. Oyster Bay. Fort Columbus.
43	"	Fort Hamilton.
44	"	Bridgewater.
46[1]	"	New York Institution Deaf and Dumb.
52	"	Liberty.
54	"	West Point.

[1] This annual mean quantity of rain is that of three years' observation by Prof. O. W. Morris, prior to 1850. Since then, Prof. M.'s observations, at the same institution, continued for six years, viz., from 1854 to 1859, both inclusive, have afforded a different average. The range of annual means of these six years is 15 inches, the lowest mean being 40 inches and a fraction, and the highest over 55 inches,

In this arrangement of meteorological stations, according to their respective quantities of rain, we have groups varying in number from those deduced from the classification of stations, according to their temperature. The number of these latter stations is 72, and they are reduced to *ten* groups; whereas the number of the former stations is 69, of which 61 are reducible to 16 groups, leaving 8 stations, each of which has its distinctive quantity of rain, showing that a greater number of localities in the State, so far as yet observed, is *isothermal* than is *isohyetal.* The range between the lowest and highest degrees of annual mean temperature of the meteorological stations is only 9° of Fahrenheit, the lowest being 42° and the highest 51°, whilst the range between the lowest and the highest mean quantities of rain is 32 inches, that is, from 22 to 54 inches. There are, therefore, comparatively but few places in the State in which the precipitation of aqueous vapor is the same, though there are many in which it is very nearly so, the differences in some cases scarcely exceeding a single inch.[1] From these facts it appears that the same temperature is more extensively distributed over the State than is the same quantity of rain.

Seeing, then, that there are districts in the State in which the quantity of rain differs so widely, may we not distinguish them by terms expressive of the differences in question. Of such districts there are at least two in which the amount of aqueous precipitation

and the mean of the whole number of years 49 inches and a fraction. It must be noticed, however, that within the last two or three years the institution has been removed several miles to the north of its former site, and to much higher ground on the eastern bank of the Hudson River.

[1] The variations in the quantity of rain in the same locality in different years is very remarkable. Thus it is said by Prof. Dewey, in his summary of meteorological observations, made at Rochester, in 1857, that "while the average of rain here is about 31.5 inches, in 1856, the measure gave only 24.356 inches, and in 1837, amounted to 42.591 inches, or more than eighteen inches beyond that of 1856. The average water for 20 years is 31.481." (Annual Report of Regents 1858.) Such variations necessarily diversify the isohyetal groupings of different series of years. Following the authority of Dr. Hough, in his meteorology of the State, we have placed Rochester among the isohyetal localities annexed to the number of 30 inches.

Similar variations in the mean quantity of rain take place, as we have said before, at West Point. In assuming in the text 54.15 inches, we take the mean of 19 years, viz., from 1836 to 1854, inclusive, as stated in the Army Meteorological Register. In the same work 46.53 inches are given as the mean of 12 years. Dr. Forry says that for the years 1836, 37, 38, 39, the mean quantity of rain at West Point, was 48.70 inches. Moreover, it is stated in the Medical Statistics, United States Army, that the annual measure of rain at that place, is about 53 inches.

is small and very nearly the same, one in the western and the other in the northern part of the State; and there is another which greatly differs from both of these in the southern part, or the region of the Highlands. These several districts cannot be said to have well defined outlines; but they may be readily, though vaguely bounded on a map, by the help of the last or eighth table. In that table it is noted, that the mean annual quantity of rain at Lewiston, in Niagara County, is 22 inches; at Buffalo, in Erie County, 27 inches; at Millville, in Orleans County, 28 inches; at Munroe Academy, Munroe County, 26 inches. These measures of rain are among the lowest in the State; and as the counties in which they occur are contiguous, and in the western part of the State, they may be said to constitute the *western hypohyetal* district. In the same table it is seen, that the amount of rain at Ogdensburg, in St. Lawrence County, is 24 inches, at Gouverneur 27 inches, and at St. Lawrence Academy, 28 inches, in the same county; at Franklin, in Franklin County, 29 inches, and at Woodville (Union Literary Society), Jefferson County, 29 inches. These stations are in the northern part of the State, and as the counties in which they occur are contiguous, they may be said to form the *northern hypohyetal* district.

Now, while in these districts the annual mean quantity of rain is about 26 inches, there are others in which that quantity is nearly doubled. This is so especially at the West Point Military Academy, a United States meteorological station, in Orange County. The amount of rain at this place is 54 inches, and at Liberty in the adjoining county of Sullivan, it is but a little less, viz., 52 inches.

These counties, therefore constitute the *hypohyetal* district of the State; and why they do so, is explained by the fact that the latitude, elevation and steep declivities of these highland regions, and especially of those which surround the seat of the military academy, are favorable to frequent and copious precipitation of atmospheric vapor, a phenomenon common, *cæteris paribus*, in countries in the temperate zone. Thus, the amount of rain in the mountainous parts of England is said to be double that of the lower districts of the country; and we are told that the quantity "in the valley of the middle Rhine and on the plateau of Bavaria is only 21 inches, whereas at the foot of the Alps, it is ~~nearly~~ double, or 43 inches.[1]

It thus appears that the place at which the amount of rain fall,

[1] Johnston's Physical Atlas.

or, as it may be said, the hyetalism, culminates, is at West Point, in the Highlands, where, as just stated, it is 54 inches, and that from that place the quantity, as a general fact, declines in varying proportions in different directions; for example, at the New York Institution for the Deaf and Dumb in the southern part of the State, it falls 8 inches below the measure at West Point, or down to 46 inches; at Lewiston, in the northwestern part, 32 inches, or down to 22 inches; and at Ogdensburg, in the northern part, ~~33~~ 30 inches, or down to ~~54~~ 24 inches. These differences no doubt vary more or less in different years.

From what has been said, it is apparent that the laws of the distribution of temperature are determined, for the most part, by astronomical relations, whilst those which govern the condensation of atmospheric vapor are dependent more directly upon terrestrial conditions. Elevations above the sea, as has already been stated, decrease the temperature of the air to the extent of about three degrees in every thousand feet. Now, there is no such definite law in respect to the quantity of rain falling at different heights; nevertheless, it is true, the quantity precipitated near the surface of the earth is greater than at distances above it—a fact shown by experiment, at heights as low as fifty or even thirty feet.[1] But there is no uniformity or correspondence between the ranges of temperature and quantities of rain at different elevations above the earth.[2]

That the method we have employed to show the isothermal and isohyetal localities in the State of New York, is preferable to the isothermal *lines*, first used by Humboldt, and to the *isohyetoses*, or lines of equal rain-fall, and the *isotherombroses*, or curves of equal distribution of summer rains, as employed in Johnston's Physical Atlas, will, we think, be conceded, when it is considered in reference to so small a portion of the earth's surface as that of the state in question. In constructing thermometrical and hyetographical charts, lines and

[1] See Observations on the Quantity of Rain at Different Heights, read before the New York Lyceum of Natural History, July 27th, 1846, by Prof. O. W. Morris, of the New York Institution for the Instruction of the Deaf and Dumb.

[2] But though it appears that rain drops increase in size in descending to the earth, yet this takes place only when the atmosphere throughout is saturated with moisture, or "when the temperature of the rain is so low, as to reduce the air with which it comes in contact, in its descent, to the point of deposition;" moreover, it is said that, during a heavy or long rain, the hygrometer indicates a degree of dryness of the air which renders it probable that, instead of increasing, the rain drops decrease in size in falling to the earth. (*Brewster's Edinburgh Encyclopedia*, article Meteorology.)

shadings are well adapted to connect places of equal mean temperature, and equal mean rain-fall, which are remote one from another; but in limited geographical areas, the same phenomena may be more fully and minutely exhibited by numerals, or points, than by any other means.

With the subject of rain are intimately associated the topics of atmospheric humidity and the dew point. Excepting the temperature, there are, perhaps, no conditions of the air more important to be studied than those now here for the first time introduced to notice; and what is remarkable, but little attention comparatively has heretofore been given to them, either as matters of science, or as elements of medical meteorology. Few or no hygrometrical phenomena are noticed in the meteorological records published in the Annual Reports of the Regents of the University. Observations of the *dew point*, made daily and systematically, as is done in regard to the temperature of the air and the quantity of rain, would probably furnish the means of solving many questions in relation to climate hitherto exceedingly obscure. It is true the humidity of the air and the dew point are not as readily determined as is the atmospheric temperature, or the measure of the aqueous precipitation. The instruments employed to indicate these phenomena require great exactness in their construction and accuracy of adjustment in using them. It is said by an English writer in speaking of hygrometric phenomena, that "although wet and dry bulbs are in the hands of almost every observer, there is a poverty of materials on the subject. Whether it is the fault of the instruments, or of the troublesome and unsatisfactory character of the deductions and corrections to be made, this is certain—that there is a tendency not to give this element of meteorological science the consideration it deserves. For although temperature may be first in importance in its influence on living beings, yet, for evident reasons, the approach to and removal from, the point of saturation in the atmosphere must exert great power for good or evil."[1]

The importance of giving more attention to atmospheric humidity than it has hitherto received, has been shown at every step in the progress of inquiries relating to it in the United States. In regard to agriculture and medicine, and especially the latter, the subject possesses peculiar interest. To the physician it affords a wide field of research. As an element of climate and a source of dis-

[1] British and Foreign Medico-Chirurgical Review, July, 1858, p. 71.

ease, aerial moisture has been ably treated in the writiugs of Drs. Forry,[1] Charles A. Lee,[2] Daniel Drake,[3] E. H. Barton,[4] and Mr. Blodget.[5] But no American has looked at the subject in a more interesting and philosophical point of view than Dr. Sandford B. Hunt, in his Report on the Hygrometrical state of the Atmosphere in various Localities, and its Influence on Health, made to the American Medical Association, in 1855.[6] Of the same character, in relation to this subject, are the observations of Dr. James Stewart, contained in his Prize Essay on Cholera Infantum, presented to the New York Academy of Medicine. To these might be added the names of a few other Americans, whose contributions to this branch of meteorology are not destitute of interest.

It is generally known that the lower degrees of atmospheric humidity have no very marked influence on the human body. They are commonly favorable to health. But when the dew point is high, and the temperature is high also, then it is that the atmosphere becomes a source of discomfort and cause of disease. The morbific influence of high atmospheric heat and excessive moisture is especially noticed by Dr. Hunt, in his paper already noticed; and in the etiological inquiries of Dr. Barton, of New Orleans, a hot and humid air is regarded as constituting, to use his metaphoric terms, one of the blades of the shears of pestilence, the other blade consisting of terrene emanations. Dr. Hunt has shown by his observations that the dew point is found highest in low situations, and that it gradually diminishes as the altitude iucreases. Does this fact explaiu what is generally found to be true, that certain diseases are most prevalent and fatal in such localities? It is au old observation that the occupants of the first floor of houses, in seasons of pestilence, are more liable to suffer than the residents of the upper stories.

With regard to the winds in the State of New York, it is observable, that they are governed by the astronomical laws which regulate the atmospheric movements in the temperate latitudes, and by

[1] The Climate of the United States, 1842. [2] Ibid.—Letter to Dr. Forry.

[3] On the Diseases of the Interior Valley of North America.

[4] Report to the Louisiana State Medical Society, on the Meteorology, Vital Statistics and Hygiene of the State of Louisiana. Also Report of the Sanitary Commission of New Orleans, on the Epidemic Yellow Fever of 1853.

[5] On the Climatic Conditions of the Summer of 1853, most directly affecting its Sanitary Character. (A Report to the Secretary of the Smithsonian Institution, Washington.)—New York Journal of Medicine, Nov. 1853.

[6] Transactions, vol. viii. p. 327.

the height and direction of the mountain ranges and other irregularities of the face of the State. There is a geographical region, which, as Prof. Henry remarks, "is well entitled to the denomination of the zone of variable winds."[1] In this zone is the territorial area in question. Dr. Hough remarks, that "one of the most striking results of the observations upon the winds (in the State of New York), is the correspondence between their direction and that of the valleys in which the stations are located. At most of those on the Hudson, northerly and southerly winds were recorded in the greatest number; in the Mohawk valley, easterly and westerly, or northwesterly winds; and at nearly every other place, the prevailing direction of the neighboring hills and valleys, was found to influence that of the surface current."[2]

Next to temperature and humidity; currents of air are the most influential elements of climate, especially in relation to health, in the middle latitudes. In table fourth are seen the mean results of the winds deduced from the numerous observations made at the New York Meteorological stations. Prof. Henry has ingeniously represented in diagrams the mean annual amount and direction of the winds in New York, in the Patent Office Report for 1856.

The rainy winds in the State, excepting that of the *nimbus*, or thunder shower, which is almost always westerly, and occurs mostly in the spring and summer, are, for the most part, easterly and northeasterly. These are, also, the stormy winds along the whole north Atlantic coast, and are remarkable in the maritime region of New York for their duration and rawness. In this region, the winds from the westerly and northwesterly quarters generally produce a clear sky, and occurring after a protracted rain storm, clear the atmosphere and bring fair weather. These winds are generally mild and refreshing in summer, and cold and piercing in winter. Easterly winds, in respect to humidity and the quantity of rain they yield, are to the Atlantic States of North America what the westerly winds are to the Atlantic countries of Europe.

It has been well remarked by Prof. Guyot, in respect to the general climatology of our country, that "the very nature of the meteorological phenomena which are to be studied, and the circumstance that they develop themselves almost simultaneously on so

[1] Meteorology in its Connection with Agriculture.

[2] New York Meteorology, 1826—1850. By Franklin B. Hough, A. M., M. D. Introduction, 1855, p. xi.

vast an extent of country, render a close comparison of the observations made all over the continent a matter of necessity. The observations made at one place, or in one single region, take their full value only when compared with those of all the others. The causes of the great atmospheric disturbances, as well as those of the general course of the winds, of the rains, and of the temperature, in the various seasons of the year, in the State of New York, are not to be sought within, but far beyond the limits of this region. Therefore a system of observations in this State cannot remain isolated without losing much of its usefulness; it must be connected with all the others, and must be considered as only a part of the great whole."[1]

The value of meteorological statistics consists in the knowledge they afford of the elements of climatic topography. These elements are the following, being six in number, and variously modified and combined, produce every variety of atmospheric condition, apart from extraneous matters, which it is our aim to elucidate, namely—1st. Temperature, viewed in its vicissitudes and ranges, and in its hourly, daily, monthly, spring, summer, autumn, winter and annual averages, in every variety of situation; 2d. The measure of rain, moderate, excessive, or otherwise, inundating low, and saturating high grounds, or, on the contrary, saturating the low and leaving the higher arid; 3d. Humidity of the air, or variations of the dew point, this being higher near to, than at heights above the earth's surface; 4. The winds, in their varieties of direction, force, and duration; 5. Electricity, in such of its conditions as render its movements destructive to plants and animals; 6. Barometric pressure, a force not physiologically appreciable except at great heights.

Now, in the constitution of the climates of some parts of the world, one or two of these elements predominate. Thus, the supreme element of climate in the intertropical regions is heat in its highest, and in the arctic regions in its lowest range. In some countries and in certain seasons, the energetic influence which the atmosphere exerts on organic and inorganic nature is due to its excessive humidity and elevated temperature. In many regions of the earth, and especially in the temperate zone, the elements of climate are combined in proportions, in the highest degree congenial to the human system and favorable to the development and exercise of the higher intellectual and moral powers; in others

[1] See Report of the Regents of the University, 1851, p. 229.

they mingle in proportions which are productive of, or which predispose to certain forms of disease; and again, in others, their combinations depress the vital forces, and cause a degeneracy of the higher and nobler moral and physical attributes of the human race. It is thus, that medical meteorology contemplates, in its minuter details, a special climate in every locality. No two spots on the earth have precisely the same complex atmospheric constitution; and hence, with a view to obviate or correct, as far as possible, the aerial influences which are injurious to health, or hostile to the interests of agriculture, it should be the purpose of every government to cause the variations and modifications of the elements of climate, and of course of their proportional combinations to be observed aud registered in every territorial division and subdivision under its control. Such a work is in progress in the United States, and it may not be improper to remark that the State of New York is not behind her sister commonwealths in labors directed to the advancement of meteorological science.

The final inquiry, in the meteorological department of our subject, is whether the climate of the State of New York has become milder or severer since its settlement. Each of these opinions has had its advocates; but little or nothing authentic is known of the climate, prior to the period at which the attention of Lt.-Gov. Colden was given to the subject. This gentleman, distinguished alike as a medical philosopher, magistrate, and surveyor-general of the Province, published, in 1720, an "*Account of the Climate and Diseases of New York.*" He remarks in that paper, that "the climate grows every day better as the country is cleared of the woods, and more healthy, as all the people that have lived long here testify. This has even been sensible to me, though I have been but about twelve years in the country. I therefore doubt not but it will in time become one of the most agreeable and healthy climates on the face of the earth. As it is at present, I prefer it to the climate of England, and I believe most people that have lived any considerable time here, and are returned to England, will confirm this."[1] But though such was the opinion of Dr. Colden, the point in question has been fairly and fully examined since his time; and the result of the inquiry is, that, in its average character, the climate is the same now, or nearly so, that it was at the time of the discovery of

[1] See the American Med. and Phil. Register, New York, 1811, p. 310; and Beck's Historical Sketch of the State of Medicine in the American Colonies, p. 38.

the country; and that the only changes which have occurred in the process of time, if there are any worthy of note, are the following: 1st. A more equal distribution of temperature over the State, and throughout the year. 2d. In those parts in which the country has been uncovered of its forests and brought under cultivation, the mildness of the autumn has been extended into the winter; and 3d. The severity of winter, owing to the deeper congelation of the earth, has encroached upon the spring. The severe winters which occur at irregular intervals are exceptions to the general fact, that the climate has undergone no material change within its historic period. It is said by Prof. Dove, "that the different degrees of severity in the winters of different years depend so exclusively on the prevailing direction of the wind, in each case, that there can be no doubt as to the more immediate or approximate cause of this severity."[1] M. Arago, in a notice ~~on~~ The Thermometrical State of the Globe, published in the *Annuaire* for 1834, states that the general temperature of the mass of the earth has not varied a tenth of a degree in 2000 years; and yet he remarks, "the surface has become cold in the course of ages, so as scarcely to preserve any sensible trace of its primitive temperature." He says "that the changes we have observed, or think we observe, in certain climates, are not connected with cosmical causes, but with circumstances entirely local; such as the clearing of woods and mountains, the drying up of morasses, extensive agricultural works, &c. &c. Thus, on comparing the thermometric observations made at Florence according to the instructions of the Academy of Cimento, towards the close of the 16th century, with those comprised between 1820 and 1830, it was found that the mean remained sensibly the same. It would merely appear that *the winters are not quite so cold*, and the *summers not quite so hot;* a result probably due to the clearings that had been made since this epoch. In the United States, an analogous effect has been observed, in consequence of the vast clearings of which this country is the theatre."[2]

[1] Quoted in Silliman's Journal of Science and Art, March, 1858, p. 246.

[2] Kaemtz's Meteorology, by C. Walker, London, 1845, page 153.

ETHNOGRAPHY OF NEW YORK.

The discovery of the Hudson River and the territory now known as the State of New York, in 1608,[1] though not regarded at the time with any special interest, has since then been classed with four great historical events which happened within the space of eight years in the seventeenth century, namely, the death of Elizabeth, or the expiration of the race of English monarchs, in 1603; the assassination of Henry the Fourth of France, in 1610; the expulsion of the Moors from Spain, in the same year; and the ascension of Gustavus Adolphus to the throne of Sweden in the next year.

Though these events were followed by important political changes in Europe, yet which of them had bearings more momentous on the destinies of mankind than the discovery in question? Discoursing on this subject before the New York Historical Society, in 1816, the Hon. Gouverneur Morris said of the navigator Hudson: "Imagine his amazement, had some prophetic spirit revealed that this island (the city and county of New York) would in two centuries from the first European settlement embrace a population of twice fifty thousand souls."[2] Since the utterance of these words forty-four years only have elapsed; and now, it may be asked, would not a sentiment kindred to amazement have been awakened in the mind of the illustrious statesman, just named, had it been prophetically announced to him, at the moment he concluded his eloquent address, that within a period of less than half a century, the city of New York would, with its immediate environs, contain over 1,000,000 of souls?

There is no portion of North America, of equal extent, more interesting, in an ethnological point of view, than that comprised in the State of New York. This is so, both in regard to its ancient and its modern population. In the two centuries and a half which have passed since its settlement, how numerous and momentous are the changes which have transpired within its borders! Within that period, how extensively have the aboriginal occupants of the

[1] Smith, in his History of New York, published in 1756, says, in a note, that "Charlevoix, a French Jesuit, author of the General History of New France, thinks this discovery was in 1609, vol. i. 12mo. edition, p. 221. But Stith, Douglas, Oldmixon, and other English writers, agree that Hudson's first voyage was in the preceding year."

[2] Collections of the New York Historical Society, vol. iii. p. 37.

soil been dispossessed of their territory, and they themselves nearly exterminated! And, moreover, how great are the numbers and varieties of the human family of foreign origin which have here met on common ground, attracted hither by the same objects, and aiming to attain the same ends? The events of the present, like those of the past, are fertile of developments tending to advance the future interests and glory of the commonwealth.

The peculiarities of a people are studied with reference to different objects. The statesman investigates them in respect to law and government; the divine, in regard to ethics and religion; whilst the physician contemplates them in relation to physiology, hygiene, pathology, and therapeutics. The agencies concerned in the formation of national character are such as operate more or less powerfully upon every class of the population. Hippocrates, the father of medical ethnology, not only shows the importance of studying the dispositions and habits of communities and nations, but describes the temperaments of the people of the eastern continent, in his own times. So admirably conducted are his researches, that a learned French physician remarks, that "the philosopher, the naturalist, and the physician, read with an equal interest, the history drawn by Hippocrates of the characters of the various nations known in his days; and such is the perfection of his descriptions, that the celebrated author of L'Esprit des Lois has not been able to improve them."[1] There are many passages in the writings of Hippocrates which show that he considered the physical and moral constitution of man as modified not only by the operations of material agents, but by those of political power; and if we may judge from his account of the effects produced on the mind and body by despotic forms of government, there can be no doubt that he considered a government based on democratic principles as specially suited to elicit and stimulate individual talent and impart spirit and energy to the public mind.[2]

[1] Treatise on Therapeutics, by L. J. Begin, vol. i. p. 67, N. Y. 1829.

[2] So striking are the observations of Hippocrates on this subject, that we cannot forbear citing a few of them to illustrate the extent to which human laws and government modify national character. In drawing a parallel between the Asiatics and Europeans, he says that the former, possessing neither vigor or courage, must be less fitted for war than the latter. He thinks that among the causes of a defect of courage in the Asiatics, a "powerful one is to be found in their form of government." "They are," he says, "almost entirely under regal authority. When we are not our own masters, but receive laws from a despot instead of framing them ourselves, we cannot feel much disposed for war, but prefer peace, for the dangers are un-

Though concurring substantially with the general proposition of Boudiu, that "man is, in more respects than one, the mere expression of the soil on which he lives," we cannot but observe that the character of a people depends in no small degree upon their laws and form of government; and in view of this fact we feel that the subject committed to our inquiry demands that we notice some of the ethnological changes which have taken place concurrently with the political revolutions in this country. The annals of New York are rich in every variety of matter, concerning her ancient and modern population. The civil history of the State has been with propriety divided by the Hon. Dewitt Clinton into four parts, viz:[1]

"1. When occupied by the Aborigines.

"2. When under the government of the Dutch, which was about half a century.

"3. Its state under England, which continued about one hundred and twelve years, and which includes the Proprietary Government of the Duke of York, and its government under the kings of Great Britain, excepting about sixteen months, when it was repossessed by the Dutch.

"4. And, lastly, its political existence as a member of an independent government."

The character of the North American aborigines has been a theme of curious and elaborate study. Whilst the history of Mexico and Peru affords evidence that the indigenous population of these countries had made greater progress in some of the arts and pursuits of civilization, anterior to the discovery of this continent,

equal. On the one hand, we must take the field, undergo fatigue, and die far from home, from wife, children, and friends, to satisfy the will of a master. On the other hand, any extraordinary action we perform is altogether for the advantage and aggrandizement of the sovereign. He alone receives the reward of danger and of death." He further remarks that "cowardice follows in the train of indolence, courage in that of exercise and labor. The Europeans ought therefore to be better calculated for war; their laws likewise co-operate, which do not, as in Asia, emanate from a king, for where kings have sway their courage is restricted. I have before said that minds enslaved will not naturally expose themselves to danger. Those on the contrary who are their own lawgivers, and encounter danger for their own advantage and not of others, do this with pleasure, and support labor readily, because they partake of the benefit. It is thus the nature of the government tends to promote courage, and we see in this respect a vast difference between Europe and Asia. I remark, in addition, that generally the European nations differ from each other in size and form for the same reasons, and equally so do they differ in respect to bravery."—*Coxe's Translation.*

[1] Collections of the New York Historical Society, for the year 1814, vol. ii. p. 7.

than the red men of the North, there is proof that these latter excelled the former in masculine qualities and decision of character. But notwithstanding these manly endowments, the North American Indian is a savage in his head and his heart. The phases of barbarism are strikingly exhibited in his mind and demeanor. His cunning, subtle policy and treachery, his mendacity, thieving propensity, revenge and cruelty, his far-reaching sight, quick perception, and retentive memory, his power of intellect, mode of thought and style of rhetoric, these, with his occasional gentleness and hospitality to strangers, are the prominent traits in his character. Moreover, his courage and indomitable spirit, his endurance of hunger and fatigue, his fortitude in the midst of tortures inflicted by his enemies, and his laugh of scorn and song of triumph in the agony of death, stamp him as one not only destitute of fear, but as a stoic not unworthy of comparison with the notable examples of antiquity.

In his admirable Discourse delivered before the N. Y. Historical Society in 1811, embracing a geographical, political, and historical view of the Indians of New York, and the neighboring territories, the Hon. Dewitt Clinton observes,[1] that "no part of America contained a people which will furnish more interesting information and more useful instruction; which will display the energies of the human character in a more conspicuous manner, whether in light or in shade, in the exhibition of great virtues and talents, or of great vices and defects." To the same distinguished citizen of New York are we indebted for the following account of the aboriginal inhabitants of the State. Of the people of the maritime region and Hudson River valley, he says: "The Long Island Indians, who are represented as very savage and ferocious, were called Meilowacks, or Meitowacks, and the island itself Meitowacks.[2] The Mohiccons, Mahatons, or Manhattans, occupied this island (city and county of New York) and Staten Island.[3] The Mohegans, whose original name was Muhhekanew, were settled on that part of the State east of Hudson's River and below Albany, and those Indians on the west bank from its mouth to the Kaats' Kill Mountains, were sometimes denominated Wabinga, and sometimes Sankikani, and they and the Mohegans went by the general appellation of River Indians;

[1] See Collection of the New York Historical Society, vol. ii. p. 40, 1814.

[2] "Smith's History of New York, p. 262."

[3] "Staten Island was purchased from the Indians by Col. Lovelace, second governor under the Duke of York, between the years 1667 and 1673. (*Chalmers' Political Annals of the Colonies*, p. 509, &c.)"

or, according to the Dutch, 'Mohickanders.' In regard to the River Indians, we are told that Hudson, in his voyage up the river, which he had discovered, found those below the Highlands 'offensive and predatory, while those above rendered him every assistance and hospitality in their power.'

"The remaining, and much the greater part of the State, was occupied by the Romans of this western world,[1] who composed a federal republic, and were denominated by the English, the Five Nations, the Six Nations, the Confederates; by the French, the Iroquois; by the Dutch, the Maquas, or Mahakuase; by the southern Indians, the Massawomacs; by themselves, the Mingos, or Mingoians, and sometimes the Aganuschion, or United People, and their confederacy they styled the Kenunctioni."[2] The Five Nations were distinguished by the following appellations; the Mohawks, the Oneidas, the Onondagas, the Cayugas and the Senecas. The Sixth Nation was the Tuscaroras, a tribe of the western parts of North Carolina, which, having been compelled to leave their country, were adopted by the Iroquois, and assigned to lands lying between the Oneidas and Onondagas.

The territory occupied by the confederates, was not only in the highest degree fertile, but one of the most elevated plateaux on the Atlantic side of North America, a region or water-shed, from which the Mohawk, the St. Lawrence, the Delaware, the Susquehanna, Ohio, Genessee, and other rivers receive a part or the whole of their waters, streams which empty into the Atlantic at various and far distant points. From these elevated table lands the Iroquois made descents in all directions, extending their military power over numerous tribes remote from their seat of empire. "The selection of this country for a habitation," says Mr. Clinton, "was the wisest expedient that could have been adopted by a military nation to satiate their taste for glory." "The conquests and military achievements of the Iroquois were commensurate with their martial ardor, their thirst for glory, their great courage, their invincible perseverance and their political talents. Their military excursions were extended as far north as Hudson's Bay. The Mississippi did not form their western limits; their power was felt in the most southern and eastern extremities of the United States. Their wars have

[1] "Volney's View of the United States, pp. 470–476. Colden's Five Nations, vol. i. p. 405."

[2] "Massachusetts Historical Collections, vol. i. p. 144, &c."

been supposed, by one writer, to have been carried near to the Isthmus of Darien.[1] And Cotton Mather, in his Magnalia, which was probably written in 1698, describes them as terrible cannibals to the westward, who have destroyed no less than two millions of other savages."[2] "Their exterior relations, general interests, and national affairs, were conducted and superintended by a great council, assembled annually in Onondaga, the central canton, composed of the chiefs of each republic; and eighty sachems were frequently convened at this national assembly." "The confederates had proceeded far beyond the first element of all associations, that of combination into families; they had their villages, their tribes, their nations, and their confederacy; but they had not advanced beyond the first stage of government; they were destitute of an executive and judiciary to execute the determinations of their councils; and their government was therefore merely advisory, and without a coercive principle."

It is further to be observed, in the language of Mr. Clinton, that "there is a striking similitude between the Romans and the Confederates, not only in their martial spirit and rage for conquest, but in their treatment of the conquered. Like the Romans, they not only adopted individuals, but incorporated the remnant of their vanquished enemies into their nation, by which they continually recruited their population, exhausted by endless and wasting wars, and were enabled to continue their career of victory and desolation: if their unhappy victims hesitated or refused, they were compelled to accept of the honors of adoption." In their debates and negotiations there was much solemnity, with great force of argument. "A distinguished feature in the character of the confederates was an exalted spirit of liberty, which revolted with equal indignation at domestic or foreign control. 'We are born free' (said Garangula in his admirable speech to the Governor General of Canada); 'we neither depend on Ononthio, or Corlear,'[3] on France or on England. Baron Lahontan, who openly avowed his utter detestation and abhorrence of them, is candid enough to acknowledge, that 'they laugh at the menaces of Kings and Governors, for they have no idea of dependence; nay, the very word is to them insupportable. They look upon themselves as sovereigns, accountable to none but God alone, whom they call the Great Spirit.'" Smith, the historian

[1] "Roger's America, p. 209."
[2] "Ibid., p. 728."
[3] "Smith's History of New York."

of New York, says: "The art of public speaking is in high esteem among the Indians, and much studied."—"Their speakers deliver themselves with surprising force and great propriety of gesture. The fierceness of their countenances, the flowing blanket, elevated tone, naked arm, and erect stature, with a half circle of auditors seated on the ground, and in the open air, cannot but impress upon the mind a lively idea of the ancient orators of Greece and Rome."[1] "As to the history of the Five Nations, before their acquaintance with the Europeans, it is wrapped up in the darkness of antiquity. It is said that their first residence was in the country about Montreal; and that the superior strength of the Adirondacks whom the French called Algonquins, drove them into their present possession, lying on the south side of the Mohawk River and the great Lake Ontario."[2]

The number of Indians inhabiting New York, when the country was first visited by the Dutch, there are no means of determining. Since that period their number has greatly decreased, their diminution rapidly following the extension of the settlements of the European immigrants and their descendants. It was estimated, in 1774, that the Indian population of the Colony was 10,000, and that of these, 2,000 were fighting men. In 1855, the number was reduced to 3,934, and these, for the most part, were residing on lands denominated the Indian Reservations. There is manifestly something in the physical and moral constitution of the Indian tribes, which renders them incapable of amalgamating, or uniting in civil compact with men schooled in European civilization.

Of the second period of the political history of the State, or that during the time the colony was called the New Netherlands, and the settlement on Manhattan Island, New Amsterdam, it is sufficient to say, that the population gradually increased till the colony was conquered by the English, in 1664, at which time the population of the territory was 10,000, and that of New Amsterdam (called afterwards the city of New York) 1500. Though the population gradually multiplied by immigration from the British Islands, after the conquest, it was said as late as 1756 that "the inhabitants of New York are a mixed people, but mostly descended from the original Dutch planters."[3] The Dutch element of the population

[1] Smith's History of New York, page 74, 1814.
[2] Ibid, page 77, 1814.
[3] Ibid., page 291.

still exists in the maritime region of the State, and in the valleys of the Hudson and Mohawk. And it is worthy of remark, that no portion of our population has contributed more to lay the foundation of a solid republic than the descendants of the original Dutch stock.

But interesting as are the first three periods of our history, it is the fourth and last, or that since the State became an independent government, which especially invites attention.

The number of the inhabitants in the province at the time of the Revolution is unknown. The first census of the State was taken in 1786, at which period the number of whites, blacks, and Indians who paid taxes was 238,897.[1] The vast increase in the population and the sources of the increase since that time are shown in the following table, taken from the census of 1855, at which period the total population amounted to 3,466,491.[2]

Table showing the Number and Birthplaces of the People of the State of New York in 1855.

Born in	Nnmber.	Per cent.	Born in	Number.	Per cent.
New York State . .	2,222,321	64.077	Southern States . .	13,124	0.378
Connecticut . . .	63,691	1.863	Ohio	5,256	0.151
Massachusetts . .	57,086	1.648	Michigan	3,413	0.098
Vermont . . .	54,266	1.565	Illinois	1,255	0.036
New Hampshire . .	14,941	0.431	Wisconsin	1,163	0.033
Rhode Island	11,737	0.339	Indiana	606	0.017
Maine	5,818	0.168	Other States . .	183	0.005
New England States	207,539	6.014	United States . .	2,528,444	72.903
New Jersey .	40,391	1.164	At sea and unknown	17,749	0.512
Pennsylvania	31,472	0.907	Foreign countries .	922,019	26.585

Now, while the census of 1855 shows that nearly one-third of the population of the *State* is not indigenous, it reveals the interesting fact, that more than one-half of the population of the *city of New York* is of foreign birth. In this metropolis, in the year here referred to, the number of souls was 629,904. Of this number, 232,155 were born in the city and county; 30,001 in other counties of the State; 41,565 in other States of the Union; and 326,183 in foreign countries. Of this last number, 22,713 were born in England; 95,986 in Germany, and 175,735 in Ireland. It is obvious that where there is such an admixture of races, and where, moreover, the drift

[1] Census of the State of New York, for 1855.

[2] The present year, 1860, being a census year, it is to be regretted that, owing to the returns not having yet been made, we are obliged to give the population of the State and city of New York of 1855.

of emigration is adding thousands and tens of thousands annually to our population, there can be no settled or determinate data, from which may be deduced a character which can be affirmed to be distinctive of the people of New York. There is, in fact, as yet, nothing as fixed in the social, as there is in the political relations of the people. A few of the social peculiarities of the old Dutch and earlier English population remain. But they have become so interfused with the elements of the German, Irish, Scotch and other varieties of European character, that with these, they form together a sort of hybrid character, or one in a transition state, aud therefore not easily definable.

The question of the peculiar characters of the people of the State of New York cannot be well discussed further, separately from those of the people of the other American States, and especially so, as in most parts of the Union there is, though not to the same extent, the same commingling of immigrants with the native-born citizens. In our subsequent inquiries, therefore, into the peculiarities of the United Americans, our attention will be directed to the general population of the Federal Republic.

In no country, within an equal period of time, have ethnological changes been so remarkable as in the United States. The first great change is rapidly approaching its completion. We refer to the disappearance or extinction of the aboriginal tribes which once inhabited a broad tract of country extending along the Atlantic seaboard from Maine to Louisiana, and to the scttlement of that country by races of men born chiefly in the British Islands and on the continent of Europe. Indeed, it is curious and interesting to remark how the red men of America have yielded their places to immigrants from other countries; in this respect following, as it were, the example of the indigenous grasses of our fields, which, as already stated, are supplanted by European species.

Another ethnological change, which is noteworthy, is that in the character of the Americans, produced by the Revolution. Of this change there is, perhaps, no account more interesting to the physician than that given by Dr. Rush, a signer of the Declaration of Independence.[1] A few passages from his paper on the subject will show the transition of the popular mind and feelings during and

[1] See An Account of the Influence of the Military and Political Events of the American Revolution upon the Human Body. (*Medical Inquiries and Observations.* By Benjamin Rush, M. D., vol. i. Phila., 1815.)

after the Revolution. He says that "the Revolution interested every inhabitant of the country of both sexes, and of every rank and age that was capable of reflection. An indifferent, or neutral spectator of the controversy was scarcely to be found in any of the States." "An uncommon cheerfulness prevailed everywhere among the friends of the Revolution. Defeats, and even the loss of relations and property, were soon forgotton, in the great objects of the war;" and he adds, "the population in the United States was more rapid from births during the war, than it had ever been in the same number of years since the settlement of the country."—"In 1783, the year of the peace, there were several children born of parents who had lived many years together without issue." In illustration of the joyous emotions excited by the termination of the war, Dr. Rush says, "that the door-keeper of Congress, an aged man, died suddenly, immediately after hearing of the capture of Lord Cornwallis' army. His death was universally ascribed to a violent emotion of political joy." The ardor in trade which sprang up during the Revolution he regarded as a disease rather than a passion. "Desultory manners, and a peculiar species of extempore conduct, were among its characteristic symptoms. It produced insensibility to cold, hunger, and danger. The trading towns, and in some instances the extremities of the United States, were frequently visited in a few hours or days by persons affected by this disease; and hence 'to travel with the speed of a speculator,' became a common saying in many parts of the country." The remedies for this species of insanity were the depreciation of the paper currency and the events of the peace. Having served as an army surgeon, and judging from his own observation, Dr. Rush states that "the patience, firmness, and magnanimity with which the officers and soldiers of the American army endured the complicated evils of hunger, cold, and nakedness, can only be ascribed to an insensibility of body produced by an uncommon tone of mind excited by the love of liberty and their country." He also describes the sad effects on the minds of those opposed to the Revolution. Many became the subjects of hypochondriasis and melancholia. He speaks of their loss of power or influence in the government, their change of habits and company and manners; the neglect, insults and oppression to which they were exposed from individuals, and the laws of some of the States. In some instances their deaths were ascribed to their disunion from their ancient friends. He further tells us that "the minds of the citizens of the

United States were, after the war, wholly unprepared for their situation. The excess of the passion for liberty, inflamed by the successful issue of the war, produced, in many people, opinions and conduct which could not be removed by reason, nor restrained by government. For awhile, they threatened to render abortive the goodness of Heaven to the United States, in delivering them from the evils of slavery and war." Dr. Rush closes his remarks with the reflection that "perhaps these weaknesses were permitted, that human nature might receive fresh honors in America, by the contending parties (whether produced by the controversies about independence, or the national government) mutually forgiving each other, and uniting in plans of general order and happiness."

On reviewing the foregoing historical periods, the fact which first arrests the attention is that of the Anglo-Saxon origin of most of the earlier settlers of the United States. Whilst large portions of this continent were colonized by the French and Spanish, the more temperate and fairest portion of its northern half became, for the most part, the possessions of the English crown. And now, looking back over the last one hundred and fifty years, no truth is more striking, in the history of modern civilization, than that the Anglo-Saxon race was destined to lay, on this side of the Atlantic, the deep and broad foundations of an empire, in which the oppressed of all nations, the lovers of liberty of every race and tongue, might congregate under a government cognizant of human rights, and wielding a power adequate to sustain it, in fulfilling the end of its institution.

Without attempting to exhibit the causes and reasons which led to the adoption of our peculiar forms of State and Federal governments, it will be sufficient for our purpose to remark, that everything connected with the settlement and progress of the colonies, strongly tended to originate new thoughts and new feelings in the popular mind—thoughts and feelings hostile to the old political systems of Europe, and favorable to the establishment of free institutions. Though the puritans of New England, and the colonists of Virginia and the other southern settlements remained loyal subjects of the British Sovereign, and adhered to the union of the church and civil power, yet their general policy was eminently conducive to the development of democratic sentiments. The religious tenets of William Penn gave a cast to the minds of his followers, which prepared them to cheerfully acquiesce in the establishment of a popular government. Nor were the feelings of the

descendants of the Huguenots from France, and of the earlier emigrants from Germany, Switzerland, Poland, and Sweden, unfriendly, but, on the contrary, were favorable to such a form of government. As to the Dutch population of the State of New York, it may be said that they were by inheritance the lovers of republican principles.

So keenly sensitive had the colonists become to the acts of injustice of the mother country, at the time of the Revolution, and so enlightened in regard to the rights of man, that, when emancipated from British misrule, they were prepared to narrow the relation existing between the church and State, and eventually to abolish it;[1] or, in other words, to adopt a form of polity which, while it secured the ends of government, would yield the largest civil and religious liberty to the citizen.

But in the formation of our national character and temperaments, there are other moral agencies in operation besides form of government. The different races of men which are here assembled under the same political institutions necessarily modify each other's character, proportionately to their respective numbers, degrees of intelligence, social position, and extent of religious influence. The basis of the American population is essentially English or Anglo-Saxon; and hence it follows, that emigrants coming from other lands than Britain, must acquire to a greater or less extent the Anglo-Saxon character. The commingling of so many varieties of men on the same ground, under the same government, gives to the question of the future character of the United Americans a curious interest. What are to be the peculiar anatomical characters, the physical temperaments, and the psychological peculiarities, arising from the mixture of the European, the African, the Asiatic and North American races? These races are not divided by any barriers sufficiently strong, or repugnances sufficiently irrepressible to prevent their amalgamation. Their union by such a process is now going on; but as yet the results afford no appearances sufficiently strong to enable us to foreshadow the issue to which they tend. "Our frontier," says the late Dr. Drake, "from Quebec, round by the lakes and Hudson's Bay, to the Gulf of Mexico beyond the Rio del Norte, presents a mixed race of whites and Indians, which is gradually lost in the population residing immediately within that boundary. Thus Indian blood is, as it were, absorbed by the sur-

[1] See Baird's "Religion in America," New York, 1844.

face of the new nation. The readiest amalgamation with the people of that race is by the Northern French and the Southern Spanish Creoles; but the Anglo-American immigrants and their descendants have at all times, when war did not prevent it, shown a propensity of the same kind. Wherever there is a negro population, bond or free, the same coalescence is displayed; so that in all our towns, from Mobile to Montreal, and from Pittsburg to St. Louis, the streets are more or less thronged with mulattoes, quadroons, and other mixed breeds, all pressing upwards; that is, ambitious of intermarriage with those whiter than themselves; and thus our Caucasian blood is constantly, though slowly, acquiring an African element. In the willingness for this commingling, the Spanish Creoles of Florida, Louisiana, and Mexico, stand first; next come the French Creoles of the lower Mississippi; then some of the modern emigrants from Great Britain, Ireland, and Germany; and lastly, the Anglo-Americans."

But there are races, from other lands, which are destined to mingle their blood with that of the native American, and the European, and African, on this part of the continent. The increase of our population by voluntary emigration has heretofore been for the most part from countries far advanced in Christian civilization. The negro has been forcibly brought to our shores; and such is his barbarous condition in his native land, and such his condition here, that it is doubtful whether he will ever become a voluntary emigrant to this republic.

So great has been the natural increase of the population in the United States, and so great the emigration from Europe, that already has the population spread itself to the shores of the Pacific; leaving, however, for the most part unoccupied, a large intervening space. At this geographical line, nature seems to have fixed the western limit of the American republic; and of course it is there the waves of *eastern* emigration are to be stayed. At this boundary, too, a new relation is developed between the new and the old world. Whilst in the Atlantic States, Asia is regarded as lying to the east, in the Pacific States the same is regarded as lying to the west. Such, in a word, is the inter-oceanic position of the American republic, that it holds both an eastern and western communication with the nations of the old continent. Brought thus in relation with Asia on the west, America will doubtless attract from China, and India, and Japan, as well as from the islands of the Pacific, large accessions to her population. Nor is it probable that the

semi-civilized people of Asia will be slow to avail themselves of the advantages of a new home in California and Oregon. Already has the cupidity of China led to the transportation of thousands of her laboring classes to our western shores; and though the Chinese population has been bound together by prejudices which no extraneous power has heretofore been able to weaken, yet in view of the glittering treasures of California, their avarice will probably induce a multitude to follow them.

It is a question of increasing interest, to what extent the people of the celestial Empire have an aptitude to assimilate with the population of the American republic. Their language, habits of thought, and religion, are so diverse from those of the Christian faith, that it can scarcely be expected that they will comprehend readily, or yield a cheerful allegiance to a system of polity so different from their own. Yet, when settled on our shores, and made acquainted with the benefits and blessings of republican institutions, it is not unreasonable to suppose, that the democratic sentiment will prove resistless in transforming them into useful and patriotic citizens. It is true their color, and some other of their peculiarities, may retard their amalgamation with the races of Caucasian origin, but this obstacle will give way, either under the influence of individual preferences, or of circumstances which, in a democracy, tend to produce and elevate self-respect, and strengthen the conviction of equal human rights.

From what has been said, it is obvious that the national character of the United Americans is still in its formative stage; and that so it must remain for yet an indefinite period; and especially so long as large foreign additions are made to the native population. What results may be looked for, when elements so numerous and so diverse meet and react on one another? Is it probable that the varieties of the five races of Blumenbach, will, after being long associated on our soil, lose their distinctive peculiarities, and acquire characters which shall mark them as a new variety of mankind? It is a principle recognized by physiologists that, to use the words of Carpenter, "the union of *varieties* has a tendency to produce a race superior in energy and fertility to its parents," or, as he otherwise remarks, "the mixed race is generally superior in physical development to either of the parent stocks."[1] Now, is such to be the result of the intermixture on this continent, of the European

[1] Principles of Human Physiology, p. 1040, Phila. edit. 1853.

and other varieties of our species? And if so, is the territory of the American confederacy the field in which such a result is to be consummated? And is "the American nation," as contemplated by Prof. Guyot, "a synthetic type, preparing a new era?"

It has been estimated that early in the next century the population of the United States will have reached upwards of one hundred millions. That such will be the fact there is no reason to question; and it is doubtless in the great valley of North America that the streams of emigration are to permanently unite and mingle. Nor is there any quarter of the world which affords a region so happily suited for the centralization and assimilation of those of all nations who seek to ameliorate their condition by expatriation. Neither the plains, valleys, or mountain slopes of South America, nor those of India or Australia, possess attractions to emigrants equal to those of our republic, and especially of the region referred to. The sagacious M. de Tocqueville designates the valley of the Mississippi as "the most magnificent habitation God ever designed for man."[1]

But the ethnographer, in surveying the present population of the United States, will observe that in some districts the inhabitants are mostly or wholly native born, and in others chiefly of foreign birth; and, moreover, reasoning from well known phenomena, he cannot fail to perceive that a uniformity of national physical character cannot exist over so vast an extent of territory as that of the United States. Certain physical and moral peculiarities will ever continue to distinguish the population in each of the great sectional divisions of our country. The people of the East will differ, in some physiological respects, from those of the West; those of the North from those of the South; those of the Atlantic and Pacific States from those of the great valley of the Mississippi, and those of the elevated mountain regions from those of low and champaign countries. The relations of man to the physical influences and objects which surround him, are interesting not merely on account of their connection with his health and longevity, but on account of their bearing on the formation of his personal character. The distinctive peculiarities of an individual are in part derived from his physical temperament; and his temperament is determined in a great degree by the climate and other local influences to which he is subjected. It follows, therefore, that wherever men are exposed to the same physical conditions, the same temperament

[1] Literary World, New York Oct. 22d, 1853.

will predominate, and of course give to them a community of character. The geographical extent of the United States is sufficiently great to illustrate, on a large scale, the laws of climate in relation to the human constitution. According to these general laws, certain races occur in tropical climates, and others in the varieties of temperate and cold climates. The physical temperaments are in a great degree governed by the same laws—the melancholic and choleric prevailing in southern, and the sanguine in northern climates. But these varieties of temperament, and also the phlegmatic and nervous, are not as strikingly exhibited on this Continent as in Europe. The sanguine temperament and ruddy complexion, though existing in our Northeastern States, are not as fully developed as in Great Britain and the neighboring continental countries. The English, and Scotch, and Irish, after a few years' residence in the United States, lose their rubicund complexion, plumpness of face, and full sanguine habit, become thinner in person, and acquire an intermixture of the choleric and sanguine temperaments. In the southern latitudes, the temperament is more decidedly sanguineo-choleric, or choleric, and the color swarthy and sallow. The red capillaries of the skin, in the American, are less full and active, and the cellular and adipose tissues less abundant than in the Anglo-Saxon and Teutonic races. Another physical peculiarity of the American is the defective organization and tendency to decay of the teeth. This effect of climate is traceable, also, among the resident population of foreign birth. An able American dentist observes that "the teeth of Europeans who have resided in this country for a few years, are as subject to decay as our own." In respect to personal form and stature, the Americans may be said to be symmetrical, erect, and inclined to tallness. Mr. J. Fennimore Cooper observes that their average height exceeds that of the French by one and a half inch. These remarks relate more particularly to the population of the Eastern and Middle States; but they are applicable, for the most part, to the inhabitants west of the Alleghanies. We are told by Prof. Drake that over most of the interior valley a ruddy complexion is rare, and often replaced by a slight turbid hue, or a tint of sallowness.

The relations of color and physiological temperament to the elevation of hot countries, above the level of the ocean, are the same as to the increase of latitude; high elevations, in the low latitudes, producing the physical phenomena of low situations, in the high latitudes. Accordingly, at various elevations in the

same latitude are found diversities of complexion and temperament. From this law may be deduced the probability that the southern elevated plateaux and slopes of the Rocky Mountains will, *cæteris paribus*, produce men more ruddy, sanguine and robust than the native residents of the southeastern Atlantic States. To these physical characters of the Americans may be added their early maturity of body, precocity of mind, versatility of talent, adventurous spirit and eagerness to gratify a restless curiosity—the last two peculiarities being more characteristic of the Eastern than of the Southern and Western population. "The genius of our country," says an eminent American medical writer, "lies in exaggeration. We must 'go ahead'—*extra flammantia mœnia mundi.* There is no resting place for our unquiet people. No principle is worth asserting, with any modification; no enterprise worth the undertaking, if it have a limit." And the same author adds, "We Americans coax forward the child at its mother's knee; urge with sharp spur the boy at school; stimulate in every way the adolescent mind, whether in the field, the workshop, or the college class; and having succeeded in giving every faculty of habit ceaseless action, we find that repose has become impossible or intolerable."[1]

It is not to be supposed that the citizens of the State of New York are the exponents of the various ethnological characters observable in the wide extent of the great Anglo-Saxon republic. In some of the characters referred to they are for the most part wanting; others they possess in common with the citizens of all the States; and others again they display in an intensified degree. In patriotism and attachment to democratic institutions, and devotion to the interests of the Union, they are not surpassed by their fellow citizens in any portion of the republic. With all their faults, they hold a rank in morals, benevolence, and religion not inferior to that of other enlightened Christian communities. In public spirit, liberality, and magnanimity, their character has long been established. In the industrial and useful occupations, their labors are unremitting. In agriculture, they are among the foremost. In manufactures, they stand next to their New England neighbors; and in commerce, they take the lead in the republic, extending their traffic to the remotest maritime countries. In these, as well as in every other pursuit, they are ever active and untiring. "See," says the distinguished physician just quoted,

[1] Essays on Life, Sleep, Pain, &c., by Samuel Henry Dickson, M. D., p. 216, 1852.

"the difference between a New Yorker, always in a hurry, and the Charlestonian, always at leisure." Moreover, in literature, professional learning, science, and the arts of design, the people of New York have claims to distinction which rest upon a solid and durable basis.

EPIDEMICS OF NEW YORK.

The ultimate design, as already stated, of the study of medical topography, is to ascertain the conditions and influences which modify the human constitution, and upon which the health and disease of a country depend; and hence, to deduce the means by which the public health may be preserved. A knowledge of the sources of disease is virtually, or in a great degree, equivalent to a knowledge of the means of health. The studies of hygiene and etiology, therefore, are naturally united. They advance together, hand in hand; and, in fact, are inseparable. What is gained in sanitary science is gained in etiological science.

Now in order to learn to what extent the conditions and influences referred to exert a salutary or morbific influence in a state or country, it is necessary to inquire into the amount and distribution of health and disease within its territory. This can be done only through the agency of many medical observers. Loose or general statements, in regard to the occurrence and prevalence of maladies in certain districts and localities, are not sufficient, at the present day, to meet the requirements of medical science. In figures only is there exactness; and, consequently, not until medical practitioners shall report every case of sickness, will it be possible to affirm to what extent a country is relatively healthy or otherwise. In no place known to us have statistical inquiries yielded results thus full and complete. The usual mode of determining the salubrity of a country, is that which is founded upon the returns of death. But such a mode does not exhibit the proportion of disease to the population. It is well known that of certain disorders, there may be many cases, but few deaths. Thus, in a given city, the annual rate of mortality may be very low. Such a fact does not prove, though it may be true, that that city is healthy; it merely proves that the mortality is comparatively small. As to the actual amount of disease there, it is unknown, and, therefore, until that amount is ascertained, the superior salubrity of the place cannot be affirmed. Now

to the attainment of such a minute knowledge of the salubrity of countries, or as it may otherwise be said, the geographical statistics of disease, the inquiries of medical men are beginning to be directed. This is especially the case in the English metropolis and in the State of New York. We are told that the medical officers of health of London have voluntarily determined upon carrying into execution a proposition made in the *Lancet*, in September, 1855, by Dr. Robert Barns, medical officer of the Shoreditch Local Board, to publish periodically a register of the prevailing sickness of the metropolis, on the plan of the mortality returns of the Registrar General; and the advantages of such returns are set forth in the following terms: "A sickness register, by noting instantly the prevailing diseases as they arise, must necessarily give earlier intimation of the condition of the public health, and earlier warning of the approach or increase of epidemic diseases."[1] Movements towards the inauguration of such a mode of registration of sickness were made in the American Medical Association, first by Dr. J. G. Orton, of New York, in 1855,[2] and by Prof. A. B. Palmer, of Michigan, in 1856 and 1857. But in no State of the Union have steps been taken more directly leading to the accomplishment of the scheme in question than in New York. Impressed with the importance of the subject, the State Medical Society, in 1856, appointed a Committee "on Medical and Surgical Statistics," and placed at its head the gentleman, just named, from New York. It was intended that the plan of registration should commence at the period of the semi-centennial anniversary of the society, namely, in January, 1857; but for reasons set forth in the chairman's report for that year, it was deemed proper to defer the undertaking until the first of January, 1858. The plan of operations devised by the Committee consisted in calling upon the regular physicians and surgeons of the State to register the medical and surgical cases and the deaths happening in their practice, with notices of the leading phenomena and characters of each case respectively. In order to secure uniformity in the mode of registration, the practitioners of the State were furnished with printed blanks, one for each month of the year, containing a nomenclature of diseases, classified for statistical purposes, embracing every form of malady and surgical casualty, the whole designed to exhibit not merely the number of deaths, but the actual

[1] Transactions of the N. Y. State Medical Society, 1858, p. 263.

[2] See Transactions of the American Medical Association, vol. viii. p. 44.

amount of disease in the State. The facts, thus collected and arranged in tabular form, were to be transmitted to certain officers appointed to generalize and report them at the annual meeting of the society.

Another mode of enlarging our knowledge of the diseases of New York, adopted by the State Medical Society, is that of dividing the State into eight districts, and appointing, in each, a physician to report on the epidemic diseases prevalent therein. The details of the plan were so well conceived, and prepared for practical use by the Committee having the subject in charge, that nothing was wanting to secure the attainment of the end designed, but diligence and fidelity on the part of individual physicians in performing the duties assigned them.

It is now more than two years since it was proposed to commence the registration; but though something may have been done, the work is not yet accomplished. It is hoped, however, that there is a sufficient "*esprit de corps*" among the practitioners of the State to unite them in a labor which, if well performed, will redound to the honor of the medical body in which the plan originated, and to the glory of the State. It is true, the work is one of stupendous proportions, demanding many heads and many hands to achieve it. To what extent individual practitioners may contribute to its accomplishment, is shown in the example presented by Dr. Brinsmade, of Troy, in his report, annexed to his address delivered before the State Medical Society, as Vice President of that body, in 1857, a report comprising a summary of all the cases of disease treated by him from 1837 to 1857 inclusive, a period of twenty-one years. The views of Dr. Brinsmade on this subject are so well timed and comprehensive, as to render them worthy of the widest circulation. In regard to New York, he says: "According to the census of the State for 1855 there are more than 6000 physicians in the State, and if but one in six of them would register as supposed, we should have one thousand doing something every day, to a greater or less degree valuable. If they saw but four new cases a day, four thousand facts would be daily placed in a tangible shape, ready for future use. Every night each one of these registrars could have the satisfactory reflection, that he had availed himself of the occurrences of the day to contribute his share of materials, which by careful generalization might result in the formation of principles approximating to certainty."

"In order to make this method useful," Dr. B. further observes, "many must enter upon the practice with zeal and perseverance.

Small statistics are dangerous, when used as the basis for principles, and for matters so various and complicated as those connected with vitality, in relation to which 'nothing is little;' all the observations of all the profession are required. One actor cannot perform all parts of a play, but each one must consider himself to have one *role* committed to him."[1] It is gratifying to know that the example of patient labor set by Dr. Brinsmade has not only been applauded in our own country, but on the other side of the Atlantic. "We wish Dr. Brinsmade," says the *British and Foreign Medico-Chirurgical Review*, for October, 1858, "every success in his undertaking, and would be glad to find that medical men generally, in his own and in other countries, kept as complete registers as he had done, so that it were possible to secure a uniform system of registration of disease."

Now, not until the registration, commenced under the auspices of the State Medical Society, has made further progress, can a report be prepared of a character suited to meet the expectation of this association. But though our inquiries must necessarily be deficient in minuteness of detail, owing to the want of statistics embracing returns of sickness and deaths throughout the State, yet there are facts on record sufficient in number and variety to enable us to pursue the investigation of the subject in some of its aspects, and especially in relation to the prevalence and phenomena of endemic and epidemic diseases.

Viewed geographically, the State of New York is found among those portions of the earth in which occur almost every variety of disease. There are, however, disorders which rarely or never appear within its boundaries. Thus the plague is unknown on this side of the Atlantic. The dengue has never, or scarcely reached as far north as New York. The yellow fever occasionally appears, but is exclusively confined to very narrow limits within the maritime region. Certain other disorders are rarely or never met with as original or endemic affections, as cretinism, elephantiasis and lepra. Goitre is occasionally observed in some of the western and central counties of the State.[2]

The more prevalent forms of endemic disease are of a febrile character, occurring mostly in districts and localities, the geological formations of which are favorable to the production of malaria.

[1] Trans. of the Med. Society of the State of New York, 1858.

[2] See New York Medical and Physical Journal, vol. ii. p. 248, and vol. iii. p. 162.

These maladies have types common to the periodical fevers of the other States of the Union. The contagious exanthemata find here a genial climate, and are developed from time to time in all their severity; and these, with certain other disorders to be noticed hereafter, prevail over the State, irrespective of latitude or topographical peculiarities. Now it is to the different kinds and varieties of epidemics which occur in the city of New York, and in the rural parts of the State, that we propose to confine our researches.

Such diseases, and such only, are properly denominated epidemics, which, springing up *de novo*, or, previously existing in a sporadic form, become popular, and after increasing in prevalence to a greater or less extent, and for a longer or shorter period, gradually decline, and finally cease to occur, or again become sporadic. In these phenomena, it is apparent, that periodicity of prevalence is the leading characteristic of epidemics, and that a multitude of disorders are excluded from their number. It is, moreover, in these phenomena we discover the important fact, that the *prevalence* of epidemics is due to certain unusual or extraordinary morbific agencies, not cognizable by any of the existing modes of investigation. The theory which contemplates certain peculiar conditions of the atmosphere as constituting the agencies in question, is the only one, in the present state of our knowledge, which offers a rational exposition of the laws of epidemics.

Regarding, therefore, the general atmosphere as essentially concerned in favoring the prevalence of certain epidemics, and as the immediate efficient cause of others, we shall, as we have done on other occasions, designate the power by which it does so by the term epidemic meteoration. Distributed according to their natural affinities or etiological relations, epidemics are reducible to three kinds, viz., *Contagious*, *Infectious*, and *Meteoratious*. These terms are here employed in the sense they are used in the writer's work on the *Elements of the Etiology and Philosophy of Epidemics*.

I. OF THE CONTAGIOUS EPIDEMICS OF NEW YORK.

The diseases comprised in this class are smallpox, measles, and scarlatina, to which may be added, as minor affections, the varioloid disease and varicella. That these disorders are personally communicable is a fact generally received. They may exist, therefore, without being epidemic; but such is their nature, that under the influence of a peculiar *epidemic meteoration* or *constitutio æris*,

they spread far and wide. Nor is their prevalence checked in traversing a country by any *sensible* conditions of the atmosphere, or geological formation. But though such is the fact, there is no doubt that topographical influences modify their character and favor their production *de novo*.

That smallpox, measles, and scarlet fever, occasionally originate spontaneously is hardly questionable when the history of their occurrence and prevalence, in certain localities, is scrutinized. There are few, indeed, who are not ready to admit, that epidemic measles and scarlet fever do arise in this way. Now, if such be the fact anywhere, it is so undoubtedly in the State of New York, for here these diseases strictly conform to the laws which govern their prevalence in other countries. But whether smallpox starts up in like manner, is an opinion against which the sense of a large majority of medical men seems to be opposed. The strength of this opinion would be forcibly invalidated, were the facts generally known and duly considered, which, if they do not demonstrate, render it in the highest degree probable, that the disease occasionally originates *de novo*. Such facts are found scattered through the literary history of smallpox; and such have been observed and recorded in the State of New York; and it is to these latter we shall appeal in support of the doctrine here advocated, while at the same time we present them as interesting phenomena in the nosography of the State. The cases in which the phenomena referred to were developed, are recorded in an able paper on "Spontaneous Smallpox," read before the Chenango Medical Society in June, 1851, by Wm. D. Purple, M. D., and published in the *New York Journal of Medicine*, for September of the same year. Of these cases we present an abstract.

Case 1. This case occurred in the town of Greene, in January, 1831, in a man aged about 40 years, who enjoyed good health with the exception of an ulcer on one of his legs. When attacked, he was employed with no other person than a lad in a rake factory, situated about a quarter of a mile from the highway. "His wares were carried away in the summer, and no stranger had been at the shop. He had not been from home in many months, and his taciturn temperament led him little into society, at least with strangers. In this case the premonitory symptoms were well marked and of the ordinary duration; indeed, all the symptoms were perfect, and such as indicated unusual severity. They ran on until the 12th day of the eruption, and terminated fatally."

"Every exposed person who was subject to the disease received the contagion; and many who had had the variolæ vaccinæ, or the vaccine disease, were more or less affected by it. There were about forty well-marked cases that arose from exposure to this patient, three of which proved fatal. Public attention was early called to the subject, and, in the end, became very much excited in relation to its origin. Professional inquiry was had in requisition."— "Courts of justice, with their talented advocates, were called in to unravel the mystery; but all in vain. After a patient investigation for two years, with the attrition of conflicting opinions, all parties were forced to the conclusion that its spontaneous manifestation was the only rational mode of accounting for its appearance, and that contagion could have had nothing to do with its origin."

Case 2. The next case occurred at the same time with the foregoing. "It presented itself on the height of land between the Chenango and Unadilla Rivers, in the town of Norwich, and fell under the care of my friend Dr. Royal Ross, of New Berlin. The patient was a child that lived in a very secluded place, and so far as the most scrutinizing investigation could determine, was entirely independent of a foreign source. The symptoms were severe, following each other in regular succession, and gave unmistakable evidence of the diagnostic character of smallpox. Contagion followed, and a number of individuals had the disease before sanitary regulations could be brought to bear to arrest its progress."

Case 3. This case "presented itself in the town of Pitcher, at the extreme western bounds of our county, and fell under the eye of Dr. David McWhorter. It occurred the same winter, and within three days of the two foregoing cases. The patient was an adult, and lived in a retired part of a rural country. It presented all the characteristics of a spontaneous case of smallpox. Thorough investigation was had at the time to demonstrate its foreign origin, but in vain. It resulted in an entire conviction on the part of all, that it did not arise from contagion. The diagnostic manifestations were perfect, the symptoms ran the usual course, and when the secondary fever appeared it proved fatal. Quite a number of persons contracted the disease by direct exposure." "It may be thought that the advent of these three cases, so near each other, and at the same time, would indicate that they had a common contagious origin. But it should be borne in mind that they occurred some thirty miles from each other; that they appeared in mid-winter, when the

snow was deep and drifted; that they all presented themselves in the most sequestered locations; while in our thoroughfares and villages the inhabitants were entirely exempt from the disease."

Case 4. This case "occurred at Chenango Forks, seven miles from our village, the first week in January of the present year. The disease attacked a child about four years of age, without the slightest evidence of exposure. I saw it in company with my friend and neighbor, Dr. A. Willard, about the fourth day of the eruption, and although the premonitory symptoms with the attendant fever were mild, and the eruption in consequence rather imperfectly developed, yet, to the experienced eye, there was not the least difficulty in distinguishing its diagnostic character. One who had seen and been familiar with the smallpox, could not but see all its essential characteristics in the case before us. This was clearly and unequivocally declared. But the attending physician and many of the relatives of the patient could not, or would not, believe it to be such. Their reason was, that the child had not been exposed to contagion." "The child died about the 10th day of the eruption, and was buried with all the formalities of a country funeral, even to the exposure of the body to the gaze of a sympathizing populace. A few days after, and before contagion had appeared, I announced in my place at the annual meeting of this society the nature of the disease, and the evidence of its being of a spontaneous character. On my return, the seed that had been sown and scattered to the four winds of heaven, had taken root and exhibited signs of germination. It spread extensively. Some twenty-four cases arose from the first subject; some of them were mild, others assumed the most appalling forms; four proved fatal, including the first, and the balance are living evidences of the spontaneous appearance of smallpox, and bear the marks of the disease indelibly engraven on their foreheads."

Subjoined to the above four cases is a notice, by the editor of the journal in which they are published, of three other cases, which, there were good reasons to believe, were of spontaneous origin. One was that of a lady at Lawrenceville, Ill., and two were those of convicts, in the Eastern Penitentiary of Pennsylvania; one occurred after two years of solitary incarceration, and the other after six. These cases are also referred to in the *British and Foreign Medico-Chirurgical Review* for April, 1850.

The spontaneous origin of smallpox is no doubt extremely rare;

and it is probable that such occurrences do not happen as readily in one country as in another of equal population. In some localities and districts, variolous epidemics may commence their course either from original or imported cases.

Whether, besides a peculiar state of the human system, there are physical conditions extrinsic to it, and if so, what that state of the system is, and what those physical conditions are, which are essential to the spontaneous production of smallpox, are questions of science which perhaps no research will ever elucidate. Whether, in certain circumstances, a case is spontaneous or otherwise, is sometimes a question extremely difficult to answer. Thus, in crowded cities, inquiries directed to the decision of such a question, can scarcely be expected, for obvious reasons, to reach a satisfactory result; but in rural districts, and especially where there is a sparse population, such inquiries may be prosecuted with fewer difficulties and the truth be ultimately attained. The cases related by Dr. Purple were examples of this sort, and consequently they possess a value surpassed by few or none of their kind on record.

Involved in the history of smallpox is that of the kine-pox, the varioloid disease and varicella. These diseases, it is alleged by some pathologists, are one and the same. Now, in regard to smallpox and varioloid, there is no question as to their identity; the latter evidently being a modification of the former, a modification arising from the influence of a previous vaccination of the individual who is the subject of the disease. It is, also, generally conceded, that the kinepox is the variolous disease, modified by the economy of the animal from which it is derived. But in respect to the question of the identity or non-identity of *smallpox* and *varicella* there is a difference of opinion.

It is well known that systematic writers anterior to the eighteenth century, and even Sauvage as late as 1731, considered varicella as a modification of smallpox. And it was not until after Dr. Heberden, in 1767, investigated the character of the disease, and pointed out its diagnostic phenomena, that it was generally admitted to be a distinct disorder. In sketching the medical history of the disease, Dr. Heberden endeavored to show that it originated from a contagion different from that of smallpox, that it affected the same person but once during life, that it afforded no protection from smallpox, and that it was communicated by inoculation. Drs.

Willan and Bateman concur with Dr. Heberden in regarding the disease as distinct from smallpox.

More recently, the correctness of this doctrine has been called in question. It is now contended by some of the most respectable pathologists, that the old opinion is true, that varicella is a modification of smallpox. Among the advocates for the identity of these diseases was the late Dr. Thomson of Edinburgh. In his account of the varioloid disease of Scotland, published in 1820, he has attempted to prove that chicken-pox arises from the same contagion as the smallpox, and has advanced many arguments to establish his opinion. This view of the disease has been taken by some other European writers, while others still assert that the two diseases are specifically distinct.

The opinion of Dr. Thomson has received the support of an able writer of the State of New York. I allude to the late Prof. Lewis C. Beck, of Albany. This gentleman in a paper published in the *New York Medical and Physical Journal*, No. XIII., has presented some strong arguments in favor of the unity of the disorders in question. The facts and reasonings from which he draws his conclusions are mainly comprised in the following extract from his paper. "The difference in the violence of smallpox, and chicken-pox," he says, "can scarcely be urged as an objection to their identity. Several cases occurred which left the physician in great doubt as to what name should be applied to them. Some had all the mildness of chicken-pox; a slight eruption only appeared, but this became *pustular*. Others, again, had all the symptoms of smallpox; but the eruption was vesicular. Amidst all this confusion, I have repeatedly asked the question, If these diseases are distinct, where is the line of separation? Where does the chicken-pox terminate, and where does smallpox commence? I have as yet been unable to obtain a correct answer, nor do I expect one. Every variety of disease has fallen under my observation, from the mildest chicken-pox to the most aggravated smallpox, and these varieties passed into each other almost imperceptibly, constituting a perfect series from the former to the latter. It is not my business to answer all the objections which have been urged against the identity of these diseases. When the disease first appeared I commenced its examination unprejudiced. I had no theory to support, no doctrine to advocate. I determined to go to the bedside, to watch carefully those cases to which I had access, and upon these to found my opinions in relation to the great questions which were agitating

the medical world. I have done so; and without travelling to Europe, or to other parts of our own country, I have here seen the contagion of chicken-pox giving rise to smallpox and modified smallpox; and I have seen the contagion of smallpox producing modified smallpox and chicken-pox. And if any reliance is to be placed upon the inductive mode of reasoning, the conclusion is irresistible that, at least here, if not elsewhere, these diseases were identical."

Although the conclusion arrived at by Dr. Beck appears to be legitimately deduced from his facts and arguments, yet there are so many instances in which the epidemic phenomena of smallpox and varicella point to a different conclusion that it may still be questioned whether these disorders are identical or not. It seems evident, however, not only from the observations of Dr. Beck, but from those of Dr. Thomson, that there are seasons in which there are cases of smallpox and varicella that so closely resemble one another as to render their differential diagnosis exceedingly difficult, and sometimes impossible, whilst in other seasons, their distinctive phenomena are well marked. There is abundant authority for stating that varicella is sometimes epidemic, where the smallpox is not prevalent, though frequently these disorders are rife at the same time. In his paper on spontaneous smallpox, already referred to, Dr. Purple states that cases of varicella preceded and followed in an epidemic form, the first and third cases of smallpox described by him, but that the disease could not be traced to smallpox. There was, he says, at that time, 1831, "a wide spread exanthematous tendency, and very many instances of spontaneous appearance." These statements in regard to the identity of smallpox and the varioloid disease, and the distinctive character of varicella, accord with the conclusions of Prof. Trousseau, deduced from his observations at the Necker Hospital. "Thus, then," he says, "variola and varioloid are identical; while varicella is distinguished from these by the differences in its period of incubation and febrile paroxysms, by the form and duration of its eruption, and by the absence of danger."[1]

Now, although smallpox, measles, and scarlatina, find their way into the State of New York from other States, and from foreign countries, yet while they do so, they must be regarded, also, as indigenous distempers. As exotics they are objects of quarantine,

[1] Ranking's Abstract; and American Med. Gazette, July, 1856, p. 420.

and, accordingly, their introduction may be prevented, but no expedient can be successfully opposed to their origin *de novo*. They are intimately related to one another; and though respectively distinct in their nature, they are, for the most part, characterized by the same fugitive epidemic characters. In their periodical occurrence, extent of prevalence, modifications of character, and epidemic duration, they strikingly conform to the universal law of pestilential diseases. To the natural diffusion of one of them, viz: smallpox, there is opposed the barrier of vaccination, which vastly abridges its extension, and which but for the negligence of its use, and the rare generation of the disease *de novo*, would utterly and forever extinguish it. No such prophylactic can be opposed to the spread of measles and scarlet fever. A separation from these diseases is the only method of protection from them.

As to the cause to which the epidemic prevalence of these diseases is attributable we may repeat, that it is manifestly some peculiar condition of the general atmosphere to which we have applied the provisional term of *epidemic meteoration*, a condition essentially morbific and variable in its intensity in the localities and countries where it occurs. No part of the State of New York is exempt from visitations of the severer forms of the contagious exanthemata. As epidemics, these disorders frequently traverse its whole territory; and excepting smallpox which, as before remarked, is held in check by vaccination, they in some years largely contribute to swell the bills of mortality. The number of deaths produced by them in the commonwealth there is no means of ascertaining. It is only in the larger cities, that the mortuary returns are full and reliable. The following table, prepared by the writer, and presented in his report on Practical Medicine and the Progress of Epidemics to the American Medical Association in 1848, is here reproduced with additions embracing the mortality from the exanthemata in the city of New York during a period of fifty-five years; and also minutes of the population at the regular census periods, and of the years in which the yellow fever ~~and cholera~~ prevailed.

Table showing the Annual Numbers of Deaths from Scarlet Fever, Measles, and Smallpox, in the City of New York, from the beginning of 1804 *to the end of* 1859; *and, also, the Increase of the Population in the Census Periods of five years, and the years (marked with an asterisk) in which Yellow Fever was epidemic.*

Population.	Year.	Scarlet fever.	Measles.	Smallpox.	Total.	Population.	Year.	Scarlet fever.	Measles.	Smallpox.	Total.
	1804*	14	2	169	185		1832	221	290	89	600
75,770	1805*	4	..	62	66		1833	179	38	25	242
	1806	4	..	48	52		1834	418	212	233	863
	1807	2	1	29	32	270,089	1835	174	82	351	607
	1808	4	64	62	130		1836	202	443	173	818
	1809*	9	2	66	77		1837	579	238	164	981
96,373	1810	1	2	4	7		1838	257	79	91	427
	1811	..	2	117	119		1839	158	133	68	359
	1812	..	9	21	30	312,710	1840	191	186	232	809
	1813*	1	35	2	38		1841	366	113	209	688
	1814	1	15	2	18		1842	416	60	181	657
100,619	1815	..	18	94	112		1843	223	118	117	458
	1816	..	19	179	198		1844	225	51	20	296
	1817	3	20	14	37	371,223	1845	63	136	425	624
	1818	..	18	19	37		1846	114	17	141	272
	1819*	5	10	.	15		1847	142	275	53	470
123,706	1820	5	74	..	79		1848	93	77	544	714
	1821	3	109	..	112		1849	266	125	326	717
	1822*	1	1	..	2	515,394	1850	311	324	231	866
	1823	2	117	18	137		1851	627	320	562	1509
	1824	3	100	394	497		1852	613	240	497	1350
166,086	1825	10	53	40	103		1853	454	134	656	1244
	1826	24	31	58	113		1854	517	362	611	1490
	1827	4	172	149	325	629,810	1855	1052	383	101	1536
	1828	11	28	93	132		1856	1283	330	388	2001
	1829	188	91	16	295		1857	1325	322	423	2070
202,589	1830	246	22	176	444		1858	668	392	492	1552
	1831	258	39	224	521		1859	840	261	60	1161

In glancing over this table, several interesting facts are noticeable. The first is, that there was a long series of years in which the exanthemata were nearly extinct, or appeared only in a sporadic form; that this series of years was followed by another in which these diseases became very rife, and that, after prevailing extensively for some years, they declined, and again increased epidemically.

The next fact which attracts attention in the above table is, that the deaths from the different exanthemata vary in number, sometimes greatly, in the same and in different years. For example, in 1823 there were only 2 deaths from scarlet fever, and 18 from smallpox, whilst there were 117 from measles. In 1824, the deaths from scarlet fever were 3, from measles 100, but from smallpox 394. In 1829, the deaths from measles were 91, from smallpox 16, and from scarlet fever 188. Similar variations have occurred in

most of the 55 years above mentioned. Such facts show, in a striking manner, that the meteorations agency which favors the prevalence of the exanthemata, operates with varying degrees of intensity; and that, in some years, it is more favorable to the diffusion of one than to another of these diseases; and, further, that its periodical epidemic phenomena are spread throughout wide spaces of time. But, though such are the leading facts in respect to the exanthematous epidemics, there are other phenomena which show that the atmospheric principle, upon which their occurrence depends, does not so constantly exist as to prevent the intercurrence of other forms of epidemic disorders. On the contrary, there are years in which that peculiar morbific principle gives way, and is replaced either by a salubrious state of the air, or by a variety of epidemic meteoration which favors the prevalence of some other form of pestilence. To these general laws of epidemics, the writer specially adverted in his report, already referred to, published in the first volume of the *Transactions* of this Association. It is there shown that the occurrence of epidemic yellow fever is favored by a form of meteoration different from that under which the exanthemata become epidemic.

II. OF THE INFECTIOUS EPIDEMICS OF NEW YORK.

In this class of epidemics are comprised those zymotic or febrile diseases which arise—

1st. From *koino-miasma*, or the exhalations from decaying organic matters exposed to solar heat on the surface of the earth, or mingled with the soil; such as intermittent and remittent fevers, dysentery, and yellow fever.

2d. From *idio-miasma*, or the aerial poison formed from the excreta of the human body, and especially those of the lungs and skin; as typhus.

3d. From *idio-koino miasma;* such as compound fevers.

These divisions will happily serve the purposes of our inquiries.

1st. *Of koino-miasmatic diseases.*—The more common or mild form of *koino-miasma*—or, as it is commonly called, malaria—occurs in many districts and localities in the State in the summer and autumn. It is, indeed, next to the atmosphere, the most prolific source of disease within the commonwealth. It is exhaled most abundantly from alluvial bottoms, on the margins of sluggish streams, and from the low, humid borders of stagnant pools and lakes. It occurs also occasionally, in wet seasons, in more elevated situations.

Most of the fevers arising from the malaria in question are, in their types, intermitting, or paroxysmal, and remitting, or exacerbating, and hence are appropriately denominated *periodical.* To determine the *special relations* existing between these diseases and the geological, thermometrical, hygrometrical, and barometrical conditions in which they occur, is, it is believed, impracticable in the present state of our knowledge. Nor can such a determination be expected until the obscurity which surrounds the subject shall be resolved by the discovery of facts which have hitherto eluded observation.

In studying the malarious or *periodical* fevers of New York, it will be found convenient to exhibit them in the order in which we find them occurring in the several physical regions into which, as we have before shown, the State has been divided by Prof. Guyot.

1. Periodical Fevers of the Maritime Region.

In this region, which embraces the counties of Richmond, Kings, Queens, New York, and the greater part of Westchester, intermittent and remittent fevers occur annually, and in some localities and seasons to an extent which may be said to be epidemic. The geological configuration of this part of the State is, in many situations, favorable to the production of malaria. Incumbent on the primary rocks, and the limited trappean and tertiary formations, of the southern part of the first geological district, is a drift deposit, varying in thickness, and so spread out as to form plains, marshes, hills, ridges, undulations and depressions. These latter deepen in many places into valleys, and give passage to the watercourses which drain the country. The lands which border the ocean and Long Island Sound are those most obnoxious to malarious fevers, and it is to a notice of these we shall give our special attention.

As a general fact, it may be stated that in the maritime region those summers and autumns are most productive of febrile diseases, in which the quantity of rain is above the mean, and the range of atmospheric temperature unusually high. In some years, for reasons unknown, the localities most subject to fevers enjoy an almost entire immunity from these diseases, and such immunity sometimes continues for several successive years; and yet in every summer and autumn the number of sporadic cases is sufficient to mark the miasmatic localities.

The most southern part of the State and of the maritime region is Staten Island, or Richmond County. In every part of this

county, excepting on the hills of serpentine rock which form prominent features in the geological structure of the island, malarious fevers are more or less prevalent. The same forms of fever also occur, varying in extent of prevalence in different years, in many localities in the other counties of this region. The western extremity of Long Island, or Kings County, is especially distinguished as a district in which periodical fever presents itself in all its various types and complications. The eastern portion of the island, embracing Queens and Suffolk counties, though not exempt from, is much less subject to malarious affections.

The Committee appointed by the State Medical Society to make a medical topographical survey of the county of Kings, consisting of Drs. John B. Zabriskie, Nelson A. Garrison, and John C. Fanning, tell us in their report, presented to the Society in 1832, that "there are no lakes, rivers, or canals in the county. But in the hills which traverse the island are found numerous ponds, in which the water collects during every rain, and is retained almost the whole year. The leaves of trees standing upon the borders of these ponds, and decaying vegetables falling into them, putrefy during the warm months, and, without doubt, are one principal cause of the epidemic fevers which prevail annually. In the southern part of the county are extensive salt-meadows which contain marshes and numerous small ponds of standing water. The grass and other vegetable substances which fall into these ponds, when subjected to the action of a summer sun, must produce deleterious miasmata. South of these meadows are two small islands, which include a large bay between them and Long Island. This bay contains many marshy islands, which are overflowed by spring tides, while in neap tides almost the whole surface of the bay is bare, and presents an extensive surface of soft and offensive mud. There are a few small fresh water streams, which in some parts produce swamps." After subjoining to these statements a few general observations on the face of the country, the soil, the inhabitants and their diet, the Committee inform us that "the principal endemic diseases prevailing, in the county are cutaneous diseases, diseases of the intestines and intermittents. The intermittents are very frequent in the spring, and generally not very serious." They say that "the principal epidemic which has prevailed in this county lately is the autumnal bilious fever, which appears in the fall, and in some seasons spreads to a great extent. In 1828, it prevailed to a greater degree than it has done since." The phe-

nomena of this epidemic are especially interesting, and the more so as they illustrate the form and severity which a bilious remittent fever occasionally assumes in this county. It is said by the Committee, in their account of this epidemic, that "the winter of 1827–8 was, with the exception of a few days at the latter end of December, unusually warm and open. There were continual rains, with little frost and no snow. These continued through the whole spring. The rains were very frequent, and no cold weather followed. The month of June was attended with weather very similar; but, in July, it became very warm and dry for three or four weeks—the atmosphere was excessively hot. During this period, the epidemic broke out, and raged with violence in most parts of the country. After this period there were heavy rains, but still the fever continued a few weeks, and then appeared suddenly to receive a check. That the above mentioned peculiarities of the season had an effect in the production of the epidemic, there can scarcely be a reasonable doubt. The character of the fever during the season was different from its usual character, and a similar disease appeared in many other places. It was found in Newark and its vicinity; upon the banks of the Delaware, both in New Jersey and in Pennsylvania, and in many other parts. That the fever was not produced by the effect of the season alone, is evident from the fact of its not being universal, while the heat and dampness of the atmosphere would equally affect every place. We must, therefore, look to some local cause to explain why the fever did not appear at Flatbush, Brooklyn, and other places, while at some, as New Utrecht, Jamaica, and a few more, it raged with unusual violence. If we carefully examine this point, we will find in every place where the fever raged, a vicinity to the sea, to marshes, to salt-meadows, or pools of standing water."—"The fever was an inflammatory bilious one. It put on various forms—intermittent, remittent and continued. The remittent was the most frequent form, and the intermittent most commonly quotidian."—"The local symptoms presented a great variety of appearances, different in almost every case." We are also told that "as soon as the fever became intermittent and the nausea was subdued, the sulphate of quinine would almost in every instance break up the disease. When the intermission was yet short, or not fully established, and the nausea continued, this salt would seldom do much good, but would most commonly add to the distress, and increase the succeeding paroxysm of fever. But when the system is properly prepared, and

it is administered in doses suited to the constitution of the patient and the state of the disease, it seldom fails."[1]

Of the city and county or island of New York, it may be said that, notwithstanding its geographical position and surroundings are most favorable to health, its surface is so uneven as to afford numerous localities which are prolific sources of miasmata. To what has already been said in relation to its geological formation, may now be added the interesting statements of Egbert L. Viele, Esq., Civil and Topographical Engineer, concerning the configuration of the island, and the artificial changes it has undergone in the last half century.

Mr. Viele justly observes that "any inquiry into the causes or remedies for sanitary evils existing in the city of New York, should be based upon a thorough knowledge of the topography of the island upon which it is built;" and he adds: "I have no hesitation in expressing the opinion that one of the chief causes of mortality is to be found in the defective drainage of certain districts of the city, and, furthermore, that this is an evil which is increasing as the city extends itself towards the northern portion of the island, and that the main elements by which the evil is increasing are the so-called city improvements, or grading of streets and avenues, which are now being carried forward."

"To properly understand the position which I assume, it is necessary to bear in mind that the topography of the island of New York varies from five to a hundred and fifty feet above high-water mark; that between these two limits there is every variety of surface. In some sections, the topography is of the most intricate description; abrupt ledges of rock, deep and narrow valleys, sudden upheavals and contortions of the geological formations. Winding along this varied surface, in every direction, are the original drainage streams, one of them of such an extent that it was formerly used for mill purposes. Now, in laying out the city, the rectangular system of streets and avenues has been adopted, no reference whatever being made to the original topography of the island. The consequence is, that the grading of the streets, especially in the upper part of the city, consists of deep rock excavations and high embankments, some of them as high as forty feet. These embankments cross, of course, the old valleys of drainage, through which flows the drainage—streams of a large area. In

[1] Trans. of the N. Y. State Medical Society, vol. i. p. 174.

most instances, a few stones are thrown together and called a culvert, for the purpose of letting these streams pass under the embankments. A few months suffice to destroy these culverts for the purposes of conductors, and the embankments soon become permanent dams, causing the collection of large bodies of water all over the island, which, in midsummer, become stagnant pools, breeding pestilence and disease."[1]

The remedy for these hygienic evils is, in the opinion of Mr. Viele, the widening of narrow streets, and raising the grade of those which pass through original depressions of the earth, and by a proper general system of draining and sewering. It is true, from many localities in which fevers formerly prevailed, these diseases have, for the most part, disappeared, owing to the filling up low grounds, and the paving of streets in the process of extending the city. Still there are places, in the suburbs, which are fertile of febrific miasmata; and the same is true of the alluvial bottoms bordering on the Harlem River. But though, throughout the low parts of the island, intermittent and remittent fevers occur annually, and in some years are epidemic, yet the former seldom assumes a pernicious, or the latter a malignant, character. Of the thousands of cases which have occurred in the city and county since 1804 inclusive, but a few, comparatively, have terminated fatally—a fact clearly inferred from the returns of the city inspector; and, moreover, it is well known that they seldom leave behind them any visceral or cachæmic disorders or sequelæ, such as are common to the malarious fevers of the southern coast.

North of the island of New York, is Westchester County, which embraces the remaining or interior part of the maritime region. To the intelligent physicians of this county, we are indebted for much valuable information respecting its physical geography and endemic diseases. Its climate, though not so decidedly ameliorated by the ocean and Long Island Sound as is that of the other counties of this region, yet it is manifestly moderated, especially in its southern part. In the report of a committee of the medical society of the county, drawn up by Dr. Trask, and published in 1857, we are presented with an able and comprehensive survey of the medical topography and diseases of the southern section of the county. After glancing at the geology of this part of the maritime

[1] See Report of the Select Committee of the State Senate, appointed to investigate the Health Department of the City of New York, p. 209, 1859.

region, and especially noticing its primitive basis, the irregularity of its surface, its ranges of hills and their southern direction, its soil and covering of drift, its watercourses, and indented shores on Long Island Sound, and its marine marshes, &c., he says: "The county of Westchester has, almost without exception, been regarded as unusually healthy. Along the Sound, miasmatic diseases have always prevailed to a certain extent, but, within the past four or five years, intermittents and remittents have appeared where they have not been known before within the memory of the oldest inhabitants. This seems to have been due to a wide-spread atmospheric influence, which has passed on northward to regions rarely if ever before affected. Its northern limit the Committee have not, from inquiry, been able to learn."

So ample is the store of facts collected by Dr. Trask from his neighboring physicians, that we find ourselves in no want of the materials necessary to sketch an outline of the epidemiology of the territory over which his inquiries were extended. It is generally admitted that periodic fevers are more prevalent in the towns on Long Island Sound than they are in those on the Hudson River. It is said by Dr. Sands, of Portchester—a town adjoining Connecticut, on the Sound—that, "previous to the last five years, I am not aware of having met with a case of disease of decidedly malarious origin in the neighborhood. I was in practice here ten years before I saw a case of intermittent; during the last five years, they have abounded. The disease has nearly disappeared, very few cases having occurred this summer." He says, also, that "remittent fever is not a very common disease. Some of the severe cases have been disposed to assume a typhoid form." But he has not seen typhoid fever as an original disease.

Dr. Stanley, of Mamaroneck, says that "there appear to be certain localities, or houses, where intermittent fever has prevailed more than elsewhere; but they seem to me to be so irregularly placed as to forbid the supposition that the ponds of fresh water, or the salt marshes, certainly produced the increased severity of the disease The large factory pond was drained in the spring of 1854, and during the summer the channel through the centre of the pond, which had been nearly obliterated, was opened, and the whole surface became quite dry in June. The fever that year was about the same as the year previous, certainly not less. In 1855, the fever in the vicinity of the stream, and also of ponds a few miles off, very much diminished, and no other disease having the marks of

an epidemic appeared in its place. The high grounds three or four miles back are not exempt, but are less affected by intermittent disease than the *first low ground back of the first ridge*, which slopes down to the tide-water, and *there*, I think, intermittents have been the most prevalent." Dr. Stanley says, at Mamaroneck, that remittent and intermittent fevers prevail at all seasons, but mostly in the fall months, and that, not unfrequently, the one terminates in the other.

In the contribution of Dr. Moulton to the report of Dr. Trask, there is much interesting matter relating to the endemic fevers of New Rochelle and its vicinity. In regard to the geology of that township, Dr. Moulton says that the soil is aluminous, that its general surface is undulating, and much of it hilly. "Some of the hills are covered with the same clayey soil, with an impervious hard-pan, as is found in the plains, and on some of them are found swamps of considerable magnitude. In the villages, and especially on the grounds bordering the streams running through New Rochelle, East Chester, and Pelham, are swamps or low grounds, which become dry in midsummer." It is in these localities that paludal fevers occur annually to a greater or less extent. Dr. Moulton says that in New Rochelle, "thirty years ago, intermittent fever often became remittent, if not speedily arrested; and many cases which commenced like ordinary fever and ague, became remittent after the third chill, but not before or after that in a single instance that came to my knowledge. The disease was broken up, if properly treated, while intermittent, without difficulty; but, in many cases, it was neglected, or mistaken for a common fever and ague, and, after the third chill, became a very dangerous and often fatal remittent fever." "Intermittents are not uncommon in spring and autumn. They are generally easily broken up, but I have met with several cases in a neighboring town which might properly be called pernicious intermittent. I have had five such cases at one time; three in East Chester, and two near Hutchin's River, which divides East Chester from New Rochelle. The subjects were all aged; the youngest not under forty-five, the others between sixty and eighty years old. These five cases were all tertian, and all were attended by similar symptoms. The paroxysms were ushered in with coldness and prostration, but without rigor. Insensibility soon followed, and continued in each case for at least twelve hours. They were not comatose in a single instance. They were apparently awake and were restless, but entirely unconscious, and ex-

hibited signs of great prostration. Medicines or food placed in the mouth were neither swallowed nor rejected. The afferent nerves seemed to be paralyzed, and the patient had, to all appearance, no consciousness of any impressions; nor was reflex action produced through the efferent nerves of the mouth and throat. In one man, about sixty years old, with organic disease of the heart, there was a remarkable irregularity of the heart's action during the paroxysm, there being an intermission after every two pulsations; this was not observed in the intermission of the fever. These patients all soon recovered, under three grains of quinine every two hours, and a teaspoonful of pepper every intermediate hour. Some congestive cases have occurred in East Chester (in March, 1856); one of these proved fatal on the third day, and one on the fifth day."

As a modification of periodical diseases, Dr. Trask says: "Intermittent neuralgia was very severe and obstinate in the spring of the present year, in New Rochelle and the neighboring towns. These cases, according to Dr. Moulton, were either of facial neuralgia or brow ague, and were regular quotidian intermittents. These cases were treated by active purgation, and the administration of two grains of quinine every two hours, till twenty or thirty grains had been taken, and, in most cases, Fowler's solution to the amount of twenty-four drops in twenty-four hours; with liniment of chloroform and aconite. Such cases were, at the same time, very prevalent in White Plains and its vicinity, and repeated doses of ten or fifteen grains of quinine were required to effect a cure."

It is stated by Dr. Moulton in connection with the history of the endemic fever of this part of the country, that "an island in the Sound, nearly a mile from the shore, of about seventy acres, has upon it a pond of fresh water about fifteen rods in diameter when full, but of much smaller dimensions in dry seasons. This pond is on the eastern side of the island, where ledges of rock project above the earth and breast the waves. Large quantities of muck are taken from the bottom and sides of this pond when left naked in dry seasons, together with the flags and weeds which grow luxuriantly on its borders, and spread upon the land as manure. Paludal fevers prevail here as well as on the main land. I have never found such diseases more prevalent, *cæteris paribus*, when salt and fresh water meet, than where there was no salt water."

Writing in 1856, Dr. Moulton says, that "intermittent and remittent fevers have prevailed during the last three or four years in New Rochelle and East Chester, to some extent, but without un-

usual complications, excepting perhaps an unusual tendency to congestion and implication of the brain, often requiring venesection, leeching or cupping. Physicians, who relieved the brain by these means, were very successful in treating such cases, while those who saw nothing in them but malarious fever, and treated them accordingly with quinine alone, lost their patients in a large proportion of cases." "Formerly, before intermittents became so general, they were confined to the valleys, and to the neighborhood of rivers and swamps, and seldom occurred near salt-marshes or meadows, unless fresh water swamps were near." "Intermittents prevail in Pelham more than in New Rochelle, if I am rightly informed; and the islands on its shore are not exempt from the disease, as they formerly were. The isthmus called Rodman's is, like the islands, generally exempt from paludal fever."

"The township of East Chester," says Dr. Gregory, "taken as a whole, is very healthy; intermittents have prevailed to some extent for the last four years. Remittent fever is seldom met with, except during the latter part of summer or beginning of autumn, and then not very often. Fevers here seldom assume a typhoid character. During the year 1855, there was a marked disposition for diseases to run into a typhoid state; this condition, however, was very generally recovered from. Typhoid disease, previous to 1855, and during that year, was very rarely met with."

According to Dr. Ellis, of the town of Westchester, "intermittents do not prevail to any considerable extent in my practice, and when occurring, are confined almost exclusively to the laboring classes." "This section is remarkably free from epidemic diseases; on the other side of the Bronx, in the township of West Farms, they are more prevalent. I do not consider Pelham Neck or City Island to suffer from malarious disease; both places are healthy, and I do not see any local cause to generate malaria." Dr. Ellis also states that in the town of Westchester, remittents occur oftener than intermittents.

Dr. Gates, of Yonkers, speaking of the sources of malaria in that town, says: "A mill-pond near the southeast part, covering the most part of one hundred acres of flat, moist land, appears to be the cause of intermittents, which have always prevailed in its immediate vicinity. In the Saw-mill Valley is a strip of moist land which has, in some instances, produced intermittents. Aside from the above, we have been exempt from the disease during the last thirty-two years, until the last five years, during which they have

prevailed a little more generally, commencing in a very wet summer; still, we are comparatively exempt." He also says that "remittents occur, sometimes a good deal. I have seen very few cases of the congestive form, such as is more common at the south, and in places more unhealthy than this. We have more typhoid, which often occurs at the same time with remittents, and frequently seems blended with them, as remittents sometimes run into typhoid, and typhoid, on removing the cause of depression, may assume the remitting form. These fevers have never prevailed here to a very serious extent, and they are very seldom fatal, excepting in unfavorable subjects. Last year (1855) we had very little fever, and nothing peculiar in the symptoms."

"The central range of townships," says Dr. Trask, "midway between the North and East Rivers, as White Plains, Scarsdale, &c., have an irregular broken surface, at a considerable elevation above tide-water. At the depot, at White Plains, this elevation amounts to one hundred feet, the average elevation of the township and its vicinity being considerably higher. Retreating from the Sound, the ground gradually rises for at least twelve or fifteen miles, the higher portions being probably 200 feet above tide-water. The surface, in and immediately around the village of White Plains, is underlaid by a bed of hard-pan; but the inequalities of surface afford abundant facilities for drainage; and this is true of almost the whole of this portion of the country." Dr. Trask further states that the town of "White Plains and its immediate vicinity, has been regarded as a singularly healthy region, and for several years had enjoyed almost an exemption from diseases that at times have prevailed along the North and East Rivers."—"For many years intermittents had not been enumerated among the diseases, previous to the summer of 1853. A few cases had occurred occasionally among those in the immediate vicinity of a mill-pond on the northeast limits of the town, and of another on the western borders. During the summer of 1853 there was much rain, and a luxuriant growth of vegetation covered the earth's surface; portions of this decomposed, giving rise to offensive odors in the gardens. During this season intermittent fever made its appearance in this vicinity, and from seventy to eighty cases came under my immediate notice. During the summer and autumn of 1854, it prevailed to a much less degree." "In the spring of 1855, it reappeared in some who had previously been affected, and attacked others who had not before suffered. Cases continued to occur during the summer, espe-

cially in August. They were characterized by a disposition to run into the remittent type, and by a resistanee to the effects of quinine." Dr. Palmer, long a praetitioner at White Plains, informed Dr. Trask that "during the first few years of his praetice" (eommencing forty years ago) "intermittent and remittent fevers were hardly heard of." Suddenly, however, these diseases made their appearance, and beeame very eommon all over that part of the county. I recolleet I used more quinine in one year than I had previously done for some half-dozen years. Aeeording to the best of my reeolleetion, the season was both wet and warm, giving rise to the deeomposition of vegetable matters, to which at the time, I attributed the prevalence of the fever.

Dr. Trask eoneludes his able report on the epidemics of Westehester County with the following remarks, viz: "There remains room for but a single remark, suggested by the faets here presented, viz., that, with searee an exeeption, those distriets in whieh malarious diseases oecur, are in the vieinity of ponds or of streams obstructed by mill-dams, or are underlaid by a bed of hard-pan, whieh interferes with the drainage of the surface; and the seasons during whieh these diseases have espeeially prevailed, through this portion of the eounty, have been aecompanied or preeeded by unusual prevalence of both warm and rainy weather."

These observations correspond in the main with the faets observed many years sinee, by the writer, a native of New Rochelle, while studying medieine under the direetion of his father, a physieian of that place for upwards of half a century; and he has reason to believe that the same observations are applicable to the northern parts of the eounty, and also the adjoining eounty of Putnam, where, however, periodieal fevers appear to be less prevalent.

To what has been said, eoneerning Westehester County, it may not be inappropriate to add, that its hygienie eharaeter is regarded with peculiar interest by the people of the eity of New York. It is so, beeause of its proximity to that metropolis, a eireumstanee which renders it a desirable and eonvenient rural retreat during the warm months.

2. Periodical Fevers of the Hudson River Region.

Leaving the maritime region, we proeeed to notiee the endemic fevers of the Eastern or the region of the Hudson valley. The geological basis of this region is formed, for the most part, by that

portion of the Champlain division of the New York system of rocks, denominated the Hudson River Group, and which is overlaid by a drift deposit and a sandy soil. The average temperature of the region not only varies in its different parts, but is, in a marked degree, lower than that in the maritime region. But between these two regions there is a narrow intermediate alpine district, viz., the Highlands, embracing parts of Orange and Putnam counties, and through which flows, by a deep gorge, the Hudson River. In this district is West Point, the seat of the United States Military Academy, a meteorological station, at which the mean annual temperature is 50°.73, and the mean annual quantity of rain is 54 inches, a quantity which, as we have shown before, makes the Highlands the hyperhyetal district of the State. Excepting the marshes on the eastern side of the Hudson, a mile or two from West Point, there are few or no sources of malaria in the district; and we are told there are no diseases, which can be considered peculiar to the locality occupied by the Military Academy, and that acute inflammatory diseases are rare. "Indeed," at this post, "the sickly report is mostly made up of slight complaints and injuries. The spring and autumn are most productive of severe catarrhal affections and rheumatism; the summer, of disorders of the digestive organs; and the winter is decidedly the most healthy period of the year. From December to March, particularly in the coldest, and, of course, driest winters, it often occurs that, out of eight hundred persons, there is not, for weeks together, one seriously sick." It appears, however, from a statistical abstract of the diseases of West Point, that there is an unusually high ratio of disease at that place; but while it so appears, the truth is, there are generally few or no severe cases of sickness. "The command consists almost entirely of cadets, students in the Military Academy, who, when suffering from headache or other slight indisposition, can only obtain respite from academical studies or military exercises by having their names registered on the sick-report. A mere glance at the abstract will suffice to show this; the majority of the cases reported being under the head of "catarrhus," "cephalalgia," and "all other diseases;" which last were mainly slight indispositions, sore-feet, toothache, and other minor disabilities."[1]

Above the Highlands, and within the Hudson River region, are, on the west side of the river, a part of Orange County, and Ulster,

[1] Med. Statistics U. S. Army, 1839–1854, page 31.

Greene, Albany, and Saratoga counties; and on the east, Putnam, Dutchess, Columbia, Rensselaer, and Washington counties. Though numerous facts have been accumulated relating to the malarious diseases of this region, there is much of its medical geography which remains to be explored.

In Orange County there is a tract of territory called the bog meadows, or drowned lands, which comprises many thousands of acres, and which, as before mentioned, are supposed to be of lacustrine origin. Through this tract flows the Wallkill River. An interesting account of the febrile diseases which formerly prevailed in this part of the county, appeared in 1810, from the pen of Dr. D. R. Arnell, addressed to Dr. David Hosack, and published in the second volume of the *American Medical and Philosophical Register*. Dr. Arnell describes the lands as generally overflowed with water the greater part of the season. "The proprietors," he says, "have been incorporated into a company for draining them, and have employed a large number of workmen for that purpose the three last summers. The country around them is hilly, rough, and uneven, and has been visited with remittent and intermittent fevers during the autumn, for a number of years past; but the fever has never put on so malignant and dangerous an appearance as it has the last two seasons, at the outlet of the drowned lands, among the workmen and hands employed in draining them." "The persons this fever attacked were mostly foreigners; a few of the natives of this country were also seized with it, though they had never lived near the outlet before they went there to work, and but one died, which was the child mentioned above; the others were chiefly Irish, who were in habits of intemperance, and irregular in their manner of living." "Intermittent and remittent fever and bilious complaints, were prevailing through the country at the same time to a considerable degree."

Dr. G. C. Monell, in his report to the State Medical Society, in 1855, on the epidemics of the second senatorial district, which embraces Orange County, says that "there has been clearly an epidemic influence over the whole district, of an intermitting character, and giving its features more or less to most diseases not acute in their nature. Intermitting fever, itself, has prevailed in well-marked forms over the whole district; some parts of which had not been visited by the fever in years. In other parts, where it annually appears, it was more obstinate and sometimes more violent; occasionally, the first paroxysm amounted to delirium. It usually

yielded in a few days to proper evacuants, followed by quinine. Sometimes it was necessary to continue the quinine for two or three weeks to prevent a recurrence of the disease, although the patient seemed well. In these cases I found decided benefit from strychnine added to the quinine. The intermitting was more marked during summer months; but extended in less degree over the latter part of spring and the early part of autumn."

The periodical fevers of Ulster County are in their types and character the same as those of Orange or the county last mentioned; and, what is remarkable, they differ much in severity and extent of prevalence in different years. In general they appear in the form of mild intermittents and remittents; but occasionally they assume the form of dysentery or that of a malignant fever. In this latter form, the fever appeared at Rondout, a few miles south of Kingston, on the Hudson River, in 1843. In this instance the disease presented phenomena so strongly resembling the yellow fever of the West Indies, that it was alleged by some to be that disease, and its specific cause was referred to the schooner Vanda, which vessel had arrived at the New York quarantine station on the 17th of August from Point Petre, Guadaloupe, *via* St. Martins, and being permitted as a healthy vessel to pass up the Hudson, arrived at Rondout on the 19th of August. The rumor that the disease was yellow fever created a general panic. "So intense did the excitement suddenly become," that the mayor of the city of New York, directed by the Board of Health, issued a proclamation, prohibiting all intercourse between that city and Rondout and Kingston, until a certain day, in order to get authentic information in regard to the nature and cause of the disease. Deputed for the purpose, Dr. Vaché, the resident physician of New York, visited Rondout and made a thorough investigation of the facts, and in his report to the Board of Health said: "From the information derived from the principal physicians of the place, Drs. Stringham and Elting, it appears that the same form of fever occurred in their practice for about two months prior to the arrival of the schooner Vanda from the quarantine ground at New York, and that now it exhibits in their opinion no new feature, unless it may be an aggregation of the symptoms, and an increase in the number of the persons it attacks. In connection with this fact, and from a personal visit to the sick, I am of opinion that the disease, as it now appears, is bilious remittent fever, readily yielding to active medicines, and attended with none of the aggravated and malignant characters of yellow

fever." This opinion was subsequently supported by the following decided testimony of Drs. Jas. R. Manly and Samuel Forry, of New York City, and of Dr. Edwin Jewett, of Rosendale. These gentlemen, in a certificate communicated to Dr. Vaché, state, "1. The disease is a *bilious remittent fever*, with a tendency to assume the typhoid type. 2. So far as our personal knowledge extends, and so far as we can learn from others, we are decidedly of opinion that there has not been a single case of *yellow fever* in this locality, nor has there been a single case accompanied with the *black vomit* peculiar to that disease. 3. As regards the question of the contagious nature of this disease, our opinion in the negative is equally decided." These opinions were concurred in by John Wales, surgeon, and Drs. H. Stringham and Richard Elting, of Rondout. A portion of the village of Rondout is described as situated "on low made ground, immediately on the border of a creek and about one mile from the Hudson River," and "that it has all the requisites for the engendering and continuing various forms of fever."[1]

Autumnal fevers of the ordinary types occur, also in the other counties bordering on the west side of the Hudson River, viz., Greene, Albany, and Saratoga; but our knowledge of the extent of their prevalence, in the two former counties, is so meagre, that we are unable to give any special account of them. Of the city of Albany we say nothing, as the sanitary condition and diseases of that and of the other larger towns of the State, excepting the city of New York, do not, as we have before stated, come within the range of our inquiries.

The medical topography of Saratoga County is especially interesting. Possessing a treasure in its medical hydrology, this county is widely known beyond the limits of the commonwealth. For a description of its physical conformation, we are mainly indebted to Dr. Steel and the State geologists; and for a sketch of its topography and diseases to Drs. Elisha Porter, O. Brisbin, and James Lee. The face of the country is uneven. Its northern and western parts are mountainous, and belong to the system of primary rocks, whilst the other parts are spread out in elevated plateaux and flats, the former consisting mainly of drift, and the latter of alluvion, extending along the banks of the Mohawk and Hudson Rivers. Of the

[1] See Account of a Malignant Fever, which prevailed at Rondout, Ulster County, New York, in the months of August and September, 1843, with an inquiry into its nature and into the question of importation by the schooner Vanda, &c., by Samuel Forry, M. D., N. Y. Journ. of Med. and Collat. Sciences, Nov. 1843.

malarious diseases of the county, Dr. Porter says, that "intermittent and remittent fevers have generally prevailed every autumn in this county, since its first settlement. About 1790, the settlements increased rapidly, and in a year or two very many of the water privileges were occupied, and the sickness was generally attributed to the dams which were erected across the streams." He further says, the fevers in 1798, "in many instances, were quite as malignant, and I may, perhaps, add, as mortal, as the yellow fever was in Philadelphia the preceding autumn." "From this period to 1811, the fevers in the river towns, with few exceptions, have been in the fall and early part of winter, inflammatory typhus." "The summers are generally very healthy."[1]

Dr. Brisbin, writing of the diseases of Saratoga County, in 1848, says, that "during the last twelve or thirteen years there have been fewer cases of intermittent fever than had prevailed antecedent to the appearance of the cholera. Previous to that period the ague and fever generally prevailed during the spring, summer, and autumn, and was the principal epidemic of the east section of the county. Since the invasion of the Asiatic cholera, we have met with less of fever, but there has been a great increase in disease of the chylopoietic viscera. I believe this change has arisen from some cause operating through the atmosphere. Probably the deleterious miasm which excited the cholera was influential to neutralize the malaria of fever. However this may be, other causes have doubtless operated to lessen the amount of noxious vapors, and abate the former prevalent exciting cause of fever. In the progress of improvement, much of the low grounds on the Hudson, and bordering the Fish Creek, have been cleared and drained, thereby converting many acres of morass into firm arable lands; hence, the wood and various other vegetable matters are removed, which, by application of heat and moisture in the process of decomposition, had ever been the fruitful parent of impurities in the atmosphere."[2]

Dr. James Lee, of Mechanicsville, has recently written an able and comprehensive paper on the topography and diseases of Saratoga County. He tells us that the alluvions in the valleys of the Mohawk and Hudson, "are composed of ooze, and contain portions of lime mixed with argillo-silicious and organic matter, which render

[1] Transactions of the N. Y. State Med. Soc., vol. i. p. 342, 1853.
[2] Ibid., vol. ii. part 2d, p. 60, 1848.

the soil fertile and vegetable growths luxuriant. In many portions of this division there is afforded an abundant supply of decomposing material and a consequently increased amount of miasmata is generated. The evil arising from this source has, however, been greatly remedied by the digging of the Champlain Canal throughout nearly the whole length of one of the divisions, and the Erie Canal through the other," and he adds the following interesting remarks: "The completion of these two great public works has contributed more towards ridding this country from miasmatic diseases than perhaps could have been accomplished by any direct effort towards a sanitary improvement of this locality, for with our peculiar facilities, they effect the most perfect drainage of our alluvial districts; and, although we are not entirely freed from the influence of marsh miasmata as an exciting cause of disease, the virulence of those diseases, depending upon this influence, has been greatly mitigated." "In the year 1840, idiopathic typhus fever prevailed with considerable force as an epidemic, but in 1843, the period at which I commenced practice, very little of its influence was observable, and very soon afterwards, all our diseases assumed an active inflammatory character." "At this period bilious remittent fever would often be so intimately blended in the same case with pneumonia, that it was difficult to determine which predominated. This was especially the case, when the late and changeable fall weather was becoming merged into that of early winter." "Intermittents which had formerly prevailed especially along the courses of the streams where the alluvial deposit predominates, had entirely disappeared, and it was not my fortune to witness a single case of the genuine disease for the first ten years of my practice in this country." Dr. Lee also informs us that an epidemic fever prevailed in the south part of the country in the fall of 1855. It commenced in the latter part of August, and assumed a remittent type; and as to its severity, he says, he lost two out of thirty-five cases, and he thinks this proportion was not lessened in the practice of his neighbors. The disease was in some respects peculiar, and he regarded it as bearing a striking similarity, if it were not the same disease, to a form of fever described by Dr. A. Baker, Jr., in a letter published in Dr. Willard's report on the epidemics of the sixth district in 1855.[1]

Of the remaining counties of the eastern region, ranging mostly between the Hudson River and the Taconic (Taghkanick) Moun-

[1] Trans. of the N. Y. State Med. Society, 1859.

tains, it is observable that there are numerous localities, which are sources of malaria, and that their prevalent diseases are similar to those in the counties on the western side of the river. Dr. Hunting Sherill, describing the fevers of Dutchess County, tells us that bilious intermittents and remittents were rife in 1809, and that they generally assumed a typhoid type, a peculiarity which continued until 1811, at which time it became comparatively healthy. In the following year appeared the fatal disease, called the epidemic, winter, or spotted fever, which prevailed to a great extent, and the asthenic diathesis of which, continued to characterize the diseases of the county for several years afterwards.

To obtain further information in regard to the endemics of Dutchess County, one of the most interesting agricultural sections of the State, the writer recently addressed notes to several physicians residing in different parts of the county, inquiring to what extent, and in what situations, intermittent and remittent fevers and dysentery occur within the circle of their observation and knowledge; and, he is happy to say, that he received from them prompt and satisfactory answers. The gentlemen referred to are, Dr. Lewis H. White, of Fishkill, Dr. Per. Lee. Pine, of Poughkeepsie, and Dr. Eliphalet Platt, of Rhinebeck.

Dr. White, in his interesting communication, dated May 7th, 1860, says "that intermittent and remittent fevers and dysentery have never prevailed as an epidemic during my residence in the county, which has been for thirty years. We have intermittents to some considerable extent in certain localities annually; but they are almost entirely confined to the valleys of the streams and to the neighborhoods where they are dammed or ponded for manufacturing purposes. We have a number of manufacturing villages and mills in the south part of the county, and to them and their neighborhoods is the disease mostly confined, except the valley of the *Sprout Creek*, a stream arising near the centre of the county and emptying into the Fishkill, some 10 miles from the Hudson. There are very few mills on this creek; the banks are low, and the current rather sluggish. Intermittents prevail on the entire line of it annually, but being confined to within half a mile from either bank. But in the open country, away from the mill-ponds and the Sprout Creek, we have comparatively none of the disease. The same may be said of remittents. These prevail mostly in and near the manufacturing villages. Away from these localities we probably have less of intermittent fever than any county in the

State. Dysentery never prevails here as an epidemic; we have some of it in August and September every year. In some seasons it has been somewhat prevalent among the families of the operatives of the factory. In September, 1849, there was more of the disease than since or before, much more; that was the year of the cholera, when, I believe, it prevailed in all the river counties. Intermittents prevail mostly in July, August, and September. Remittents in September, October, and November, often extending into the winter months, particularly so if we have a late or warm fall."

Dr. Per. Lee. Pine, of Poughkeepsie, in his reply to the writer's inquiries concerning the diseases of the central part of Dutchess County, states that cases of protracted remittent fever are not as numerous at present as they were about the years 1835–36. He says: "Those we have now are mild. During the course of the year I treat quite a large number of intermittent fevers; but only a few cases of dysentery since the last cholera. A large creek runs through the northern part of our city, some portions of the distance being through low and flat land; and when the mills are not in operation, the water stagnates. In the same distance there are four dams. Near this stream we expect to meet with frequent cases of intermittent fever. The eastern section of the town of Hyde Park is the greatest generator of intermittent fevers and dysentery I know of, owing probably to the marshy lands and creeks running through the town to the Hudson River. As you approach the Hudson River these cases disappear."

Dr. Eliphalet Platt introduces his communication to the writer relative to the diseases of the northern part of Dutchess County, with a general description of the face of the country. He says: "The eastern towns of the northern half of the county, including Washington, Amenia, Pine Plains, and North East, are hilly, but not rocky. The central towns of Stanford and Milan are in many parts rocky and rugged, and Milan is the roughest, most hilly and rocky of any in the county. It is separated from the town of Pine Plains on the east by a veritable mountain called *Stissing*, from which the Stissing Bank takes its name. Many of the hills in this town are very steep and rocky, and the surface of the ground very uneven and broken. The centre is much lower than the other parts, and may be called a broken and uneven valley. This extends from near the northern boundary, south through the centre of the town of Stamford, and may on an average be about two miles wide.

More sickness prevails in this valley, and epidemics are more common than in any of the other towns. Hyde Park, Rhinebeck, and Red Hook adjoin the Hudson River. In the two latter there is a good deal of plain level land, particularly in Red Hook. The soil is generally in all the towns a gravelly loam, the loam predominating in a greater or less degree. On the river it is sometimes clayey. Rhinebeck and Red Hook are in my opinion the two healthiest towns in this State, or perhaps any of the States."

In respect to the situations in which intermittent and remittent fevers prevail, Dr. Platt states "that they are not limited to any locality; and since I commenced the practice of medicine, about thirty years ago, they have never prevailed epidemically but once. The first year that I began business here, remittent fever prevailed extensively in this town (Rhinebeck), as an epidemic. It was severe and long continued, and many cases were fatal. It continued only one year, and has not appeared since, nor I think a dozen cases in all, in thirty years. It was followed immediately by intermittents, which for two years prevailed almost universally; in the second year I do not think a dozen families in this town escaped. After this it disappeared entirely, and for twenty or twenty-five years I do not think there were twenty-five cases in this town during that time; except among the Irish laborers on the Hudson River Railroad, who have it I believe every year to a greater or less extent, but it is confined exclusively to them, or very nearly so. When it prevailed here epidemically it was severe, and relapses were very common, and from this cause, the quinine became very unpopular. The moment the fever left, the quinine was abandoned, and of course a relapse upon the first exertion or fatigue followed."

Ascribing many evils to the use of quinine, the people resorted to a nostrum, which Dr. Platt believes was quinine combined with aloes or some bitter purgative, which, when continued in moderate doses for two or three months, effectually prevented the return of the disease. "Taken thus ignorantly, quinine," says Dr. Platt, "hurt nobody and cured everybody." "At the time that intermittents prevailed here, they prevailed to a greater or less extent in all the northern towns, and they ceased in these at about the same time to be epidemic."

"In 1849, we had an epidemic dysentery here which was extensive and very fatal. In this village, of then 1500 inhabitants, and immediate vicinity, there were nearly 50 deaths. It prevailed a little the three subsequent years, and then disappeared entirely—for

the last five years there have been no cases, or none of any severity, and last year I think not one in this town. At the time that it prevailed here, it also prevailed very badly in Hyde Park, but not at all in Red Hook; it also prevailed to some extent in all the northern towns, and has ceased altogether there as here, except perhaps now and then a sporadic case."

"When the remittent and intermittent fevers prevailed epidemically they were not confined to any locality. They prevailed just as much on the highest hills as on lower ground, and were no more frequent in the vicinity of creeks or ponds than elsewhere. This is a curious fact, but I am positive that it is such. These fevers must have been produced most probably by some general atmospheric and not by any local causes. Sporadic cases are doubtless produced by local causes."

"In the valley or low ground of the towns of Stanford and Milan above mentioned, there have been epidemics which affected no other part of the county. Seven years ago, a very peculiar disease prevailed extensively in that district, and in that only. Whole families in some cases were affected. It was known by the name of *brain fever*, and was different from anything in the form of disease that I had ever seen. Many were affected in a manner similar to tetanus, with rigidity of the cervical and lumbar muscles, drawing back the head similar to opisthotonos, with the tongue literally black. In this state many died. This disease continued only two or three months."

"Typhoid fever likewise prevailed epidemically in this district some ten years since, and Dr. Campbell, a physician of Stanford, at one time told me of the number of cases that he had on his hands at one time, I think it was twenty seven. I do not believe that during the last twenty-five years there have been that number of cases in this town and Red Hook adjoining, all told, but, as I said above, these two towns are pre-eminently healthy."

The medical topography and epidemics of Columbia County have been briefly sketched by Drs. Peter Van Buren, Robert G. Frary, and Samuel P. White. In this county, which in some parts is hilly, and on its eastern border mountainous, are many small lakes and ponds, and also several streams which rise in the eastern uplands and empty in the Hudson. The principal of these streams are the Kinderhook and Claverack creeks, the latter being a tributary of the former. There is also the stream called Ruloef Jansen's Kill, which passes through the county from the north and

terminates in the Hudson. These streams are somewhat rapid, and in rainy seasons, the grounds on their borders are, for a few days, more or less extensively inundated. There are but few morasses and bogs in the county, and no canals. It is in the latter part of the summer and the early part of the autumn, that miasmatic exhalations are most noxious. It is said, in the report referred to, that periodical or "intermittent and remittent fevers, are quite common, in some parts of the county, and more particularly in its southern portions."—"The remittent form is more rarely met with, and when it is, we sometimes encounter it as an idiopathic disease, but not unfrequently as the result of a neglected intermittent. When early prescribed for, the intermittent is pretty sure to yield to an emetic, and quinine during the apyrexia. It may not be improper to observe, that the quinine has in some parts of the county lost much of its reputation, from the frequent recurrence of the same disease, in persons who had been cured by it by this remedy. From eight to ten days is the usual immunity enjoyed by those who are the fit subjects of this malady."

For much valuable information concerning the topography and meteorology of Rensselaer County, or rather that section of it comprising Troy and its environs, we are indebted to Dr. Brinsmade. Speaking of Troy, he says, "Epidemics have never been very severe here,"[1] and it appears from his elaborate paper, embracing a general statistical summary of all the diseases observed and treated by him during a long series of years, that periodical fevers are not of frequent occurrence in that city.[2] The paper here referrred to presents a mode of registering the diseases observed in private practice, which is worthy of general adoption.

For information respecting the topography and epidemics of Washington County, our acknowledgments are due to Dr. Hiram Corliss. In his paper, entitled "Brief Noticcs," &c., communicated to the State Medical Society, in 1850, he says: "It is about two hundred years since its first settlement by civilized man. This county is about sixty miles in length, from north to south, and is comprised of almost every variety of soil and surface. At the northern end of the county there are mountains fifteen hundred feet high, with many low grounds and marshes. it abounds in all parts in lakes, ponds, rivers, and smaller streams of pure water. This county, no doubt, is as healthy as any other in the State

[1] Trans. of the N. Y. State Med. Society, 1851, p. 143.
[2] Ibid., 1858, p. 257.

or nation. Formerly, on some of the low lands near the still waters, bilious and intermitting fevers prevailed; some few places are not yet quite clear, but nearly so."

3. Of the Periodical Fevers of the Western Region, or the elevated Table Lands of NewYork.

It will be found conducive to a clear exhibition of the sources of fever in Western New York, if we again advert, and with more particularity than we have heretofore done, to the topographical geology of this part of the State. The whole of the New York territory, west of the 76° of west longitude is underlaid by transition rocks or those of the New York system, so called by the State geologists. The outcroppings of these rocks, the strike of which is east and west, and the drift which covers them, give a very uneven surface to this part of the State. On the northern frontier, *i. e.*, bordering on the shore of Lake Ontario, is a low plateau, which extends from Niagara River to near Sodus Bay, and which varies in breadth from three to nine miles. The southern limit of this plateau is determined by an elevation of the earth, at its western extremity, to about 200 feet, a height which gradually decreases towards the east till it sinks to the level of the surrounding country. The summit of this elevation varies in breadth from that of a carriage way to 200 or 300 feet, and forms a highway, called the "ridge road." From this ridge extending southerly is an extensive terrace, slightly depressed in the centre, and which terminates by a rise of about 60 feet to another level or terrace, and this again, after extending many miles to the south, ascends more or less rapidly, at different points, to the height of from 800 to 2500 feet. These successive terraces are due to the outcroppings of the rocky groups, which extend through the State from east to west. In these geological arrangements, it is seen that Western New York may be naturally divided into two parts: 1st, the low lands or terraces on the side of Lake Ontario; and 2dly, the high table lands on the side of the Pennsylvania frontier. The higher of these elevated lands, running east and west, through nearly the central part of the State, is the line of division between the waters which flow to the north and northeast, from those which flow to the south; and, moreover, the high table lands are intersected by several extensive and deep valleys, the most remarkable of which are those of the Cayuga and Seneca Lakes. From this configuration of Wes-

tern New York, it results that there are several notable water sheds, *Divortia aquarum;* 1st, the great one which runs as we have just said, through the State from east to west, and which, on the one hand, turns the streams to the north, and on the other, to the south; and 2dly, those formed by the high table lands, and which turn the waters into the Delaware, Susquehanna and Alleghany rivers. These are the geological differences between the southern and northern portion of Western New York, which led Prof. Guyot to divide that part of the State into two physical or climatic regions, viz., the western, or, as it might be called, the southwestern, or high table land; and that of the great lakes, a division which we adopt in our inquiries into the topography and fevers of the extensive territory in question.

Though much is wanting to complete a full exploration of the medical topography of the western region, we are not without several valuable contributions to that special subject. Such contributions are found in the Transactions of the State Medical Society, and in the Transactions of the Medical Association of Southern Central New York. Of the diseases described in the publications referred to, those of a periodical character, and arising from malaria, are the ones to which our attention will at present be chiefly directed.

Of the few counties in this region of which we have any special medico-topographical knowledge, the first we shall notice is Otsego. Dr. Jenks S. Sprague, in giving the history of the most common diseases in that county, says that "its surface is considerably elevated, though not enough so to be denominated mountainous. It is watered by the Susquehanna and Unadilla Rivers; the former having its head waters in the Otsego and Canaderaga lakes, two small bodies of very pure water, abounding with excellent fish, lying in the northern part of the county. The rivers run in a southerly course through the county, each receiving in its course several small tributary streams." "The lakes are surrounded by gentle elevations, at once picturesque and beautiful; their shores, everywhere bold, retain their waters upon a bed of gravel, while the rivers and other streams, though they run a very tortuous course, are everywhere sufficiently rapid to prevent a stagnation, or the formation of swamps and marshes."

"In the almost entire absence of all the acknowledged sources of malaria, this county, as will readily be anticipated, has ever been remarkably exempt from intermittent and remittent fevers. Com-

mon continued fevers, however, prevail to a considerable extent, assuming, for the most part, the synochus grade, and usually terminating in from 14 to 21 days in convalescence. It has been noticed, however, that for the last eight or ten years they have been gradually assuming a graver form, and during the past and present year many cases have occurred which have exhibited all the symptoms of typhoid fever, as described by our best authors."[1]

The topography of Madison County is remarkably diversified by its geological formation. The northern part is low and flat, whilst the southern is elevated, and rises till it attains an altitude greater, with a few exceptions, than any other county of the State. The elevations and depressions run north and south. Several of the more interesting rocky groups of the New York system, outcrop in this part of the State. The southern, or elevated half of the county is occupied mostly by the Hamilton group; and the northern or lowest part, by the Clinton, Niagara, and Onondaga salt group. Through a valley in the Hamilton group passes the Chenango Canal, which serves as a drain to the country. Though so much of the county is elevated, there is a great extent of area from which miasmata are exhaled in the warm months. "There is," says Dr. Alvin Foord, "but one *swamp* or *marsh* of much magnitude, or that exerts any deleterious influence upon the health of the people of this county, and that is the great Canaseraga Swamp in the towns of Lenox and Sullivan, containing an area of between 10 and 12,000 acres, and having numerous arms extending into the level country around it. This swamp and the surrounding country are extensively inundated in rainy seasons, and when the water subsides there is left a vast quantity of decomposing vegetable matter, and from it are exhaled those miasmata that give character to the diseases of the surrounding country. There are a few mill-dams that occasion the water to set back and become stagnant, so as to give rise to remitting fever in the warm seasons of some years."[2]

After describing the rivers and creeks in the county of which there are no large ones, Dr. Foord states that "in regard to disease, this county must be divided into two regions or districts, viz: the low and flat lands, and the elevated and uneven. The former lie in the north part on an average of 600 feet lower than the latter, and occupy nearly one-fourth of the area of the county. In this

[1] Trans. N. Y State Med. Soc., vol. vii. part 2d, 1848.
[2] Ibid., vol. ii.

district lie the Erie Canal and the great Cauaseraga Swamp already described. The soil consists almost entirely of sand and loam lying upon a bed of clay, and is evidently of alluvial formation. The land along the line of the canal and between that and the hilly country south of it is thickly inhabited, and about two-thirds of it under a high state of cultivation. North of the canal, very little of the land is settled, except a beautiful ridge of a gravelly alluvial soil, about one mile and a half wide, that rises gradually from the lake, till it reaches an elevation of 50 or 60 feet above its surface. This strip of land is in a fine state of cultivation and has many excellent farms."

"The character of the diseases of this region, is entirely different from that of the southern and more elevated district. Here bilious and bowel complaints are very common, and *intermittent* and *remittent* fevers are endemic. In the early settlement of Chitteningo flats, they prevailed annually, sweeping off immense numbers of the early settlers; but since the lands have been generally and well cultivated, these diseases have very greatly diminished." As an example of the prevalence of fevers in this county, in some years, Dr. Foord says, that "in 1819, hot, sultry weather commenced in the early part of June, soon after the spring freshets, and these diseases commenced in that month, and prevailed extensively, till the latter part of September, during which period but very few of the population escaped attacks of more or less severity. Many instances occurred of whole families being simultaneously attacked with the various grades of the disease, from the mildest intermittent to the most malignant form of remittent or continued fever."[1] To these observations might be added many others, furnished by Dr. Foord, in his very valuable paper on the medical topography of Madison County.

Broome County, which lies on the southern border of the western region of the State, has nothing in its topography or meteorology which is favorable, over any wide extent, to the development of malarious fevers. Dr. N. S. Davis, in his medical and topographical sketches of Binghampton, a village at the confluence of the Susquehanna and Chenango rivers, and of the surrounding country, says: "The ground on which the village stands is agreeably uneven, but mostly occupied by two extensive plains—one, called the Chenango level, rises abruptly from the river at low water about

[1] Trans. of the Med. Soc. of the State of New York, vol. ii. p. 30, 1835.

fifteen feet."—"The other rises equally abrupt from the water in the Susquehanna to the height of twenty-five or thirty feet, spreads out into a beautiful and gently ascending plain, and is destined to contain much the larger share of the village population. The low lands, which border the two rivers just mentioned for several miles above their junction, vary in width from a few rods to a mile, and are highly cultivated. These lands are in many places almost always overflowed in the spring and autumn. The adjacent elevated country is undulating and hilly." "Back from the rivers, a large portion of the country is uncultivated, being still covered with its primitive forests of beech, birch, maple, oak, and chestnut; but these regions are being settled very rapidly. There are no large ponds or lakes, and but few small ones, and those few arise from springs, with constant outlets, which render them pure and unproductive of disease. There are no marshes of any considerable extent, and the water generally is good, containing only a slight trace of sulphate of lime." In regard to the prevalence of disease, Dr. Davis remarks that, owing to the want of complete records, he can only approximate to accurate results, and that there is nothing in Binghampton and its vicinity which is comparable with the periodical fevers of some other localities. He thinks the influence of soil over disease is well illustrated by contrasting the fevers which occur in these parts with those of a tract of ground bordering a small stream about fifteen miles distant. "In the first location," he says, "the soil, as we have already mentioned, is light and gravelly, allowing the water to pass through it with the utmost freedom, while in the latter it is much more moist, with a clayey or argillaceous substratum. In the former, severe gastric and bilious fevers are rare, but in the latter they often prevail to a limited extent, and in some seasons are very fatal."[1]

Concurrent with these statements, in regard to the occurrence of periodical fevers in Broome County, are the observations of Dr. French. "Intermittent and remittent fevers," he says, "were very common in this country in its early settlement, since which time they have scarcely been known. Only two years have occurred in which cases of intermittents have shown themselves in the northern part of this county, during the last quarter of a century. In the one instance, cases to the number of half a dozen occurred in the immediate vicinity of a mill, the dam of which had been torn away by the spring freshets. In the other instance, the water

[1] Trans. of the Med. Soc. of the State of New York, vol. v. p. 294, 1843.

was shut off from a mill-race, and the debris thrown out from its bottom for the purpose of deepening its channel. In this instance, a dozen or more cases occurred, together with a few cases of remittent or bilious fever. These cases constitute the sum total of all the cases of intermittent fever, which have occurred within the above specified time, except such as have been introduced from other localities."[1]

The county of Cortland, though generally healthy and exempt from periodical fevers, is occasionally visited by epidemics, which are probably partly, if not entirely, due to the influence of malaria. The most formidable of these is dysentery. This disease was extensively epidemic in the county in the summer and autumn of 1849. Dr. H. P. Eels reports that "the season was dry—without rain from the first of July to the last of September or first of October. The weather, particularly in August, was excessively warm, with a marked disparity between the temperature of the day and night." The country within the circle of his practice is rolling and hilly, the valleys narrow, and the soil underlaid by hard-pan, and there are no large rivers, ponds, or marshes. "The locality of the disease was chiefly in the valleys, in the vicinity of small streams; and in the evening there would be seen a low, creeping fog extending along these streams, rising, with a sharply defined outline, to the height of from three to five feet from the ground, and in which might frequently be detected the odor of the muddy bottoms of the streams. The same, too, might be seen in the vicinity of moist spots apart from the streams. The presence of a marked and pervading epidemic influence was evident, however, through the whole community—perhaps quite as strongly in those who did not, as in those who did, succumb to it." Observations relating to the same epidemic are recorded by Drs. Hyde, Smith, Woodward, Bradford, and Green.[2]

Taken as a whole, the southern frontier territory, from Delaware County on the east to Chautauque County on the west, is, in its geological conformation and climatology, favorable to health. Malarious epidemics are rare, and such as do occur are limited in their prevalence. Dr. A. Willard, of Greene, Chenango County, to whom was assigned by the State Medical Society the duty of preparing an account of such epidemics as had prevailed during the year 1854

[1] Trans. of the Med. Assoc. of Southern Central New York, 1857, pp. 35 and 36.
[2] Trans. of the Med. Assoc. of Southern Central New York, 1850.

in the district comprising the counties of Chenango, Broome, Tioga, Tompkins, Chemung, Alleghany, Steuben, and Cattaraugus, reports that, in order to accomplish his end, he addressed a circular to many of the physicians living in the district, asking information in relation to such epidemics as may have come under their observation; and he tells us, that to his circular he received very few answers; and that in the few he did receive, it was stated that no epidemics had occurred during the preceding year. To this fact, Dr. Willard imputes the silence of those who returned no answer to his circular. He thinks the few communications he received show, pretty conclusively, "that the 'southern tier' of counties has been quite free from diseases of an epidemic character for a long period of time." In respect to Binghampton, Broome County, he states, in the language of a report from Dr. George Burr, that, "as a locality, this place and the surrounding section of country appear to be entirely free from the prevalence of epidemic disease." "Fevers, mostly of a bilious remittent character, occasionally occur, but they are not characterized by great severity, and seldom prove fatal." His further remarks concerning Broome County are so accordant with what we have cited from the medical and topographical sketches of Binghampton and its vicinity, by Dr. Davis, that it would be superfluous to repeat them. Dr. Willard expresses his indebtedness to Dr. T. H. Squier, of Elmira, Chemung County, for communicating the fact that no epidemic of importance had occurred in that place since 1849, excepting the dysentery, and also to Dr. Woodward, of Big Flats, of the same county, for an answer to his circular, in which, however, nothing appears to show that periodical fevers are ever epidemic in that county. A fuller account of the diseases of Chemung County is given by Dr. W., in the *Transactions of the Medical Association of Southern Central New York*, 1850.

Of Chenango County, Dr. Willard remarks, that "it has the reputation of being a healthy district, and its geological and topographical character would go far to give countenance to the opinion. The surface of the country is hilly, but not mountainous. It is well watered by the Unadilla and Susquehanna Rivers, which form its eastern boundary; by the Chenango, which passes somewhat diagonally through the heart of the county; by the Geneganslette, and many smaller streams. The valleys are deep, beautiful, and fertile; the hills are susceptible of cultivation to their very summits; there are no malarious swamps and marshes to poison and contaminate

the air with their noxious exhalations; the water is very pure, and living springs are abundant. The underlying rocks are mostly sandstone and slaty shales, and are classed by the State geologists in the Hamilton, Portage, Ithaca, Chemung, and Catskill groups."[1]

Though Dr. Willard failed in his inquiries, to obtain any information of the diseases of Tompkins and Tioga counties, while performing the duty assigned him by the State Medical Society, in 1854, yet we are not without a knowledge of many interesting facts, accumulated previously, respecting them. In 1836, Dr. William Bacon read before the State Society a report on the medical topography of Tompkins County. He describes the surface of the country as extremely diversified; in the south are hills, sterile, abrupt, and elevated, and intersected with narrow valleys; in the centre is a wide valley, and in the west, north, and east, the land is rolling. The southern extremity of Cayuga Lake extends into the county about ten or fifteen miles. The greater part of the county is occupied, beneath a covering of soil and drift, by the Portage and Chemung group, consisting of strata of slate, and compact shale, and argillaceous sandstone, including beds of gypsum, and strata of limestone. "The only morass, bog, or swamp," says Dr. Bacon, "of any considerable extent, is in the Ithaca valley," and "the diseases which prevail principally in the spring and latter autumnal months, are rheumatism, peripneumonies, and other pulmonic affections; in the summer and early fall months, synochus, typhus, and intermittent fevers, dysenteries, and other diseases of the intestinal exhalant tissue."[2]

Dr. Bacon has also enriched the *Transactions* of the State Medical Society with a communication on the medical topography of the adjacent county of Tioga.[3] He describes the surface of the country as broken into hills and valleys, with the Susquehanna running through the southern part of it. "The valleys," he says, "are deep and the hills are rugged and heavily covered with timber, except occasional spots, where it is removed by the hardy yeoman; giving the whole face of the country a gloomy, sombre, and forbidding appearance, without the sublimity or grandeur of a mountainous, or the cheering aspect of a fertile champaign country." The Chemung River touches the county on its southwest corner. "The Owego, Catetant, Pipe, and Cayuta creeks, take their rise in the

[1] Trans. of the N. Y. State Med. Society, 1855.

[2] Trans. of the Med. Soc. of the State of New York, vol. iii. 1837, p. 25.

[3] Ibid., vol. iii. p. 151.

north part of the county, and in the adjoining counties of Tompkins and Chemung, and run nearly in a southerly direction, discharging their waters into the Susquehanna River, and forming the before mentioned valleys. They flow neither rapidly nor sluggishly, but there is a gradual descent of their beds of about ten feet to the mile. The Wappesena Creek rises in the State of Pennsylvania, and running a northerly course falls into the Susquehanna, in the town of Nichols. There is a marsh or swamp, in the town of Spencer, of something more than a mile in diameter, which is a prolific generator of malaria, and is the only one of any importance in the county; near it are two small ponds, forming the head of the western branch of the Catetant Creek. It contains no lakes or canals, neither are there any large tracts covered with water in rainy seasons." The diseases most prevalent in the county, are those affecting the nutritive and respiratory organs, rheumatism, fevers, and convulsions. "The fevers," says Dr. Bacon, "and affections of the alimentary canal prevail from June till October. Some of the inhabitants within the influence of the malaria of the before mentioned swamp in Spencer, are annually affected with agues, synochus and typhus fevers, from spring till winter."

"In the valley of the Catetant, where I have observed diseases for a quarter of a century, I have noted that synochal and typhus fevers have *extensively prevailed* only in a few particular seasons; while in some of the intermediate years there has been only an occasional case, and other entire years without a single case originating in the valley." To these interesting observations on the diseases of Tioga County, by Dr. Bacon, may be added, that they are for the most part accordant with those of Dr. H. N. Eastman, of Owego, in that county, published in the *Transactions* of the Medical Association of Southern Central New York, in 1850.

In the view which has now been taken of the malarious sources of fever in the western region, or that of the high table land of Western New York, we have been compelled to pass by unnoticed several of the counties which occupy, or partly occupy, that region. This omission has arisen from necessity, there being no materials within our reach with which we could complete this branch of our inquiry. The counties which we leave unexplored are those of Delaware, Steuben, Alleghany, Cattaraugus, and Chautauque, and a few others. A paper by Dr. Noah Niles, giving a history of the county of Steuben and its diseases, was read by Dr. Rodgers before

the Medical Society of the State, in 1815, but we regret to say that we have not met with a copy of it; and if there be other memoirs relating to the medical topography and epidemics of the other counties above mentioned, they have not fallen in the way of our researches.

4. Of the Periodical Fevers of the Region of the Great Lakes.

In again adverting to the formation of this part of the State, it is sufficient to say, that its lithological basis consists, first, of the Ontario division of the New York system, viz., the Medina sandstone, and the Clinton and Niagara groups, the latter including shale and limestone, and secondly, of the Helderberg series, embracing the Onondaga salt group, and various limestones. These groups, covered with a rich soil, and diluvium, in some parts of great depth, form an extended belt which rises from Lake Ontario by low terraces till it merges in the high table lands at the south. The country is interspersed with lakes, and is intersected by the Genesee, and several other rivers and small streams. Of those who have given a general description of the topography and diseases of this region, there are none, known to us, who have been more elaborate in their inquiries than Drs. Alexander Coventry and Edward G. Ludlow. The former of these gentlemen has graphically sketched the outlines of this part of the State. "The tract called the Genesee or Lake country," says he, "may be said to extend from the foot of the Alleghany spurs, or dividing ridge, to the shores of Lake Ontario, and may be said to be a gently inclined plane, facing the north, with some slight elevation on its surface. The levelness of the country may be estimated from its moderate elevation above the water, the sluggish movement of the streams that discharge into the lakes, by the few rapids on the Seneca River, the immense marshes on that stream, said to contain many thousand acres, and by the route of the Erie Canal, which might have been carried on the same level from Utica to Lockport, above two hundred miles. This tract lies between latitude 42° and 43°.50, above eighty miles in width from north to south, and two hundred miles from east to west. The centre of this tract is about three hundred and fifty miles from the sea, and about four hundred feet above tide water, where the canal passes. It abounds with marshes at the head; while along the outlet of most of the lakes

there are swampy lands; wherever a bay extends inland from the large lake, you find low lands."[1]

In regard to the temperature and quantity of rain, in the lake or Genesee country, it will be seen by a reference to the foregoing meteorological tables, that there is a wide range of temperature, the maximum being nearly equal to that of the most southern part of the State; but that the amount of rain is much below that in the maritime region. In the former region the annual mean quantity, as observed at different stations, varies from 22 to 38 inches, whilst in the latter the annual mean quantity varies in different places from 42 to 54 inches. This last number represents the quantity at West Point, a locality which is, or is near, the centre of the hyperhyetal district of the State; whilst the first, of the former low numbers, represents the quantity in the lake region; and this quantity being the extreme opposite of that of West Point, constitutes that region, as has already been shown, the western hypohyetal district of the State. But though the annual mean quantity of rain is comparatively small in the Genesee country, it is observable that the quantity is much greater in summer than in winter. The summers may be rather dry, but the showers of rain which occur, attended with thunder, are usually copious.

In this circumspective view of the lake region is recognized that combination of geological and meteorological conditions which is especially favorable to the production of intermittent and remittent fevers. Such is the view taken of the subject by Dr. Coventry. This gentleman has shown that this part of the State was more prolific of malarious fever in the earlier years of its settlement, than it has been in later times, the difference arising from causes not perhaps difficult to assign. He tells us that while residing near the outlet of Seneca Lake, in 1792, he left his family on the 1st of July in good health; and that on his return on the 17th of the same month, he found thirteen of the fourteen inmates sick in bed with fever.[2] He also informs us that "during the autumnal months, from the year 1792 to 1795, inclusive, the proportion of the sick to the well was, according to the population, much greater in the Genesee country than in either of the large cities, even in those seasons when malignant fever was most prevalent." Whilst residing in the lake country he says: "I frequently remarked

[1] Trans. of the Medical Society of the State of New York, 1859, p. 345.

[2] Trans. of the N. Y. State Med. Soc., 1859.

the effects of rains; if much water fell, the ponds near the lakes were kept full, and the lowlands in their vicinity continued healthy; but superabundant moisture assisted the decay of the leaves which covered the surface of the uplands, and fevers prevailed at a distance from the waters." Of the sanitary effect of removing the forest of a malarious country, he says: "The Genesee country is in proof, and perhaps still more so the country in which I now reside." (Utica.) "Few of the first settlers escaped a seasoning; when I first became acquainted with that district, endemic disease was rife; now, agues and dysenteries have almost disappeared from the valley; yet few drains are cut; and the removal of the forest is almost the only change." "When Oneida was first settled, agues, remittents, dysenteries, and other endemic diseases, were common. We may now vie with any section of the Union, or perhaps of the universe, for exemption from these maladies." Few countries can boast of having had during the period of their transition from the primeval state—of forest, marsh and bog to that of clear grounds, drained lands and cultivated fields, a medical topographer more learned and enterprising than the late Dr. Coventry.

Dr. Edward G. Ludlow has written an able and interesting Statistical and Medical Account of the Genesee Country.[1] He tells us that "*Genesee* is an Indian term, signifying pleasant valley, given to the country near the river of the same name. Its bounds are not very clearly defined, being sometimes extended to all that part of the State of New York lying west of Utica: but more generally restricted to that portion west of a meridian, passing through the northwest corner of Seneca Lake." To fix more definitely the geographical limits within which our inquiries are restricted, we would observe, that it is to that portion of territory west of Utica, north of the ridge of elevated land which divides the waters flowing to the north and to the south, and which forms, as already stated, the region of the great lakes, that our citations from Dr. Ludlow's paper will exclusively apply. After naming the numerous lakes and rivers of this part of the State, and describing the swamps and marshes, as those of Tonnewanto, Cayuga, Onondaga, Sullivan, Newton, Catharines, Braddock's, and Iroudequot bays, and after alluding to the geological structure of the country and its meteorological phenomena, he gives a history of the epidemic diseases from the year 1801 to 1823. Among these, periodical fevers take the

[1] See New York Medical and Physical Journal, vol. ii. 1823.

lead. He says that "the intermittents of this country naturally arrange themselves under two heads: intermittents with ague; and intermittents without ague, or, as they are termed, *dumb agues*. Some authors notice many varieties of this disease, classing them according to the organ or organs most particularly affected, or the diseases with which they may be complicated." "Tertians are more common in this country than quotidians, although the latter are also frequent. Double tertians are not uncommon—quartans are met with occasionally. As to septans and octans, I have seen the fever return at these intervals, but believe that they are in general mere irregularities in the recurrence of the paroxysms."

"Intermittents commence in March, and continue generally until the middle of July, when they are succeeded by remittents. Sometimes, however, intermittents predominate during the summer, the patients becoming pale, yellowish, and emaciated. In the months of September and October they again become prevalent; unless, however complicated with visceral obstruction, they are suspended by the approach of cold weather, but usually return for a short time in the spring, especially if the course of the disease has been interrupted by remedies, in which case they will certainly recur, unless these are continued."

Dr. Ludlow adverts to the well known fact that there are "three stages in the settlement of a country. The first when it is in a state of nature; second, when partly cultivated; third, when entirely so," and in reference to the mixture of salt water and fresh water, he thinks that the mingling of the former with the water of marshes does not increase the malignancy of intermittent fevers. He says: "The result of my observations made at the villages of Salina and Montezuma, where this combination takes place, is, that it depends entirely on the proportions in which the waters are mixed. If the waters of fresh marshes are largely combined with salt water, or *vice versa*, the general healthiness of the situation will be improved."

"Both at Salina and Montezuma, the proportion of salt water furnished by the springs is small, when compared with the great quantity with which the fresh waters of Onondaga and Cayuga lakes dilute it. Both of these places, although proverbially unhealthy, are not more so than similar situations where fresh water is uncombined. Exceptions are, however, to be made to those places where the waters mingle in a concentrated form. Thus, at Montezuma, the inhabitants of those houses in the immediate

vicinity of the salt spring, are never free from intermittent and remittent fevers. Every family that moves into them is attacked, while those who live at a short distance, although adjacent to the marsh, are comparatively exempt;" and he adds that "it is a singular fact that the boilers of salt are generally free from these fevers."

Dr. Ludlow also informs us that he has known the first several paroxysms of a tertian ushered in by colic or cholera, and a quotidian attended throughout the paroxysm with subsultus tendinum. He further tells us that the *dumb ague* is generally of the quotidian type; commences in March; continues till the middle of June; reappears in September; and is arrested by cold. That the remittent fevers of the country appear about the middle of July; prevail till the end of October, and then either disappear or end in intermittents or dysentery.

To what has been said we may add, that there is much interesting information relating to the medical topography of Onondaga County, in a report by Drs. Sing, Clary, Hanchett, Davis and Hoyt, communicated to the State Medical Society in 1835.[1] This county occupies a central position in Western New York; its southern part lying in the region of the high table-lands, and its northern in the lake region; or, in other words, the ridge which divides these two regions passes through it, as it does through several others of the western central counties. In the report referred to, there are notices of many of the general facts mentioned by Drs. Coventry and Ludlow, and of some others not adverted to by these observers. It is said in the report, that "within the last few years, the character of diseases prevailing in the lower districts, has undergone a material change; all these affections of these sections are more of an inflammatory type than formerly. However, these parts of the county are still subject to the intermittent and remittent fevers.' In regard to the prevalence of these diseases, we are told that "the most extended epidemic occurred in 1828; it prevailed over the whole range of low lands bordering on the great lakes, and appeared in every variety of grade from the mildest to the most stubborn and malignant affection; and undoubtedly resulting from animal and vegetable decomposition. In July of that year, immense quantities of rain descended upon the marshes and low lands, so that the valleys and morasses were completely deluged with water;

[1] Trans. of N. Y. State Med. Society, vol. ii.

the ensuing weather was extremely hot and dry, and with this state of things the epidemic commenced its ravages. In the course of the disease there was generally some visceral determination, either to the liver, bowels, lungs or brain, though generally the former."

East of the southern part of Herkimer, is Montgomery County, of the medical topography of which, Dr. Joseph White has given us an interesting description in the Transactions of the Medical Society of the State for 1850. Through this county passes, from west to east, the Mohawk River, and also several of its tributaries, which flow from the north and the south.

"The surface of the county is diversified," says Dr. White, "rising abruptly from the level of the streams to a height of from two to six hundred feet. This feature is particularly prominent at the Nose on the Mohawk and its vicinity. When once the common elevation—about four hundred feet—is attained, the surface is undulating, approaching hilly. The general direction of the hills is nearly east and west, and they have mostly a rich clay soil based upon slate or lime rock, which appears to underlie the whole county. There are no swamps of magnitude, and what few there are might easily be drained. The waste land of the county is but little, and that caused chiefly by the outcropping of lime-rock, which occasionally presents ridges that appear to have been elevated by some internal force, presenting a precipitous front from ten to twenty feet in height, generally facing the northeast."

The value of Dr. White's paper is enhanced by his account of the effect produced by the construction of the Erie Canal upon the salubrity of that part of the county through which it passes. He tells us that, "while the country was new and the land being cleared, bilious fevers were prevalent, with the addition of agues along the river. As the country became cultivated, the bilious fevers gave place to pneumonia and typhoid diseases in the elevated portions; agues disappeared in the valley, but bilious fevers continued predominant in those localities in summer and autumn."

"This brief general history brings us to the period of constructing the Erie Canal, about 1820 and upwards. During the progress of that work, and for some years after, agues again occurred in the valley; bilious fevers were more prevalent and severe. The portions bordering upon the valley were tinctured with the same influences, while the remote parts were not at all affected by those causes. After a few years, the agues gradually abated, and almost wholly disappeared until 1839, when the enlargement of the Erie

Canal commenced. Large quantities of the alluvium of the flats were thrown up during the heat of the summer, and were followed by a very prevalent and high grade of bilious fever in the autumn. Agues recurred again the following season, and continue to the present time, accompanied with functional derangements of the liver in most instances, and in a few cases with organic disease of that organ of a serious character. This is more especially the case since the admission of water into the enlarged canal, through the section west of us. The water in the canal is now of a darker color than formerly, which is attributed by boatmen to the additional quantity of water which comes from Oneida swamp and other low grounds between Utica and Syracuse. What influence this state of things has upon the diseases of this vicinity, I am not prepared positively to say; for they may vary in character and severity in different seasons, and that, too, without any change in the physical features of the county, or even of any locality, that can reasonably be supposed to influence them. But one thing is certain, since the use of the enlarged canal in this section and west of here, the diseases of this vicinity have been of a much higher grade, and more difficult to cure than they were previously."

"The first summer and autumn following the use of the enlarged canal, bilious and typhoid fevers were prevalent along the Mohawk valley and parts adjacent, and attended with more than ordinary prostration of strength; and, in quite a number of instances, colliquative hemorrhage supervened, proving fatal in a few cases, although a great majority recovered under the use of brandy, opium, ice, and the mineral acids, with strict attention to rest."

The preceding observations on the topography and malarious fevers of the lake region are, it is believed, applicable to the counties not heretofore named, viz: Seneca, Ontario, Livingston, Wayne, Munroe, Orleans, Genesee, Niagara, Erie, and a few others. Moreover, the same general remarks will apply to the low tract of country into which the lake region opens, namely, the valley of the Mohawk River, a stream which, with the Erie Canal, takes its course through the counties of Oneida, Herkimer, Montgomery, and Schenectady. The alluvions spread out in that extensive country, like the soil of the lake region, annually afford malarious exhalations.

A passage or two from an interesting communication addressed to Dr. Coventry by Dr. Willoughby, of Fairfield, Herkimer County, in 1824, will illustrate the former malarious character of the district in question. "Since my residence in and near this place (thirty-

two years), I have had various opportunities of observing and investigating the cause of endemic fever. It prevailed in certain neighborhoods in the years 1792 and 1793, and again in the summer and autumn of 1796, and in the winter and spring of 1797."

"But the most distressing and widely diffused state of fever prevailed in this country in the spring, summer, and autumn of 1803. Emphatically may it be said of that year, that the 'mourners went about the streets.'"

"I do not recollect a single year since I have been a physician that I have not witnessed sporadic cases of fever, originating from some local filthiness. But we have not had anything like a spreading state of fever since 1803; and probably we shall not again witness such a scene. The cause cannot again exist, to wit: the decomposition of vast bodies of vegetable matter; for, independent of the foliage of the forest, and the luxuriant growth of vegetables from the woodlands that were in a decaying state in the spring of 1803, may be added the decomposition (in every field) of stumps, old log-heaps, *girdled* and felled trees. These pestiferous bodies being acted upon, in the spring of 1803, by more than an ordinary share of vernal heat and moisture, readily account for the prevailing fever. The forest having been subdued by the axe of the industrious farmer, the stumps and decaying trees having disappeared, and the fields annually clothed with verdant crops, while our district of country being elevated and airy, with no sluggish streams, no stagnant ponds, or marshy grounds to annoy our borders, we have an exemption from the most prolific source of febrile excitants."[1]

5. Periodical Fevers of the Northern Region of the State.

In regard to the northern region of the State, it may be said, that much of the central and eastern part of it is yet a wilderness; and such are the masses of primitive rock which form its extensive mountain ranges, that it is probable it will never become as densely populated as the other parts of the State. Its rise from the Mohawk valley, Lake Champlain, and Lake Ontario, is abrupt, whilst from the St. Lawrence River, it is, for the most part, gradual, forming an extensive slope. The table land of the central parts has an altitude of from 1500 to 1700 feet, and its mountains, as we have shown before, are the highest in the State, some of them ex-

[1] New York Medical and Physical Journal, vol. iv. p. 205.

ceeding 5,000 feet. In this region are numerous small lakes, and the sources of the Hudson and various other rivers. Of the valleys, the most remarkable is that of the Black River, which has a depth of from 700 to 800 feet. Throughout this extensive tract of country, the summer temperature is sufficiently elevated to favor the generation of malaria. But, excepting the bottom lands, which border the eastern end of Lake Ontario, the St. Lawrence, Lake Champlain, and the larger rivers, there are few localities, especially in the counties of Essex, Hamilton, Franklin, Clinton, and St. Lawrence, which are productive of malarious epidemics. Among the more noticeable of the localities which are so, are those mentioned in the Statistical Report of Sickness and Mortality in the Army of the United States, prepared by Dr. Coolidge, under the direction of the Surgeon General, U. S. A. Speaking of Madison Barracks at Sackett's Harbor, Assistant Surgeon Thomas Henderson says, that "the grounds around the garrison are so level that they cannot be perfectly drained. The soil is dark, with much clay, and rests on a stratum of limestone, which is from one to three feet below the surface. The nature of the soil, and this superficial calcareous stratum, keep the immediate vicinity of the post, even after ordinary rains, boggy, and favoring terraqueous exhalation." There are, however, no marshes in the vicinity of the barracks. Fevers, however, not unfrequently prevail at this military post. It did so especially in 1839, a circumstance which surgeon Henderson thinks was not remarkable, seeing that in several localities not far from the post similar and severer visitations of fever appeared; and he adds, "Sackett's Harbor village has had more fever than has been known for twenty years. In the neighboring farming country, places usually healthy have suffered from fatal malarial sickness. In a little village on the St. Lawrence (Cape Vincent), not far from the post, there were at one time twenty-three cases of fever. At Hammond, and at Lisbon, places about a day's journey from Madison Barracks, and places heretofore healthy, sickness was very severe."

Taking into view the entire territory of the northern region of the State, it may be said to be almost entirely exempt from malarious diseases. In this respect it assimilates with the northeastern States, which, as is generally known, enjoy a remarkable immunity from periodical fevers. To this interesting and important fact, Dr. Bartlett adverts in his work, on the Fevers of the United States in the following terms: "The only considerable portion of the vast

and various territory, now occupied by the United States, which is quite exempt from malarious fever, is to be found in its extreme northeastern corner, constituted by the five New England States, and a large part of the State of New York. From nearly the whole of this region, periodical fever has almost entirely disappeared. That it was sufficiently common here for a long period after the settlement of the country, has been clearly shown by the very careful and thorough inquiries of Dr. S. W. Holmes, contained in his prize essay upon this subject."

In the survey which has now been made of the districts and localities in the State of New York, in which periodical fevers prevail, it will be observed that the topographical and meteorological conditions in which they occur are, for the most part, the same as those in which they prevail in the more southern latitudes. It is, however, noticeable that the intermittents and remittents, in this State, are less disposed to assume a pernicious or congestive form; and what is no less noteworthy, the malaria does not so generally induce visceral enlargements, nor that sallow hue of the countenance and cachectic condition of the system so frequently observed in southern miasmatic countries. Individuals, however, who suffer from ague in this State, are not entirely exempt from these malarious affections. In the sketch we have given of the periodical fevers which are due to malaria, there would be a notable defect were we not to notice one of the more common and severer forms which those diseases sometimes assume. We refer to dysentery. Though frequently occurring in situations where malaria does not exist, it is usually prevalent in the summer and autumn in miasmatic localities, where intermittents and remittents are rife, and of which it may be justly regarded as a modification. These diseases, occurring contemporaneously in the same locality, and being convertible into one another, are manifestly produced by the same efficient or malarious cause. Now, the source from which fever, whether originating from malaria or any other cause, derives its dysenteric form, is manifestly a peculiar variety of atmospheric influence, or what we denominate *epidemic meteoration*, an influence which, varying in its properties in different years, varies the diathesis and phases of popular diseases.

It would be useless to recount the numerous rural districts in which dysentery occasionally appears epidemically in the State of New York. In every county where miasmata occur, cases of the dis-

ease frequently and sometimes extensively prevail promiscuously with cases of intermittent and remittent fevers. This fact is specially noticed by the contributors to the literature of the medical topography and endemics of the State. Were it necessary to illustrate this remark by examples, it would be sufficient to refer to the reports and essays from which we have so liberally quoted, and without which our inquiries would have proved abortive.

The preceding observations are naturally suggestive of questions of the highest public interest; questions concerning the best modes of extinguishing the sources of *koino-miasma*, and of rendering productive, malarious grounds hitherto untillable. That much may be done to accomplish these ends is undeniable; and hence it cannot be supposed that an enlightened commonwealth would fail to look upon such objects as among the first to which its attention should be directed.

Though it is not our purpose to dilate on this subject, yet we feel constrained to drop a remark or two in relation to it. As much is done for improving the sanitary condition of cities by sewerage, surface grading and paving, so much may be done for correcting the insalubrity of rural localities and districts by ditch and canal draining, filling low places with earth, and cultivating the soil. There are numerous examples in the State of New York in which these means have proved eminently successful in the extinction of malarious diseases. A striking instance of this sort is the one cited in a former page from Dr. Lee's paper on the diseases of Saratoga County.

To render drainage effective in exterminating malarious diseases, the work should be thoroughly done. It is true, a partial drainage may lessen the area from which miasmata are exhaled; but it is also true, that in some instances it may produce the opposite effect. These different results depend upon different topographical conditions. Where the surface and situation of a marsh or bottom admit of the water being entirely drawn off by ditching, a degree of desiccation of the soil may be produced which is unfavorable to the generation of malaria. But where, on the contrary, the ground is uneven, and there are many shallow pools or depressed boggy places, saturated with water, the process of draining often increases the evil it is intended to correct. This result necessarily follows in cases, where the drainage reduces a larger surface to a condition fitted to exhale the marsh poison, than that which it renders incapable of doing so. To such dangers cities and villages are ex-

posed in attempting to reclaim marshes in their neighborhood, which do not admit of being perfectly drained, and also in cases where the work, though achievable, is but partially accomplished. A remarkable example showing the calamitous consequences of defective drainage, is related as occurring at Bordeaux, after attempting to reclaim the marsh of Chartreux, near that city. It is said that a "succession of bad fevers, before unknown, commenced immediately on the drainage, showing themselves first in that part of the town which lay nearest to the land reformed, and lasting through many years, proving so fatal in 1805, that 12,000 people were affected, out of whom 3,000 died in five months."[1]

In concluding our researches concerning the periodical fevers of New York, we cannot forbear expressing the conviction which has been strengthened at every advance made in surveying the malarious localities which so extensively checker the territory of the State, that very many of these might, by a right system of drainage, be brought into a condition incompatible with the generation of the endemic cause of fever. That such a change could be effected, to a great extent, under the direction of a State sanitary commission, and a corps of engineers provided with ample funds for the purpose; and that such an outlay would be more than repaid, directly by the general improvement and security of the public health, and, indirectly, by adding to the vital force employed in enhancing the wealth of the State, there is no reasonable doubt.

The forms of fever to which our attention has hitherto been directed are those arising from the milder species of *koino-miasma*. It must now be observed that there is another form of febrile disease of a highly pestilential character, which occasionally appears in the State, and which is manifestly the product of another and more virulent species of that generic poison, viz:—

Yellow Fever.

Though much difference of opinion formerly existed in relation to the nature and cause of yellow fever, it is now generally admitted by the highest medical and sanitary authorities on this side of the Atlantic that the *materies morbi* of the disease is a specific malignant *koino-miasmatic* poison, and consequently that the disease in its nature is *sui generis*. This view of yellow fever is directly opposed

[1] Maccullock on Malaria, page 56.

to the once popular doctrine that the distemper was due to a contagious principle, generated within the living human body, and communicable from one individual to another.[1]

In glancing over the literature of this pestilence, it will be found that the following are the leading facts in its epidemic history; 1st, that it occurs annually, as an epidemic, in certain insular and maritime continental situations within the tropics; 2dly, that it appears occasionally without the tropics, on the eastern shores of America, and on the western shores of Africa and Europe; 3d, that the frequency of its occurrence in these latter and distant countries, varies with the latitude, the higher the latitude generally the rarer its appearance, up to about the forty-third parallel, beyond which it seldom shows itself. In its northern extension, on this side of the Atlantic, it has appeared from time to time as an epidemic in the port of New York; but never excepting under a peculiar epidemic influence, and in seasons in which the sensible meteorological phenomena have been of a tropical character. Though it may be said to be definitively settled that the poison of the disease is not a specific contagious principle engendered within and emanating from the human body, but a virulent terrene miasm, it is by no means equally settled, whether the miasm in extratropical countries, as in most of our Atlantic States and in southwestern Europe, is always indigenous, or always exotic; or, whether in these countries the poisonous miasm is not in some instances imported, and in others of local or domestic origin? In regard to these questions medical minds are at present divided; nor is it probable they will soon be united. It would be in no degree consistent with our present design to engage in an elaborate critical examination of the conflicting opinions on the subject. Instead, therefore, of discussing mooted points, we shall merely advert to the visitations and ravages of the disease within the city of New York and those parts of Richmond and Kings counties embraced within the limits of the metropolitan precincts. It must be observed, however, that it is admitted by all parties, that the cause of the disease is transportable, in certain conditions and limitations, from one country to another, and that its occurrence at the quarantine station and on the adjacent shores of the bay of New York, is referable to infected ships recently arrived from the West Indies, or sickly ports on the southern coast.

[1] See Proceedings and Debates of the Third National Quarantine and Sanitary Convention, 1859.

It is only when the disease has prevailed *epidemically*, for several months, within the metropolis, and that, too, when there have been no infected vessels continuously moored at the piers, that the question of domestic or foreign origin has been agitated.

The first yellow fever epidemic in the city of New York of which we have any authentic account, occurred in, or about 1751.[1] Many, it is said, died of the disease. It appeared again in 1762, and then not until after a lapse of thirty-one years, viz., in 1791. It prevailed also moderately in 1793. But the first great outbreak of the disease occurred in 1795; an interesting account of which was given by Dr. Richard Bailey. The question of its origin, whether domestic or foreign, was warmly contested. It reappeared in 1798, and again ravaged the city. The number of deaths was 2084, or 1110 men, 589 women, and 885 children. The etiology of the disease was again the subject of dispute. A few cases occurred in Old Slip in 1799; and in 1803 there were 1639 cases reported, of which 606 died. It commenced in Coffee House Slip. In 1804, 708 died of the disease; and in 1805, 600 cases were reported to the Board of Health. There were a few cases in 1809: and the next appearance of the disease was in 1813. It again occurred in 1819, in and about Old Slip; 63 cases were reported, of which 43 died. The last epidemic prevalence of the disease in this city was in 1822. It commenced at the foot of Rector Street, on the 10th of July, and slowly and gradually spread from that point for several weeks over the greater portion of that part of the city south of Fulton Street. All this section of the city was for the most part vacated by the inhabitants, a circumstance which consequently vastly abridged the ravages of the disease. The area of the infected district was progressively enlarged without the agency of persons actually suffering from the disease. In the same season the yellow fever broke out in Cheapside Street near Catharine Street, and extending to Lombardy, Bancker, Henry, and Cherry Streets, thus forming another or second infected district, but of more limited extent than the first, owing no doubt to its development at a later period of the season. This locality was also vacated by the population. The number of cases in the two infected districts was 411, and the number of deaths 240.

Here, it will be observed, is a period of more than seventy years

[1] See Report of a Special Committee of the House of Assembly of the State of New York, on the present Quarantine Laws, 1846, p. 6.

in which yellow fever has prevailed in this city more or less extensively fourteen times, the deaths varying in different years from a few to upwards of two thousand. Now, without aiming to establish any etiological fact, we deem it proper to state, that out of the multitude of cases which have occurred in this metropolis, or in its environs, not a single one can be specified and authenticated as arising from a specific virus emanating from the bodies of the sick. In the few instances which have been set forth as resulting from personal contagion, there is good reason to believe that the distemper was not yellow fever, or if so, that it was induced by exposure to the miasm of the disease, either at its source, or to materials imbrued with it, and removed from its source.

It would be superfluous to enumerate the instances in which the yellow fever poison has been brought from southern ports to the quarantine station, and thence diffused to the neighboring shores of Staten Island, Bay Ridge on Long Island, and Governor's Island. Nor would it be worth the time to mention the examples of the introduction of the disease into Brooklyn and the navy yard. Few or no summers pass in which vessels infected with the yellow fever poison do not arrive at the port of New York; and it is only by the detention of such vessels at the quarantine station, that the shores of the city are shielded from invasions of the disease. That a system of quarantine is necessary for the protection of the emporium of our country from yellow fever, no one can for a moment hesitate to affirm; but that the system now in operation is defective and oppressive, in some of its provisions, must be obvious to every one acquainted with its details, and with the present state of sanitary science.

2d. *Of Idio-Miasmatic or Typhus Fever and Typhoid Fever.*—The most common and best characterized *idio-miasmatic* disease is *typhus fever*, which is generally regarded as a disorder *sui generis*. But there are fevers arising from very different causes, which in their latter stages resemble, and in fact partake, more or less, of the nature and symptomatology of that disease, and which for that reason are distinguished by the epithet *typhoid*. It is observable, however, that in the use of the terms *typhus* and *typhoid* there is much confusion. The term typhus is sometimes employed to designate not only the disease induced by breathing *idio-miasma*, but also the *low states* of fever, from whatever causes produced,

whilst the term *typhoid* is used in two senses, first, to designate a febrile disorder attended with *dothinenterite*, rose-colored spots on the skin, meteorism, diarrhœa, &c.; and secondly, to indicate an adynamic condition of the system, which various diseases sometimes assume in their advanced stages. Now the truth is, genuine typhus and the morbid conditions of other fevers which resemble it, are due to a similar *zymosis* or *toxæmia*, and hence they are similar in their symptomatology. The chief differences between these disorders are, for the most part, due to the different modes in which the system is brought under the influence of the febrific or toxical principle. Thus some cases of fever originate directly from the *breathing* of *idio-miasma*, and such cases properly receive the name of *typhus* or *primary typhus;* whereas those pathological states which arise in the latter stages of other pyretic disorders, and which assume the character of typhus, result either from, first, the action of a noxious principle engendered in the blood, a principle which is similar in its poisonous property to *idio-miasma;* or, secondly, from the absorption of such a principle, generated in the semi-putrescent discharges of the patient, or in some offensive deposit, or disorganized tissue, in some part of the body. These are the forms of disease properly denominated *typhoid*, and which may not inappropriately be called secondary typhus.

In this view of the subject, it is seen that the several conditions of fever, induced by the introduction of idio-miasma into the blood by breathing, and by the poison spontaneously generated in the system in low fevers, are virtually identical. In like manner it is seen, that malignant puerperal fever, hospital erysipelas and hospital gangrene are modifications of typhus. These various forms of disease constitute a group of cognate affections which are as nearly the same, as are the affections which form the group of koino-miasmatic fevers, such as the various types of intermittent and remittent fevers and dysentery.

Moreover such are the changes which occur in the system in typhus, that the exhalations from the lungs and skin of those suffering from the disease, if closely confined, are readily converted into the aerial poison *idio-miasma;* and the same is true of the matters transpired from patients in the low or typhoid stage of fevers originating from various causes; and hence it is, that a fever not primarily typhus, may become the source of *idio-miasma* and thus propagate that disease.

Now, though the typhus poison is not diffused, in an active

form, in the general atmosphere, but is confined to private dwellings, hospitals, jails, ships and similar inclosures, yet its occurrence is so common in some years that it may be said to prevail epidemically. In this form it occasionally appears in the city of New York, arising not unfrequently from the poison engendered and imported in crowded emigrant ships, and also in the filthy habitations of the poor. There have, indeed, been several periods in the past half century, in which the influence of a peculiar epidemic meteoration has been especially favorable to the prevalence of typhus in the city of New York. Such was the case in 1818, 1825, 1827, 1828, 1837, 1846, 1847, and especially in the last of these years.[1]

An instance of jail fever, *typhus carcerum*, the legitimate result of *idio-miasma*, occurred at the penitentiary connected with the Bellevue Almshouse, in the city of New York, in March and April, 1825, and afforded the writer an opportunity to study the disease under all its aspects. The building was exceedingly defective in its architectural arrangements for prison purposes, and also in its general hygienic economy. Some prisoners were confined in solitary cells, but the greater number in a few large rooms. The number of convicts cannot at this time be accurately ascertained, but it was probably not less than two hundred, a number which greatly overcrowded the apartments. The pestiferous quality of the air of the prison was demonstrated not only by its effects upon the incarcerated inmates, but upon the doorkeepers and medical attendants. These latter being prostrated by attacks of the disease, the writer and his friend Dr. Isaac Wood were appointed by a committee of the Common Council to take the temporary charge of the medical and hygienic management of the prison. That the poison of typhus should be generated in the condition in which the prison was found, was not surprising. What could otherwise occur where there was not only negligence in, but to some extent an impossibility of so cleansing and ventilating the building as to render it wholesome? If we estimate, as the writer has shown may be done in a report made to this association in 1850,[2] the amount of effete matter exhaled from the lungs and skin from a given number of individuals in given times, it will be

[1] See Report on Practical Medicine by the writer in the Transactions of the American Medical Association, vol i.

[2] See Transactions of the American Medical Association, vol. iii. p. 223, 1850.

seen to what result a lack of ventilation and cleanliness in the prison in question would lead. The amount of pulmonary and cutaneous exhalations from 200 adult persons, in one day, is 666 lbs. 8 oz.; in one month or 30 days, 20,000 lbs.; and in one year or 365 days, 243,333 lbs. 4 oz.; of which the quantity of animal matter is, in the first period, 8 lbs. 4oz.; in the second, 250 lbs., and in the third, 3041 lbs. 8 oz. Now, if in such circumstances, cleanliness and ventilation be not observed, the poison of typhus will, almost necessarily, under a favoring epidemic influence, be engendered. Such was the case in the instance in question. The attendance of the writer and his colleague commenced on the 17th of April, and terminated on the 18th of May. On surrendering their charge, they say, in their report to the Committee from whom they received their commission, that "agreeably to the advice given by that Committee, the sick and all the men in good health, except those in the new cells, were removed to the new and spacious fever hospital. The advantages of this removal, embracing the benefits of cleanliness and free ventilation, were soon discernible; the disease assumed a milder character, and the favorable effects of medicine were immediately apparent. The number of cases of fever at the commencement of our visits was thirty six. The number increased daily for two or three weeks, owing to the strong predisposition to disease induced in the convicts by their previous exposure to the pestiferous atmosphere of the penitentiary. The small number of females first affected, and the apartments of this class of convicts being in a better condition than those occupied by the men, seemed to render it unnecessary to remove them; but as new cases continued to occur, it was thought proper, about the 1st inst., to remove them also to the fever hospital. By this measure the prison, excepting a few of the solitary cells, was entirely vacated, the doors and windows of the whole building were then thrown open and the house thoroughly cleansed and purified. The disease has now entirely disappeared, and the convicts are for the most part unusually healthy." The whole number of sick treated during the month was 61, of which there were of white men 35, black men 14, white women 7, black women 5. Of this number only five died, a result more favorable than was anticipated, and which was undoubtedly due to the new hygienic circumstances in which the patients were placed.

The cases of primary or genuine typhus, usually met with in rural districts, have their origin from two sources: 1st, from the

idio-miasma emanating from patients laboring under that disease, who are new-comers, as emigrants, and who contracted the disease in infected ships, hospitals, or other places; and, 2dly, from the exhalations from patients, residents of the locality, whose disease sprung from common causes, but which, in its progress, assumed an adynamic form. Such cases are sometimes the *de novo* sources of typhus epidemics. An example of this kind is recorded by Dr. Charles A. Lee, of Peekskill, New York;[1] an example which happily illustrates the manner in which the *idio-miasmatic* poison is generated and diffused in country situations. In his account of the epidemic, Dr. Lee says that "no one can doubt, on reading the history of these cases, that the disease was typhoid fever, in a majority of cases, of a mild type; in others, of a very malignant form. In all, some fifty cases have occurred during the last three months, scattered over a thinly peopled district of several miles in extent. Of this number, but two proved fatal. All the cases could be traced to one single source, a sporadic case, originating under circumstances likely to give rise to idio-miasmatic infection. The disease originated in Yorktown, but a majority of the cases occurred in the adjoining town of Somers, Westchester County, N. Y.; all, however, traceable to the original case." After a narration of the first case, by Dr. Curry, of Yorktown, we are told that there shot off from it, "in perfectly straight lines, thirty others, bearing each idio-syncratic symptoms, but of the same general type. The residence of the young man whose case I have referred to, stands upon the highest hill in Yorktown, two story, no basement, rooms small, no ventilation in the apartments occupied by him, except from the south; family large, two or three sleeping in a bed; no squalor, no fastidious neatness." Among the cases collected by Dr. Lee, are several of peculiar interest, described by the attending physician, Dr. James Fountain, of Jefferson Valley. Of the origin of the fever, he says it "seems to have been generated in my neighborhood, in a family, in a situation calculated to engender idio-miasmatic agents. It was an idio-miasmatic fever."

Dr. Lee, in his analysis of the epidemic, remarks that, "with the exception of the first case, which, we have seen, originated from exposure to extreme cold, fatigue, and perhaps unsuitable food, all the others, it is believed, can be traced to contagion (*idio-miasma*). In a few cases, the patients had been a good deal worn down by

[1] See the American Journal of the Medical Sciences, Oct. 1859.

watching, fatigue, and anxiety; but others who watched but a single night were also attacked, and, in one case, soon after washing the clothes of a fever patient. The severity of the disease in every instance, when not aggravated by treatment, seemed to be in a good measure proportionate to the degree of exposure in the sick room. Those but slightly exposed were but slightly affected, and *vice versâ*."

"All the cases which have occurred since the first case, fifty odd in number, may be distinctly traced to personal infection; and no sporadic case, since the first, has occurred, where the individual has not been thus exposed. Of fourteen persons who watched with Wm. S. Tompkins, brother of the patient who first sickened, seven took the disease. Where great attention was paid to changing frequently the bed and body linen, cleansing the patient's body and limbs daily, and free ventilation, no other member of the family, nor any who watched with the sick, were subsequently attacked;[1] but where these were neglected, nearly every inmate was seized, and about half who stayed for any length of time in the sick-room." In a postscript to his account of the epidemic, Dr. Lee states that the cases were scattered over a district six or eight miles square, and that "it commenced in the coldest weather in January (1859), and on the highest hill in this region of country, where, even in summer, no local causes of fever exist—the locality being in all respects most healthy." And further, he thinks that "this epidemic goes to sustain the conclusion—now very generally adopted —that typhoid fever, though it may originate sporadically, from ordinary causes, yet may be propagated by idio-miasmatic effluvia, or personal infection."

An instance, similar to that just related, of typhus being diffused epidemically from a single case, in a rural population, is recorded in the able annual address delivered before the Medical Society of the State of New York, in 1843, by Dr. William Taylor, as communicated to him by Dr. Stearns, of Pompey, one of the most elevated towns in the county of Onondaga. "The first case of typhus

[1] "An exception to this has occurred since the above was written. A Mr. C. went safely through the disease, the fever running about twenty days; and though the greatest attention was paid to ventilation and cleanliness, the bed and body linen being changed daily, the wife and daughter, who had nursed the patient throughout, took the disease, from which they have not yet entirely recovered (August 1, 1859)."

which prevailed in this town in 1829 and 1830," says Dr. S., "occurred in the month of October. A young man, who had resided for some time in the State of Ohio, returned sick with the usual symptoms of typhus fever. The family in which he had resided had permitted water and vegetables, which had been frozen, to remain in the cellar until late in the spring, and which had become very offensive. Soon after the stagnant water and filth were removed, five of the family fell sick of a malignant fever, some of whom died. From these the disease spread, and from eighty to a hundred cases occurred. The young man alluded to, feeling the premonitory symptoms, left Ohio and was enabled to reach his friends in this town, where he died in five days after his arrival. Two young men who had attended him were soon after taken sick with the same kind of fever, one of whom died; the other, after a long and severe sickness, recovered. These cases I did not see. The first that occurred under my immediate observation and care, was a young lady who had nursed a friend sick with the fever, and soon after her return home was attacked with the usual symptoms. In ten or twelve days, four or five other members of the family were taken sick, the symptoms varying only in degree. Two young ladies who were visiting this family, one of whom resided in the town of Onondaga, and the other in the town of Nelson, after remaining a short time, returned to their respective houses, and in ten or twelve days—the usual time after exposure for the effect to be produced—both were taken sick with the typhus fever. Thus I might trace every case that occurred to its source, which in all amounted to seventy or eighty, and not an individual, to my knowledge, had the fever who had not been exposed to the contagion, and almost every person who was among the sick became more or less affected."

In discoursing on typhoid fever, Dr. Taylor remarks that, "as the disease made its appearance in a section of the country usually healthy, and no local causes were known to exist which could satisfactorily be assigned as the origin of the fever, it is proper to presume some common atmospheric origin. The fevers which formerly prevailed to some extent in this location were usually of a remittent and intermittent character. But, from changes in the face of the country, these have chiefly disappeared, and, for the last ten or twelve years, fevers have assumed more of a continued form, varying from an inflammatory to a typhus type, perhaps commonly more nearly resembling the synochus of Cullen, and with a mani-

fest increasing tendency to lesions of the mucous membrane of the intestinal tube."[1]

Numerous other examples of febrile disorder having the typical characters of typhus or typhoid fever, are described by practitioners residing in different parts of the State. In most instances, the cases are of that form which occurs in the low advanced stage of periodical fever, and of fevers from other ordinary causes; and what is worthy of special notice, common fevers are more disposed to assume that form in some districts than in others. Dr. Ludlow in his paper on the diseases of Genesee County, before referred to, speaks of "*Remittents terminating in Typhus*," "A few cases of this description," he says, "occur every summer, in particular sections of the country, in some instances terminating fatally in six or seven days, with highly aggravated symptoms; while, again, their duration is much longer." Dr. Coventry, in his observations on endemic fever, delivered as the annual address before the Medical Society of the State in 1825, says that, "during a residence of five years in the lake country, I have no recollection of a case of fever that assumed the typhoid type."

But typhus and its modification typhoid fever, occur not only in countries in which periodical fevers prevail, but also in districts in which there is an almost entire absence of the sources of periodical fever. Thus, Otsego County, an elevated and eminently agricultural district, has ever been, we are told by Dr. Sprague, remarkably exempt from intermittent and remittent fevers. "Common continued fevers, however," he says, "prevail to a considerable extent, assuming, for the most part, the synochus grade, and usually terminating in from fourteen to twenty-one days in convalescence. It has been noticed, however, that for the last eight or ten years they have been gradually assuming a graver form, and during the past and present year, many cases have occurred which have exhibited all the symptoms of typhoid fever, as described by our best authors."[2]

In Broome County, where intermittent and remittent fevers were once very common, and where they are now scarcely known, these diseases have been replaced by fevers of a continued type, which are said by Dr. French to be "purely typhus in some cases, typhoid in others."[3] It is also said by Dr. White, of Montgomery County, that,

[1] See Transactions of the New York State Medical Society, vol. v.

[2] Trans. N. Y. State Med. Soc., 1848, p. 97.

[3] Transactions of the Medical Associations of Southern Central New York, 1857.

"as the country became cultivated, bilious fevers gave place to pneumonia and *typhoid* diseases in the elevated portions."[1]

It would be useless to multiply examples to elucidate the circumstances in which typhus and the typhoid conditions of fever occur in the State of New York. The foregoing illustrations are fully sufficient for the purpose. The truth is, the circumstances in which these affections prevail in one part, are the same as those in which they prevail in other parts of the commonwealth. The facts that typhus fever is propagated from one individual to another in country situations, and that periodical fevers become less frequent, or extinct, in rural districts, as typhoid fevers become more prevalent, have engaged the attention of practitioners in every part of the Union. Why these phenomena should be so, are matters of curious and interesting inquiry. A few remarks on this topic may not perhaps be inopportune. And first, in regard to the diffusion of typhus by *idio-miasma.*

The importance of cleanliness and ventilation of the apartment occupied by a single typhus, or typhoid fever patient, in order to avoid the propagation of the disease by idio-miasma, will perhaps be more forcibly impressed on the mind, by estimating the quantity of effete matter eliminated from his lungs and skin in the course of his disease. Allowing, as we have done in illustrating this subject on another occasion, the quantity to be 40 oz. per diem, and supposing the duration of the disease to be twenty days, there will emanate from the body, in that time, 800 oz., or 66 lbs. 8 oz. But it is probable that the matter exhaled in the first few days from a case of primary typhus, or of a periodical fever assuming a typhoid form, is not that which renders the air, surrounding the patient, noxious to the attendants, but that it is the vitiated effluvium emanating from the patient in the advanced states of the disease which does so, and which, by stagnation in the apartment, is transformed into idio-miasma. In this mode, as we have before repeatedly shown, typhus originates from typhus; and may also originate from any other kind of adynamic fever, in confined places, whether in town or country, in low or elevated regions, and in every season of the year, though more frequently in winter than in summer, owing to the free ventilation of houses in the former than in the latter season.

Now, the simplest form of typhus is that which arises from idio-miasma, uninfluenced by any other external or zymotic agent. In

[1] Trans. N. Y. State Med. Soc., 1850, p. 156.

that form it occurs in situations remote from malarious localities, in elevated, hilly, and mountainous districts. But it is observable that typhus is usually more or less modified or changed from its normal type, by various causes, and consequently assumes a diversity of forms. Such variations in the character of the disease not unfrequently occur in malarious countries, where the natural course of the disorder is modified to a degree which gives a new phase to the malady, analogous to that given to a remittent fever by the toxical principle or typhus poison sometimes generated in the system in the advanced stage of that disease.

In this view of the subject, we are enabled to explain why it is, that in miasmatic localities, typhus, in its purest form, is not as frequently seen as it is in countries where there is no malaria, and, also, how it is we are led to recognize a combination of the typhus poison with malaria as equivalent to a distinct source of fever, and to distinguish it by a generic denomination.

3d. *Of Idio-Koino-Miasmatic or Compound Fever.*—So long as typhus is but slightly modified by *koino-miasma*, ~~or, in other words,~~ and so long as a periodical fever is but slightly modified by *idio-miasma*, the departure of these diseases from their simple form will not be so considerable as to render their differential diagnosis difficult; but when the two miasms are blended in certain proportions they occasion a fever of a compound character, or one in which the phenomena exhibit evidence of the joint action of the two miasms in question. A fever of this description is specially mentioned by Pringle who regards it as a disorder *compounded* of *bilious* and *jail fever*, and as one "*not thoroughly known.*" He refers also, to a disease called *Morbus Hungaricus*, described by Sennertus, which he thinks was a *compound* of *bilious* and *hospital fevers.* The literature of fever exhibits so many evidences of the two poisons, named by Dr. Edward Miller, *koino miasma* and *idio-miasma*, combining and producing a distinctive form of disease, that the writer felt himself justified, many years since, in uniting them in one word, viz., *idio-koino-miasma.*

Though there are many cases of remittent fever in which may readily be discerned the influence of idio-miasma in modifying the disease, yet it is rare to see a case of remittent fever so altered in its character by that poison as to warrant the calling it a compound fever. There are, however, occasionally, examples of fever so strik-

ingly peculiar in their pathological phenomena, that they cannot fail to be referred by the most superficial observer, to the agency of *idio-koino miasma*. A notable example of this kind occurred in the city of New York, in 1820, and was known by the name of the Bancker Street fever. There was so much novelty in the special character of the disease, that many physicians, equally skilled in the diagnosis of fevers, essentially differed in opinion in regard to its nature, one party believing it to be a malignant form of typhus fever, or, as they called it, bilious typhus, while the other party identified it with yellow fever. But neither of these opinions could be sustained by the facts. On carefully investigating the circumstances in which the disease originated, there was left no room to doubt that it sprungfrom the compound poison idio-koino-miasma. A description of the disease with a full account of the topography and condition of Bancker Street and its vicinity, was prepared and published by a committee of the Medical Society of the city and county of New York, and by Dr. Richard Pennell, in his Inaugural Essay, in 1820.

"As to the causes, the Committee state that the population, in the sickly quarter of Bancker Street, amounted to 1566; and further, that in August there were residing on 30 lots in this street, 234 families, consisting in all of 1096 individuals; and that of this number 842 resided on 20 lots, 542 on 10 lots, 144 on two lots, and 81 on one lot. In Lombardy Street, one small lot is said to have been occupied by 24 families. Other parts of this district were also extremely crowded. The Committee correctly observe that 'living in *crowded* dwellings in the vicinity of putrefying *vegetable* and *animal matter*, will inevitably dispose to malignant fever; and such causes and similar circumstances have existed in Bancker Street and its vicinity.' From the middle of August to the end of October, the number of deaths in this district was about 150." The disease was more fatal to the black than to the white population of the infected district.

III. OF THE METEORATIOUS EPIDEMICS OF NEW YORK.

Of the epidemics of this class, the more remarkable are the influenza, typhoid pneumonia, diphtheria, erysipelas, and Asiatic cholera. These diseases range more or less extensively over the face of the earth, and in their migratory movements occasionally visit the State of New York.

In studying the natural history of these diseases, we are led to refer them to certain insensible and insalutary qualities of the general atmosphere, and hence we denominate them Meteoratious Epidemics. Being traceable, as we have already shown, to the same primary source as the contagious exanthematous epidemics, there is of course an intimate relationship between these two classes of distempers. But though referable to a common origin, each epidemic is marked by peculiar phenomena. In the strictly *contagious* epidemics, the great majority of cases spring immediately from specific poisons, generated in primary or atmospheric cases, and communicable from one individual to another; whereas in meteoratious epidemics, excepting in one or two of them, every case is of atmospheric *origin;* and, in the exceptionable instances, as in the cholera, which is believed to possess a contagious attribute, the great *majority* of cases manifestly arise, not from the diffusion of its contagious virus, but from the existing meteoratious influence. Of the nature and sources of the epidemic influences of the atmosphere, we are entirely ignorant. Nor is this a suitable occasion to speculate in regard to them. It is here sufficient to remark, that they are doubtless dependent upon some spontaneous change occurring in the air, or upon some extraneous principle diffused through it. The primary causes of the epidemics in question, in some instances, require, in order to produce disease, the aid of accessory agencies, a circumstance in which they, for the most part, differ from contagious epidemics. These general facts will be illustrated in the following notice of the diseases above mentioned as they have prevailed in the State of New York.

1. Influenza.

In no disease, perhaps, are the characters of a meteoratious epidemic better defined than in influenza, or, as the disease is otherwise called, epidemic catarrh. Its sudden appearance, and rapid diffusion, its migratory movements, and irregular periodical occurrence, or, in other language, its rise, progress, decline, and cessation, show how widely it differs from ordinary contagious and infectious diseases. With these peculiarities the disease has several times, in its career over the earth in the present century, been developed in the State of New York. Its occurrence has been irrespective of the seasons of the year, and also of every variety of the sensible qualities of the atmosphere. Its mode of invasion and general behavior are well

illustrated in a description given of the disease as it prevailed in the northern and eastern parts of the United States, and more particularly in the city of New York, in the autumn of 1815, by the late Dr. Ansel W. Ives.[1] At what place the disease was primarily developed is unknown. But we are told that "on the 29th and 30th of September, many persons in the city of New York were attacked with what was then supposed to be a severe catarrh, and some were so violently affected, that their disease was mistaken for cynanche trachealis. On the 2d of October, the number of cases was multiplied to such an extent, and that too without any assignable cause, that physicians began to forebode, what was soon after realized, the universal prevalence of an *epidemic influenza*. It now appeared suddenly in every part of the city, and on the 15th, it was estimated that it affected not less than twenty thousand persons. I have been informed by physicians from different parts of the country, that it appeared in Quebec, Montreal, and Kingston, about the 1st of October; in Vermont and in the northern parts of New York, between the 10th and 15th; in Boston on the 1st; in the southern seaports of Massachusetts and in Rhode Island, a week later; in the southern and south eastern parts of Connecticut, between the 10th and the 15th; in Philadelphia, about the 15th; in Pittsburg, the 12th: in Muskingum, Ohio, the 15th of November; and in Chillicothe, the 20th. In the southern states, it varied in the time of its commencement, from the first of November to the middle of December."

"In the northern and middle States, it was at its greatest height in one month from its first appearance; and in two months, it had almost entirely disappeared."

It is said that the disease was most severe towards the termination of the epidemic, and that secondary attacks were not unfrequent and more severe than the primary, that the disorder assumed a decided febrile character, with more than ordinary disturbance of the nervous system, such as erratic pains, exquisite sensibility to alterations of temperature, sometimes loss of smell and loss of voice without much soreness or swelling of the throat, and in a few cases paralysis of the lower extremities. To these symptoms were sometimes added inflammatory developments in the respiratory organs under the various forms of coryza, laryngitis, trachitis, bronchitis, and pneumonia, and occasionally an exanthematous eruption. It

[1] Trans. of the Physico-Medical Society of New York, vol. i. 1817.

is further said that "the functions of the abdominal viscera and urinary organs were unimpaired," and that the disease continued with an evident exacerbation toward evening for four or five days, when the inflammation and slight fever began to subside; and in eight or ten days the disease usually terminated in a copious discharge of a thick mucus from the lungs. In the therapeutical management of the disease but little in general was required beyond the expectant treatment. The chief attention was directed to the relief of the inflammatory affection of the respiratory organs. The mortality in the city of New York was but slightly increased by the epidemic and its sequelæ.

Of the later invasions of the State of New York by the influenza, that of the year 1843 was remarkable for the simultaneousness of its outbreak in different and distant places. It commenced at the Military Academy at West Point about the first of June, and ended about the first of July. It first appeared at Fort Columbus, in the harbor of New York, on the 11th of June; at Buffalo Barracks, Erie County, on the 20th of that month; and about the same time, at Fort Niagara, Niagara County; at Fort Ontario, Oswego County; and at Madison Barracks, Jefferson County.[1] All the intermediate parts of the State also suffered by the disease. Dr. Lee says, that in Saratoga County scarcely an individual escaped;[2] and Dr. Forry, in speaking of the same epidemic, says that "it is here in the city of New York, as cities always abound in the exciting causes of epidemics, that the disease seems to have its strong hold. The population appears, indeed, to have experienced an almost universal attack, neither age, sex, nor any condition in life being exempt from its invasion."[3] Dr. N. S. Davis describes the disease as it occurred at Binghampton, Broome County, at which place it made its appearance about the first of May, and continued to increase in extent until the middle of June. From this time it declined and ceased to prevail about the first of August. Dr. D. divides the prevalence of the epidemic into three periods, in each of which the disease was characterized by some peculiar symptoms. The first period extended from the first of May to the middle of June; the second, from the middle of June to the middle of July, and the third, from the middle of July to the first of August. He

[1] See Statistical Report of the Sickness and Mortality of the Army of the U. S., &c., 1856.

[2] Trans. of the Medical Society of the State of New York, 1859, p. 233.

[3] New York Journal of Medicine and the Collateral Sciences, July, 1843.

further states, that "the duration of the attacks was from three days to three weeks."[1]

So few were the deaths from the influenza of 1843, in its simple form, that the disease could scarcely be regarded as a fatal one. According to Ozanam's estimate, made from an examination of all the records of epidemic catarrh, the mortality of those attacked is not less than two per cent. This was about the ratio in England, in the influenza of 1836–37. In relation to the question of fatality in the present epidemic, Dr. Forry remarks, that "one would not suppose, from a superficial view of the question, that the mortality in this city (New York), including all attacks, can possibly be higher than one per thousand cases; for, supposing two hundred thousand persons to have experienced the disease, it would require two hundred deaths to produce this per centum. The mortality of two per cent., doubtless, is derived from such cases only as came under medical treatment."[2]

In every instance in which the State of New York has been visited by the epidemic catarrh, the adjacent States and British Provinces have also suffered from the disease. Nor has the epidemic influence been confined to the land, but has extended many leagues off the northern Atlantic coast, as shown by the outbreak of the disease in ships approaching the American coast.

2. Pneumonia Typhodes.

This disease, in the form it has occurred epidemically in the State of New York, manifestly belongs to the class of maladies which owe their existence and prevalence to a peculiar variety of epidemic meteoration. Unlike the influenza, it is when developed, as a popular distemper, one of the most formidable and fatal pestilences. Its occurrence in the State of New York has afforded matter for some of the most interesting pages in the medical history of the commonwealth. It is, however, fortunately of rare occurrence, having scarcely shown itself as an epidemic but a few times in the last and present centuries.

The disease has been described under different denominations, as *malignant pleurisy*, *malignant epidemic*, *peripneumonia notha*, *peripneumonia typhodes*, and *epidemic pneumonia*. The earliest notice of

[1] N. Y. Journal of Medicine and the Collateral Sciences, Nov. 1843.
[2] Ibid., July, 1843, p. 73.

the disease in the State, is from the pen of one of the most eminent medical practitioners of the last century, namely, Dr. John Bard. His paper is entitled, "An Essay on the Nature and Cause of the Malignant Pleurisy, which proved so remarkably fatal to the inhabitants of Huntington, and some other places on Long Island, in the winter of 1749."[1] Dr. Bard gives the following description of the disease.

"The patient, in this malignant pleurisy, is first seized with a shivering or rigor, which is soon succeeded by a pain in his back and head, an early disposition to vomit, with great oppression and anxiety. Soon after the fever is formed, these appearances are followed with an acute pain in the breast and side, resembling peripneumonic symptoms, attended with a labored and painful respiration, a frequent cough, by which a crude, glazy, frothy spittle, lightly tinged with blood, is discharged; light deliriums, through the whole progress of the disease, not constant, but frequently returning; the tongue for the most part parched and dry; but the skin inclined to be moist and sweaty, which, if encouraged, the skin and coats of the eyes become extremely yellow; the blood appears rather dissolved and thin, than viscid; the pulse in most cases soft and frequent. This disease generally ends in the death or safety of the patient on the fifth day, sometimes on the third and fourth from the invasion of the distemper. In those that have died, it has been observable that, some hours before their death, they have recovered their senses, and appeared easy, but soon after have unexpectedly and suddenly expired. Most of these symptoms, together with the time it takes in going through its stages, are similar to the stationary fever, excepting the pain in the side, which appears to me to arise from the acrimony of the disease, which (in its simple state used to be thrown upon the stomach and bowels, producing violent pains, inflammation, and sometimes mortification of the parts) is by the present disposition of the air and season of the year, favoring the production of an epidemic pleurisy, determined upon the pleura and lungs, and produces its tragical effects upon these organs. It is further observable, that the disease is aggravated by the common method of treating an *essential pleurisy*, and is found to be relieved by sweating and diluting methods, which is a prevailing argument to consider it in this light, as that method was always found to be the most successful in curing the original fever;

[1] American Medical and Philosophical Register, vol. i. p. 409, 1811.

of which kind I suppose this to be, and the pain in the side and breast only accidental symptoms."

About sixty years after Dr. Bard's description of the malady was drawn up, and communicated to a society of gentlemen, in the city of New York, the disease reappeared in the State. It was first noticed in 1811, but its greatest prevalence was in 1812 and 1813. Its more malignant ravages were experienced in the northern and eastern parts of the State, though the central and southern parts were not exempt from its pestilential visitation. The disease, though chiefly characterized by its pneumonic phenomena, appears to have been epidemically allied to, or a modification of the malignant distemper so well known in New England by the name of spotted fever.[1] Besides destroying a multitude of the staid farmer population of the country, it cut off many of the American troops on the northern frontier during the last war with England. Among those who have enriched our medical literature with descriptions of the disease, the more worthy of notice are Drs. Mann, Low, Willoughby, Whitridge, Stearns, Yates, V. Mott, M. Smith, Hosack, Reynolds, and Hudson. Though essentially the same, the disease appears to have varied in some of its features and in its diathesis in different parts of the State. In describing the epidemic, as it appeared in Newtown, Long Island, Dr. Valentine Mott says, that "this disease attacked all ages and constitutions, and was mostly confined to those districts which were inhabited by the lower and more indigent classes; exceptions to this, however, now and then occur. It was ushered in, in all cases, by a very severe chill, which lasted for some time; this was followed by a great degree of heat, pain in the back, limbs, and head, and most intense pain in the chest; great difficulty of breathing, and in some instances the oppression was so great as to threaten immediate suffocation, with violent cough and expectoration of yellow matter, and generally very bloody. The secretion from the lungs, when not bloody, was so yellow as to stain linen on which it was received. The expectoration of blood was much greater than had usually been observed to take place in any peripneumonic affection. The pulse generally was small and frequent, and by no means tense; skin hot and dry; tongue white and moist; bowels more or less relaxed, with nausea, and in many

[1] See a Treatise on a Malignant Epidemic, commonly called Spotted Fever, &c., by Elisha North, 1811.

instances violent and repeated vomitings, attended from the commencement of the chill." Sometimes a profuse diarrhœa attended from the attack, and in such cases the chest was less affected.

Generally, says Dr. Mott, "after the lapse of one or two days, great prostration of strength would take place, without a comparative abatement in the oppression and distress at the breast; which continued, though in a lesser degree, accompanied with an augmentation of the pain in the head, heat of the skin, and other symptoms of ardent fever. At this time, frequently a considerable yellowness would be manifest in the eyes and face, and generally over the body; in some cases to as great a degree as was ever observed in the autumnal bilious remittent, or yellow fever of our cities. This bilious discoloration lasted through the whole course of the disease, and even during the convalescent state, which was generally very protracted and tedious."

The asthenic diathesis of the disease as it prevailed at Newtown, was shown by the extremely depressing effects of bloodletting upon the patient. Of venesection, Dr. Mott says: "Once was enough, and in some, it is feared, more than enough, even when only three or four ounces were taken. It is a fact, not a little remarkable, that even so small an evacuation from the bloodvessels, as last mentioned, would induce the most astonishing prostration, with small and feeble pulse, &c., convincing the physician, before he left the chamber, of his error; though the evacuation seldom failed to give temporary relief to the distressing affections of the chest."[1]

Dr. Matson Smith, of New Rochelle, Westchester County, in his communication to Dr. Hosack, relating to the disease, states that the first case that came under his care was on the 28th of March, 1812, and that from that time the disorder was epidemic until the following July; and further, that its epidemic character was illustrated in the fact that during its prevalence all other disorders were assimilated to its nature.

"No particular class of persons," says Dr. Smith, "appeared to be the subject of the disease; all ages were equally liable to its attack. In children, and some cases of adults, it bore a strong resemblance to croup. Persons of temperate and intemperate habits suffered indiscriminately; but it may be especially remarked that those persons who labored under the disease, that had long indulged in habits of ebriety, generally fell victims to its violence.

[1] American Medical and Philosophical Register, vol. iii. 1813.

The attack usually was sudden; the premonitory symptoms being chilliness, lassitude, and pain, more or less acute in some parts of the chest, head, or extremities. When the head was primarily affected with pain, the patient soon became delirious, and disposed to stupor; and as long as these symptoms continued violent, there was no pain of the chest; or if any, it was inconsiderable; but when the pain of the head or extremities abated, the chest became affected. This was observed in a great number of cases, and it was noticed, where the lungs were secondarily affected, that is, where the pain was translated to the chest from another part, its acuteness was greatly diminished, but the consequences were not less dangerous. To these symptoms followed a cough, which oftentimes exceedingly harassed the patient; and to this succeeded an expectoration of mucus, intimately blended with blood. In this particular, however, there was much variety, the matter expectorated being sometimes simple mucus, at others, unmixed florid blood, ~~consisting of~~ perfect hæmoptysis. It was not uncommon for patients, immediately after their attack, to complain of excessive prostration of strength, while, at the same time, they were able to walk their room with apparent ease. In the generality of cases respiration was not very laborious, particularly in those in which some other part than the chest was originally affected. In some cases, however, such were the oppression and pain about the chest, as to excite a distressing and powerful exertion to inspire, and to induce the patient to elevate the shoulders to increase the capacity of the chest and throw the head back in order to straiten the passage of the air to the lungs." To this it is added that as the disease advanced the face became flushed, and afterwards livid, a discoloration which extended more or less over the whole body, that the temperature was generally below rather than above the natural standard, and that the tongue was covered with a thin coat of brownish fur, which afterwards became darker, though it often became clean and a bright red color.

In regard to the treatment Dr. Smith observes that bloodletting, if had recourse to indiscriminately, seldom failed to produce pernicious consequences. "Where I found the pulse full, and sufficiently tense to warrant the use of the lancet, it was my practice to employ it, and, I believe, often with manifest advantage; but such was the typhoid tendency and debility induced by my first venesection, that a second was never thought safe." Usually the

violence of the disease abated by the fifth day or the patient died, or between that day and the ninth.[1]

Dr. Willoughby speaks of the typhoid pneumonia in the following terms. "We have an epidemic at this time prevailing, which has proved uncommonly mortal in this, as well as some of the neighboring counties. The complaint is somewhat peculiar; has by many been called spotted fever, by others peripneumony, peripneumony notha, malignant pleurisy, &c. &c. If I were to give it a name, I would call it *peripneumonia innominata;* for I am certain that the complaint, as it has appeared in this county, has no place in nosology; and those physicians who have been anxious to give the disease a name and prescribe accordingly, have too frequently lost their patients."[2]

Of the same import are the accounts of the disease in other parts of the State, and hence a notice of a few of them will suffice. The epidemic in its devastating course, in 1812, and 1813, visited the county of Onondaga, and many fell victims to its rage.[3] At the same time it was very prevalent and mortal in Saratoga County. "From the reports made, there were as many as 4000 cases in the county."[4] Dr. Mann, Surgeon U. S. A., writing in 1813, says, that "its attacks are made under the various forms of sthenic and asthenic diathesis, while those varieties of the disease mostly depend upon the habits established prior to the attacks. In many of the first cases, among the soldiers at Burlington, the disease proved fatal in a few days, in some instances within 24 hours."[5] An idea of the severity of the disease, in Madison County, may be formed from the statement of Dr. Foord, that "those only who participated in the public excitement on the approach of the cholera, in 1832, can justly appreciate the alarm produced by the epidemic of 1812 and '13."[6] Dr. Whitridge has embodied his observations of the epidemic, as it prevailed in the northern division of the Army of the United States, during the autumn of 1812, and winter of 1812 and '13, in an Essay addressed to Wm. E. Ross, M. D., Hospital Surgeon U. S. A.[7] Dr. W. first noticed the disease in December, 1812, at which time he was stationed at Burlington, where it pre-

[1] American Medical and Philosophical Register, vol. iii., 1813.
[2] Trans. of the N. Y. State Medical Society, 1859, p. 292.
[3] Ibid., vol. ii. p. 239.
[4] Ibid., vol. i. p. 346.
[5] American Medical and Philosophical Register, vol. iii. p. 498, 1813.
[6] Trans. of the N. Y. State Medical Society, vol. ii. p. 53.
[7] Trans. of the Physico-Medical Society of New York, 1817.

vailed in its most violent form, and proved destructive to the soldiers and general population. He tells us that the first seized were the soldiers of the army, that its ravages among them were more violent than among the citizens, a circumstance which he imputes to the fact that the army was mostly composed of recruits who were unaccustomed to the hardships of a military life. His general views of the disease are concurrent with those who had studied its pheuomena in various parts of the State.

In respect to the cause of this epidemic, there seems to have been but one opinion, all agreeing that it origiuated from a peculiar epidemic meteoration, or as it is expressed by Dr. Hosack, from an *epidemic constitution* of the air. The exciting causes of the malady, appear to have been the same as those of other acute inflammatory affections of the respiratory organs.

In its symptomatology and essential nature, the epidemic typhoid pneumonia of 1812 was readily recognized by those conversant with American medical literature, as a recurrence of the fatal distemper described by Dr. Bard, as prevailing at Newtown, Long Island, in 1749. Its prototype is well deliueated in many of the older writings on Epidemics. It is said by Dr. Hugh Williamson to have prevailed in North Carolina in 1792, and that it is known in the south, probably under some modification, by the name of *pleurisy in the head.*[1] In the records of the epidemic to which we have referred, are valuable contributions to our knowledge of the etiology and philosophy of meteoratious epidemics.

A disease resembling the epidemic just described, is occasionally observed in different parts of the State. Its leading features are those of pneumonia, and bilious remittent fever of an asthenic character, and hence has received the name of "*Pneumonia Biliosa* or *Typhoides.*" Though generally sporadic, it sometimes assumes an epidemic form. The phenomeua, however, in which it corresponds with those of the malignant epidemic of 1812, are not sufficient to identify it as essentially the same disease, though its prevalence seems manifestly due to an epidemic meteoratious influence. Au excellent account of the disease is given by Dr. John D. Watkins, of Sullivan County. "As an epidemic," he says, "its occurrence has been more frequent and extensive in our county, than any disease that I have encountered, in an experience of about thirty years; excepting, perhaps, the influenza, with which it not unfrequently simultaneously prevails. In March, 1832, between one and

[1] American Medical and Philosophical Register, vol. iii. p. 449, 1813.

two hundred cases came under my care, in one of the northern towns of the county. Since then, it has occurred epidemically several times, and every invasion of the disease has been somewhat diversified in the type of the attending fever. It should be regarded as a different and distinct disease from inflammation of the lungs, occurring sporadically, the consequence of exposure to cold, the attending fever of which is an effect of the inflammation, and of a *synochal* character."[1] The observations of Dr. W. on the symptoms, diagnosis, and treatment of the disease are especially interesting and instructive.

3. Diphtheria.

Besides the influenza and typhoid pneumonia, in which the mucous membrane of the bronchi and pulmonary vesicles are specially implicated, there are a few diseases in which the mucous membrane of other portions of the air-passages is particularly affected. The disorders to which we allude are grouped under the general head of angina or cynanche. Some of these affections are of a most formidable character; and especially those denominated *membranous croup*, *angina maligna* or *ulcerous sore throat*, *cynanche maligna*, *tonsillitis*, *angina suffocativa*, and *diphtheria* or *diphtherite*. How far the diseases thus denominated are the same, or different in their nature, is a question not satisfactorily settled; and the reason that it is not so, is, that they vary in their phases, and are often confounded with the anginose form of scarlet fever. Now, scarlet fever aside, the parts which are the seats of angina, are the tonsils, velum pendulum palati, posterior nares, fauces, larynx and trachea; and the special forms of lesion of the tegumentary tissues of these parts, are inflammation, swelling, ulceration, sloughing, œdema, and pseudo-membranous exudation. Some of these affections are primary, and some secondary, or in other words, some are local diseases, whilst others are connected with a constitutional disorder.

Now, as all the forms of angina may be divided into two classes, 1st, those which are developed independently of any general disorder of the system, and 2dly, those which have a constitutional or zymotic origin, it is important that the phenomena by which these classes may be distinguished should be definitely ascertained. It would be inconsistent with our purpose to attempt, at this time, to investigate the differential diagnosis of the affections in question. The point of inquiry now before us is, which of them have an

[1] Trans. of the N. Y. State Medical Society, 1859, p. 144.

epidemic character? It is in the decision of this question, we shall have the determination of another, viz., which of them are local, and which of them are due to a constitutional disorder? It is a universal fact that all the well known and acknowledged forms of epidemic distempers, whatever may be their local manifestations, are essentially constitutional or humoral diseases. Now, examined in the light of this fact, it will not be difficult to determine which of the throat disorders are local, and which are constitutional. Those of the latter kind disclose their true character, by appearing periodically and prevailing extensively, and that, too, so decidedly, as to leave no doubt as to their epidemic attribute. If we allow, therefore, the law or general fact, just stated, to guide us, we shall at once be led to the conclusion that tonsillitis, trachitis, laryngitis, as we see them daily occurring, are not entitled to a place among epidemics; they lack the element of a zymotic disease, and in regard to their prevalence, the most that can be said of them is, that they are, for the most part, always sporadic. Being topical phlegmasiæ, any disturbance of the system which attends them is secondary or symptomatic. And so, judged by the same law, we readily conclude that as the anginose affections called malignant or ulcerous sore throat, angina suffocativa and diphtheria occur epidemically, they are topical manifestations of a general or humoral disease, and therefore essentially different from the ordinary inflammations of the air-passages.

Now, the justness of this division of throat diseases, as deduced from their epidemic and non-epidemic characters, it is believed, is sustained by an analysis of their symptoms and anatomical characters. In assuming this to be true, the question arises whether the epidemic forms of angina are in their nature essentially one and the same or different maladies. However this may be, it is evident they are intimately allied to one another, and that with influenza and typhoid pneumonia, they constitute substantially the group of meteorations epidemics, the local complications of which are mostly confined to the mucous membrane of the respiratory organs.

Looking at diphtherite as the leading or type affection of the *epidemic* disorders of the throat, we cannot well avoid dropping a word or two in relation to its diagnosis. The disease, apart from scarlatina, with which it is most likely to be confounded, is croup. In drawing the line of distinction between these two diseases, the pathologist will first note the parts in which the affection begins,

and the mode in which it spreads. In ordinary croup the inflammation and plastic exudation commence in the larynx or trachea, and extends down to the bronchi and causes death by suffocation; whereas in diphtheria the inflammation usually begins in the tonsils, velum pendulum palati, posterior nares, or fauces, and spreads more or less over all these parts, and is followed by a pellicular deposit which adheres closely to the mucous membrane. In some cases the affection extends into the larynx and trachea, and causes death by obstructing the passage of air to the lungs. The false membrane in croup is confined to the larynx, trachea and larger bronchi, and differs in its consistence and structure from the pellicular exudation in diphtheria. Of the relation of this disease to scarlet fever we shall have occasion to speak hereafter.

But without extending these preliminary remarks, we proceed to observe that the literary history of diphtheritic angina, in the State of New York, has its epoch anterior to the American Revolution. The first accounts of the disease were from the pens of Dr. Jacob Ogden, of Long Island, and Dr. Samuel Bard, of the city of New York. The former gentleman describes the disease in two letters addressed to Mr. Hugh Gaine, of New York, one dated in October, 1769, and the other, in September, 1774, and which are preserved in the New York Medical Repository; and the latter, in an essay entitled, "An Inquiry into the Nature and Cause of the Angina Suffocativa, or Sore Throat Distemper, as it is commonly called by the inhabitants of the City and Colony of New York." This essay is published in the first volume of the Transactions of the American Philosophical Society, and has attracted great attention on both sides of the Atlantic.

In his discourse on the life and character of Dr. Bard, in 1821, the late Dr. Samuel L. Mitchell says, the disease described by that gentleman "has puzzled the physicians who have read his publication. For Cullen, the acute nosologist, places it in the list of works on the cynanche maligna; while Albers, the successful competitor for the Buonapartean Medal, quotes it as a treatise on cynanche trachealis. The former classes it with the writings on the malignant or ulcerous sore throat, while the latter ranks it with the publications on croup or trachealis infantum."[1] A careful perusal of

[1] See "An Historical Sketch of the State of Medicine in the American Colonies, from their first settlement to the period of the Revolution. By John B. Beck, M. D., &c."

Dr. B's essay, can scarcely fail, we think, to produce the conviction that the disease he describes is the diphtherite of Bretonneau. A few passages from his paper will show some of the more striking features, which indicate the identity of the two diseases.

"In general," says Dr. Bard, "this disease was confined to children under ten years old, though some few grown persons, particularly women (while it prevailed), had symptoms very similar to it. Most of those who had it were observed to droop for several days before they were confined. And the first symptoms, in almost every case, were a slightly inflamed and watery eye, a bloated and livid countenance, with a few red eruptions here and there upon the face, and in one case a small ulcer in the nose, whence oozed an ichor so sharp as to inflame and erode the upper lip. At the same time, or very soon after, such as could speak complained of an uneasy sensation in the throat, but without any great soreness or pain. Upon examining it, the tonsils appeared swelled and slightly inflamed, with a few white specks upon them, which, in some, increased so as to cover them all over with one general slough; but this, although a frequent symptom, did not invariably attend the disease; and some had all the other symptoms without it. The breath was either no ways offensive, or had only that kind of smell which is occasioned by worms; and the swallowing was very little if at all impaired." With these symptoms was a slight fever which sometimes continued five or six days, and also in some, a difficulty of breathing which occasionally suddenly increased, threatening suffocation.

"This stage of the disease was attended with a very great and sudden prostration of strength; a very remarkable hollow dry cough, and a peculiar change in the tone of the voice; not easily described, but so singular, that a person who had once heard it, could almost certainly know the disease again by hearing the patient cough or speak. In some the voice was almost entirely lost, and would continue very weak and low for several weeks after recovery." In some the pulse was quick, soft, and fluttering, and there was a tendency to coma, and towards the close of the disease great restlessness, languor, and dejection expressed in the countenance, subsidence of the swelling of the face, sometimes a purging, and the patient died apparently of suffocation at the end of the third or fourth day, and occasionally within thirty-six hours. Cases occurred which "had not the difficulty of breathing, but in its stead very troublesome ulcers behind their ears. These began with a

few red pimples, which soon ran together, itched violently, and discharged a great deal of very sharp ichor, so as to erode the neighboring parts, and in a few days spread all over the back part of the ear, and down upon the neck." In some, however, in which there were ulcers behind the ears, there was a slight difficulty of breathing. "These ulcers would continue for several weeks and appeared covered in some places with sloughs, resembling those on the tonsils."[1]

Dr. Bard met with but two cases in adults. One resembled an inflammatory angina, but on the third day the tonsils were covered with thick sloughs; he had a low and feeble pulse, a moist skin, dejection of spirits, but no great difficulty of breathing. In the other case the tonsils were swelled and covered with sloughs, similar to those in children, the breath was more offensive but the breathing not suffocative.

In three instances Dr. Bard had an opportunity of studying the pathological anatomy of the disease by dissection. "One was a child of three years old. Her first complaint was an uneasiness in her throat. Upon examining it the tonsils appeared swelled and inflamed, with large white sloughs upon them, the edges of which were remarkably more red than the other parts of the throat. She had no great soreness in her throat, and could swallow with

[1] In using the term *slough* to denote the material spread over the throat, it is obvious that Dr. Bard supposed that material to be the mucous membrane in a state of disorganization or gangrene, whereas the truth undoubtedly is, that it was the exudation of diphtheria. Bretonneau tells us twenty-two autopsies were successively made, with the view of ascertaining whether the exudations in the pharynx were eschars or not, and to be assured if the tissues which they covered preserved their integrity. "In no case," he says, "even when the malignant angina had assumed the most repulsive aspect, was I able to discover anything which resembled a gangrenous lesion."

One cannot fail to be interested with the fact that a similar affection (*cutaneous diphtheria*) of the parts on and about the ear, are especially noticed by Bretonnean and Trousseau. The former says that he saw "in a woman of thirty, who was attacked by malignant angina to such a degree as to resemble gangrene, a membraniform pellicle, which projected from the external auditory meatus, and extended to a part of the concha. There was the most perfect similarity between the affection of the pharynx and that of the skin, and they both yielded to a few local applications of hydrochloric acid."

"At the very time when this woman was most seriously affected, her daughter, aged five, had behind her ears a slight excoriation covered with a membranous coating, the symptoms of croup supervened suddenly; the intractability of the little patient scarcely allowed of the possibility of my assuring myself that the tonsils were covered with pellicles of a yellowish-white color; she died forty-eight hours after this examination."

little or no difficulty." Subsequently the pulse was quick and soft, heat of the body moderate, face swelled, strength prostrated and breathing difficult. These symptoms increased and with some others continued till the third night, when, after several loose stools, she died early in the morning.

"Upon examining the body, which was done on the afternoon of the day she died, I found the fauces, uvula, tonsils, and root of the tongue interspersed with sloughs, which still retained their whitish color. Upon removing them, the parts underneath appeared rather pale than inflamed. I perceived no putrid smell from them, nor was the corpse in the least offensive. The œsophagus appeared as in a sound state. The epiglottis was a little inflamed on its external surface, and on the inner side, together with the inside of the whole larynx, was covered with the same tough white sloughs as the glands of the fauces. The whole trachea, from the larynx down to its division in the lungs, was lined with an inspissated mucus, in form of a membrane, remarkably tough and firm; which, when it came to the first subdivisions of the trachea, seemed to grow thin and disappear. It was so tough as to require no inconsiderable force to tear it, and came out whole from the trachea, which it left with much ease; and resembled more than anything, both in thickness and appearance, a sheath of thin chamois leather. The inner membrane of the trachea was slightly inflamed; the lungs too appeared inflamed as in peri-pneumonic cases; particularly the right lobe, on which there were many large livid spots, though neither rotten or offensive; and the left lobe had small black spots on it, resembling those marks left under the skin by gunpowder."

After referring to an account of the first appearance of the disease in New England by Dr. Douglass, of Boston, published in 1736, Dr. Bard sums up his views of the distemper in the following language: "Upon the whole, I am led to conclude that the present disease, as well as other similar diseases, which have made their appearance at different times, and in different places, arose from a particular disposition of the air, or *miasmata sui generis;* which more or less, according to particular circumstances, generate an acrimony in the humors, and dispose them to putrefaction; and which have a singular tendency to attack the throat and trachea, affecting the mucous glands of these parts, in such a way as to occasion them to secrete their natural mucus in greater quantity than is sufficient for the purposes of nature: and which in this

particular species, when secreted, is either really of a tougher or more viscid consistence than natural, or is disposed to become so from rest and stagnation." Dr. Bard evidently considered the disease described by him as identical with the malignant ulcerous sore throat of Huxham, and in this opinion he was undoubtedly correct.

It would be injustice to Dr. Ogden, the contemporary of Dr. Bard, were we not further to notice the account given by him of the malignant sore throat as it prevailed in Jamaica, on Long Island. The chief purpose of his letter, already mentioned, on the subject, appears to have been to commend the use of calomel in the disease. In his second letter he has given a graphic account of the distemper. His sketch, however, comprises only the principal symptoms.

"The first," he says, "are commonly heaviness, restlessness, weakness, sometimes feverishness, watery eyes, giddiness, a more than common discharge of a watery saliva or spittle from the mouth, and a thin limpid matter from the nose. All these symptoms are not always conspicuous in every patient; in some so slight as not to be noticed by the family in children, nor scarcely by the adult patient himself. Soon after, and sometimes coeval with the above symptoms, an inflammation with a soreness is observed in the throat; a relaxation of the palate, which will appear much longer and thicker than common; a difficulty of swallowing; a swelling of one or both tonsils, commonly called the almonds of the ears; after which a small white speck or slough will appear on one or both tonsils, resembling cream or a piece of white fustian. Sometimes three, four, or more specks will be on one side, but soon unite. In most, the breath has a disagreeable smell; and if the patient had not before, he now begins to have a fever, generally attended with a low quick pulse; the sloughs increase until the whole tonsils, the space between them, behind and under the palate, and sometimes the nostrils are covered. Soon after, a cough seizes the patient, which, although at first little different from the common, in a few hours becomes remarkably hollow and hoarse; and the countenance appears bloated, with a bluish or livid color about the mouth, too frequently a mortal presage. These are the common symptoms; but the most certain criterion is the slough in the throat; unless when it begins behind the ears, in the groins, or in some other part previously sore. Wherefore it is highly expedient, that those who have the care of children should frequently examine their throats when this disease is epidemical or suspected, that relief may be applied for in season."

Since the American Revolution, until recently, the medical annals of the State of New York have been for the most part barren of memoirs and notices of epidemic affections of the throat of a well defined diphtheritic character. In the instances in which the disease has been observed, it has rarely assumed a pestilential form ; but in the last few years it has attracted particular attention in some parts of the State. Such has been the fact in Albany and its neighborhood, and, also, in the city of New York, and some of the rural districts.

In a brief and highly interesting paper on the subject, Dr. Willard, of Albany, says[1] that "within a few months past, Albany has been visited by an epidemic sore throat malady, recognized as the distinct disease diphtherite."

"There are," he remarks, "two diseases to which diphtherite bears marked similarity; one is cynanche tousillaris, the other is croup; but it exists independent of both of these, variously modified by the epidemical influences that produce it." It was observed, that just as the epidemic influence of cholera produces modified forms of disorder of the bowels, so the epidemic influence of diphtheria induced in the adult population a mild form of diffuse inflammation of the throat and tonsillitis. This latter disease in some instances terminated in subjects under twenty years of age, in suppuration or gangrene, and death. "But the disease diphtherite," says Dr. W., "has prevailed among children, mostly under the age of twelve years. Its onset is sudden and insidious, the false membrane having been formed to some extent, when the first symptoms of illness attracted the attention, and occasionally when the attention was directed only by the alarming condition of other members of the same family. The membrane rapidly extends upon the palate, tonsils, rima glottidis, into the larynx, and trachea, producing mechanical obstruction to respiration, and the patient dies in precisely the same manner as in croup. In some instances the first examination of the patient showed the tonsils swollen and covered with a pseudo-membrane of a pearly or oyster-like appearance; such were almost uniformly rapid in progress, and terminated fatally in two or three days. Those more slow in their progress, developed a blood poison, and after several days the mucous membrane of the nose, fauces, and bronchi, threw off a thick offensive acrid secretion as so often exists in scarlatina. The congestion extends to the

[1] See Trans. of the Med. Society of the State of New York, 1859, p. 182.

cellular tissue and skin about the throat and chest, the parotid glands become swollen, and there follow before death, incipient mortification and decomposition. In the progress of the disease, where it advances less decidedly to an unfavorable termination, there is a strong effort on behalf of nature to separate and throw off the pseudo-membrane from the fauces, and to expel it from the breathing passages. The line of demarcation forms in four or five days, and the separation may often be hastened by seizing portions of the membrane with forceps, and gradually and gently detaching it; but the tendency on the part of the disease is to reproduce it, so that when large patches of it have been expelled by expectoration or otherwise, it has been speedily reproduced and life destroyed."

But, besides prevailing to some extent in Albany and its neighborhood, diphtheria has occurred in some other parts of the State. It was first noticed in the City of New York, in February, 1858, in which month two deaths from the disease were reported by the city inspector. The appearance and continuance of the disorder, in the metropolis, attracted the attention of the Academy of Medicine; and though no definite statistical records to show to what extent the disease prevailed, were brought before that body, it was evident from statements made by fellows of the Academy, that there existed an epidemic influence favorable to its prevalence. It was also evident from the descriptions given of the disease, that its character was essentially the same as that of the epidemic at Albany. The disease has continued to occur in the city of New York up to the present time, June, 1860, but the mortality from it has not been large. Thus, from February, to the close of December, 1859, the deaths numbered only fifty-three. Since the 1st of January last, the disease has been more rife, the number of deaths, within this period, about five months, amounting to one hundred and ninety-three.

In studying the causes of the disease, the question of contagion has everywhere engaged the attention of physicians. Whether the attribute of communicability belongs to the malady we are not prepared to assert or deny, but whether it be contagious or not, there are few observers who will question that its primary source is a peculiar epidemic meteoration. The disease prevailed in Albany in those months in which malaria does not exist. Dr. Willard says: "The first case occurred in the south part of the city, as early as the second of April, and the second case is reported on the 20th of the same month, in the same section of the city. The

last cases occurred on the 26th of February, and 15th of March, showing that the disease is not yet extinct." One hundred and eighty-eight deaths were reported, nine of which were without the limits of the city. But three adults are reported as having died. The greater number of cases, as before stated, occurred in children under twelve years of age, and the mortality was one-third greater among girls than boys.

Dr. Willard regards the disease as closely allied in its pathology to scarlatina. This view of its nature is accordant with the theory, that there is an intimate etiological affinity between the entire class of the contagious exanthematous epidemics and the class of meteorations epidemics; or in other words, between those specific febrile diseases which chiefly affect the external tegumentary tissues, and those which are specially manifested in lesions of the gastro-pulmonary mucous membrane. In this view of the disease, epidemic diphtheria is allied to influenza, and epidemic typhoid pneumonia, diseases which are clearly referable to certain meteorations influences; influences which are similar, in their properties, prevalence, and mode of extension, to those which primarily induce and favor the spread of the contagious eruptive fevers.

It must here be observed that the general relationship between the two classes of epidemics consists in their possessing certain common epidemic characters, one of the chief points of difference between them consisting in the one possessing a contagious attribute and most of the others not. The only epidemics which are strictly entitled to the term contagious are those in which the number of cases springing from contagion, outnumber those which arise from their primitive source. There are a few diseases which possess the attribute of contagion in a feeble degree, and yet, owing to the great majority of their cases being primary ones, are properly denominated meteorations epidemics. A remark of Dr. Willard strikingly illustrates the near relationship between the contagious and meteorations epidemics. "Deprive," he says, "a case of scarlatina maligna of its efflorescence, and such cases do occur, and it would require a delicate diagnosis to distinguish it from some of the modifications of diphtherite." A similar statement is made by Dr. Bailey, of Joliet, Illinois; in describing a disease of the throat in children he says, that "all the appearances were like scarlatina except there was no scarlet eruption," and again that, "had there been the usual eruption, it would have been scarlet fever."[1]

[1] Trans. of the American Med. Association, vol. xii. p. 199.

Now, as diphtheria is manifestly more nearly allied in its phenomena to scarlatina, than it is to the other eruptive fevers, we are led to regard these two diseases as the links which unite in close relationship, the contagious and meteoratious epidemics. In genuine scarlatina there is the specific element of contagion. If a *de novo* case of this disease should by any means have its development arrested before it reaches the condition in which the contagious element is generated, the disease wanting this element would take its place among the meteoratious epidemics. Such a disease would be closely related to scarlet fever, but would not be identical with it. Diphtheria, as is well known, is regarded by many distinguished observers as a contagious disease. If this be a fact, its power of propagating itself by its specific virus must be exceedingly limited, seeing that the great majority of cases manifestly spring up in circumstances in which nothing short of an epidemic aerial influence can account for their occurrence.

The treatment of acute affections of the throat vary with their diathesis and nature. If the disease be primarily local, the remedies will differ from those which are proper in sore throats connected with disorder of the constitution. Thus in croup, a local disease, the means of relief are directed simply to the removal of that disease and its symptomatic effects; whereas in diphtheria, a *zymotic* or general disease, the chief remedies are constitutional, with the addition of such as tend to relieve the throat affection. In croup, the chief, if not the sole danger, is from obstruction in the larynx and trachea, whilst in diphtheria, the danger mainly arises from exhaustion of the general system, and the occasional occlusion of the larynx and trachea. The remedies employed in the treatment of these diseases, are too well known to require from us any special notice. In regard to diphtheria it is sufficient to say that, considered as a zymotic disease of an asthenic character complicated with a peculiar affection of the throat, the leading remedies are a nutritious diet, tonics, and stimulants, as beef-tea, sulphate of quinine, the liquid preparations of iron, and wine whey, &c., with chlorate of potassa, used as a gargle, and administered internally, and sometimes the application of hydrochloric acid, or a solution of nitrate of silver, or alum, to the diseased parts of the mucous membrane of the throat which are not covered by the pellicular exudation.

4. Epidemic Cholera.

The writings concerning the epidemic or Asiatic cholera constitute no inconsiderable part of the original medical literature of the present century. Whilst the ravages of this disease have not been surpassed by those of any other form of pestilence, its extent of prevalence is equalled only by the influenza or epidemic catarrh. In its western march from India to this country, it occupied about fifteen years, its career being signalized by its occasional advances, pauses and retreats, and also by its devious routes, which, though apparently capricious, were on the whole steadily directed towards the northern Atlantic Ocean. After ranging over many of the most populous northern regions of continental Europe, it reached England in 1831, and in the following year appeared on this side of the Atlantic, first showing itself at Quebec on the 8th of June, 1832. Travelling westward it arrived at Montreal on the 9th of the same month, at La Prairie on the 11th. From this point the disease proceeded in two directions; on the one hand, passing up the St. Lawrence, and on the other, entering the State of New York, by the way of St. John's and Lake Champlain; and, after manifesting itself, here and there, in a few solitary cases, among emigrants, entered the city of New York on the 24th of June. From this period the disease may be said to have invaded most of the populous towns and many of the rural districts, along the lines of the great thoroughfares through the commonwealth. For the details of its epidemic prevalence in the State we must refer to Dr. Lewis C. Beck's able report on the subject, made to his excellency Gov. Throop, August, 1832, and to Dr. Vache's brief historical sketch of the rise and progress of cholera in a letter to the Hon. C. D. Robinson, 1850. The deaths from cholera in the city of New York in 1832, were 3,513. The disease reappeared in that city in 1834, destroying 971. It prevailed also at the same time in other parts of the State. After this year the disease did not occur epidemically until 1849, a period of fifteen years. During its prevalence in that year in the city of New York, the mortality from it alone amounted to 5,017. The disease again reappeared in the metropolis in 1854, causing 2,509 deaths.

In thus noticing the visitations of cholera in the State of New York, we but glance at a very small part of the geographical area over which the disease has spread on this side of the Atlantic. To

follow its migratory movements into other parts of the Union would not comport with our present design.

Though fully developed cholera may be recognized as a specific malady, we cannot separate it from certain forms of disorder, which at all times, and in all places, with few exceptions, precede and attend its epidemic prevalence. We refer to diarrhœal and dysenteric affections. These disorders were not only the forerunners and concomitants of the genuine cholera in every place where the disease became epidemic in the State of New York, but they were marked by peculiarities which allied them in character to the reigning pestilence. Indeed, these antecedents and attendants of cholera are not inappropriately denominated *cholerine* or *choleraic* diarrhœa, and dysentery. It must also be noted that these forms of disease were common or epidemic in many parts of the State where few or no cases of cholera occurred. Such epidemic phenomena have been observed in all countries which have been ravaged by this pestilence. We are told in the able report of the English Board of Health, "that in every European town where cholera appeared, it gave warning of its approach by the increased prevalence of zymotic diseases, such as influenza, scarlet fever, dysentery and diarrhœa, and that the last named as a premonitory symptom, invariably prevailed extensively before the cholera broke out."[1] The exceptions to this rule, so far as the two latter diseases are concerned, are few; and hence, there can be no question, that there is an etiological connection between the cholera and the diarrhœa which precedes it. It is usually some days or weeks after the appearance of the diarrhœa, that the cholera bursts forth in a pestilential form, characterized by rice water discharges from the bowels, rapid emaciation, cramps, algidity of the body, huskiness of the voice, suppression of urine, cyanosis and asphyxia. In few places have bowel complaints been more extensively developed, anterior to and during the prevalence of epidemic cholera, than in the city of New York. The general relation of the diseases in question to one another is well exhibited in the following table[2] of their mortality, in that city, in 1849, and also the greater extent of the mortality of bowel disorders than in 1848.

[1] British and Foreign Medico-Chirurgical Review, January, 1856.

[2] Taken from the Report of the Proceedings of the Sanitary Committee of the Board of Health in relation to the Cholera, as it prevailed in New York in 1849.

Table showing the Weekly Mortality in the City of New York by Cholera, and that from Bowel Complaints, during twenty-two weeks, from May 20 to Oct. 14, 1849, and also the same during the corresponding periods of the preceding year.

Week ending	Total mortality.	Cholera asphyxia.	Cholera infantum.	Cholera morbus.	Diarrhœa.	Dysentery.	Inflammation of stomach and bowels.	Other diseases of stomach and bowels.	Mortality from bowel complaints.
1848.									
May 20	285	...	2	..	3	5	14	2	26
" 27	247	...	5	..	4	4	11	2	26
June 3	228	...	4	.	2	4	6	1	17
" 10	245	...	4	2	1	7	8	..	22
" 17	250	...	7	..	5	4	19	2	37
" 24	263	...	8	..	7	5	9	1	30
July 1	288	...	22	..	8	11	13	1	55
" 8	285	...	29	..	10	18	19	..	76
" 15	284	...	26	4	13	24	18	2	83
" 22	299	...	29	1	19	26	14	1	90
" 29	403	...	52	6	19	44	20	1	142
Aug. 5	368	...	44	3	12	41	19	1	120
" 12	338	...	52	1	22	41	14	2	132
" 19	351	...	46	..	10	46	13	..	115
" 26	331	...	37	2	18	34	12	1	104
Sept. 2	309	...	31	1	20	37	17	..	106
" 9	278	...	22	2	11	33	14	1	83
" 16	282	...	27	1	13	38	14	..	93
" 23	261	...	17	..	7	22	7	3	56
" 30	236	...	9	..	3	27	8	1	48
Oct. 7	271	...	6	1	12	28	12	1	60
" 14	260	...	3	3	8	19	10	1	44
Totals	6362	...	492	27	227	518	291	24	1565
1849.									
May 19	323	1	..	6	5	6	10	1	29
" 26	294	13	..	1	4	3	16	..	37
June 2	270	29	2	9	11	6	11	1	69
" 9	409	121	4	12	17	11	13	3	181
" 16	425	145	5	13	4	1	15	..	183
" 23	473	152	10	10	10	13	16	..	211
" 30	734	286	34	15	17	18	18	1	389
July 7	702	317	31	10	25	25	7	..	415
" 14	991	484	64	18	55	44	14	1	680
" 21	1409	714	102	34	61	71	29	..	1011
" 28	1352	692	108	24	49	79	16	2	970
Aug. 4	1278	678	105	20	54	58	26	3	944
" 11	1011	423	86	19	64	68	21	2	683
" 18	968	387	98	13	55	78	18	3	652
" 25	749	233	67	8	52	78	17	6	461
Sept. 1	687	171	68	3	40	79	11	3	375
" 8	520	94	47	4	24	87	12	1	239
" 15	378	36	23	..	21	65	12	3	160
" 22	366	21	19	1	14	55	16	2	128
" 29	319	11	12	3	18	45	16	.	105
Oct. 6	312	6	12	2	8	38	12	1	79
" 13	249	3	4	1	7	29	18	1	63
Totals	15,219	5017	901	226	615	949	344	34	8064

It would be unduly extending this report, already perhaps too prolix, were we to attempt to discuss the questions concerning the efficient and accessory causes of the epidemic cholera. Our general views of this subject may be expressed in a few words. The facts relating to the appearance of the epidemic cholera, its migratory movements, its sudden and brief visitations in a locality at one time, and its protracted visitations in the same at another time, its ravages in countries of every variety of geological and climatic character, and its invariable association with gastro-intestinal disorders allied to and more rife than itself, affecting sometimes the entire population—these facts, we think, warrant the inference that the efficient cause of the malady is not exclusively a contagious principle, or exclusively an atmospheric one. To explain and reconcile the facts before us, it seems necessary to admit the existence of both of those principles. Thus, while the disorder in many points conforms to that of influenza and certain other migratory disorders, it must be supposed to spring primarily from a peculiar epidemic meteoration, and on the other hand, while it manifestly propagates itself, in certain circumstances, by personal communication, it must be regarded as arising from contagion. In this view of the modes in which cholera is diffused, we are led to regard the great majority of cases as immediately referable to the epidemic atmospheric influence, and also all the concomitant cases of choleraic diarrhœa and dysentery, and that a minority only springs from contagion.

But though a meteoratious influence and to some extent a contagious principle, are essential to the existence and prevalence of pestilential cholera, yet there is perhaps no epidemic distemper so readily induced by accessory causes or more readily prevented by avoiding them, than the one under notice. We refer to intemperance in eating and drinking, and especially to the use of indigestible food, to crowding, exposure to mephitic exhalations from the soil, and recently turned up earth, to grief, and other depressing passions. The proofs of the power of such agencies in producing cholera, have been abundant in the State of New York. It is a truth which should be widely and impressively promulgated that the observance of a few hygienic precepts would preserve the lives of hundreds and thousands of a population, while under the influence of a cholera meteoration.

5. Erysipelas.

Regarded as a simple diffusive inflammation of the skin and subcutaneous and mucous membranes, erysipelas can scarcely be looked upon in any other light than as a complication of various medical and surgical diseases. It supervenes in cases of typhus and in certain visceral disorders and traumatic injuries; and hence its occurrence in such cases is incidental and not common to them. There is, however, an epidemic distemper which is so constantly attended by a diffusive inflammation of the face and mucous membrane of the mouth and throat, that it may not improperly take the name of epidemic erysipelas. The disease is a constitutional one; and though generally exhibiting a very decided erysipelatous character, sometimes occurs without showing any remarkable cutaneous phlogosis. A distemper. of this sort occasionally prevails in the towns and rural districts of our country, and sometimes assumes a very malignant form. Such a disease is among the more formidable meteoratious epidemics which periodically visit the State of New York.

Of the contributions to the epidemic history of the disease in the State, the one from the able pen of Dr. James Fountain is especially worthy of notice.[1] This gentleman describes the disease as it occurred in 1825, in the extreme northern part of the maritime region of New York, embracing a part of Westchester and Putnam counties, of about 20 miles in diameter. He denominates the disease an "*Epidemic Erysipelatous Fever*," a term eminently proper, as it implies the disease to be a constitutional affection. Much of the face of the country in which it prevailed is hilly, being rendered so by the outcrops of granitic rocks and drift deposits unequally distributed. There was nothing remarkable in the weather before or after the epidemic. Dr. Fountain says "the epidemic commenced about the first of February, 1825, and continued in scattering cases even as late as the first of August. The number of cases that occurred was not less than two hundred and fifty, and that of the deaths about thirty. Compared to many former epidemics, it appears indeed insignificant, yet it was attended with peculiarities not altogether uninteresting."

An epizooty, called the slavers, affecting horses, and proving

[1] See the New York Medical and Physical Journal, vol. iv. 1825.

fatal to many, was an immediate antecedent to the epidemic, as was also the influenza which prevailed throughout the State.

Though the attack of the disease was sometimes without any premonitory symptoms, it was usually preceded by a slight soreness of the throat, with a general redness of the tonsils and fauces. Commonly with these symptoms, after a day or two, and occasionally without them, the disease was suddenly and violently developed with a chill, quick and small pulse, and pain in the head, back, and extremities, and a universal soreness. These symptoms were soon followed by a reaction of the heart and arteries. Subsequently the pains were of a character to be sometimes mistaken for rheumatism. But the more remarkable phenomena during the first few days, were observable in the throat, such as a diffused redness, slight swelling of the velum, uvula and tonsils, and the surrounding parts. This condition of the throat sometimes resulted in the formation of small abscesses in the tonsils and about the larynx and pharynx. In some cases the patient was threatened with suffocation by laryngismus. In the milder cases the disease progressed no further, but gradually ceased, while in malignant cases, the fauces became gangrenous, and death took place about the third or fourth day. But in neither of these modes did the disease usually terminate: we are told by Dr. Fountain, that, "more commonly about the 5th, 6th, or 7th day, the patient was observed to breathe with difficulty through the nose; and on its upper part across the ossa nasi a red patch was discovered, glistening and smooth, slight at first, but a sure omen of portentous import. Like a cloud gathering gradually for a storm, it darkened, and spread from every point until the whole face was lost in redness and tumefaction; the eyes were closed, the nose appeared to sink, the mouth was distorted, and the ears stood aloof, projecting and stiff, and from them and the nostrils a thin acrid fluid was continually oozing. The disease continuing, the redness deepened, verging to a purple, and blisters from the size of a sixpence, and smaller, to that of a dollar, appeared, sometimes solitary, but more frequently in clusters. These were filled with a yellow serum, and the skin or rete mucosum beneath them, was often purple, and even black, giving the whole visage an unnatural and terrific aspect. This appearance spread from the edges, while the part first assailed rather improved in appearance, or even desquamated. It seldom descended to the trunk of the body, though in one instance I saw it spread over the breast and shoulders. Immediately on the appearance of the ery-

sipelas on the face, the throat affection began to abate, and ceased entirely when the face became much affected. The general irritation, during this state of things, remained the same; slight morning remissions, and evening exacerbations, with restlessness, and sometimes delirium, heat, thirst, foul tongue, dry skin, &c., marked its progress. After four, five, or six days, the spreading ceased, desquamation ensued, the eyes re-opened, and the skin became smooth, retaining its redness, however, several days. This may be called the full course of the erysipelatous epidemic fever in a good habit, when not interrupted nor diverted by interference. Convalescence was generally very rapid after such cases when properly managed."

Among the anomalous phenomena of the disease, Dr. Fountain mentions affections of the stomach, intestines, and bladder. But the most dangerous one was a metastasis to the abdomen, which was sometimes rapidly fatal. In some cases the abdominal affections were the primary complications and not metastatic. Viewed in its various forms, the term Epidemic Erysipelatous Fever, applied to the disease by Dr. Fountain, seems to have been peculiarly appropriate. In assigning it a place in the writer's classification of epidemics, he says he cannot place it in the first class, "*Contagious epidemics*," nor in the second, "*Infectious epidemics*," but must refer it to the third, "*Meteorations epidemics*." To this arrangement, however, he says he must urge one objection. "I cannot conceive," he remarks, "how it happens that the atmosphere, which is continually driven over this section of the country by the storms of a tempestuous season, should shed all its venom on this little devoted spot. During the whole time this epidemic raged, not a foot of air exterior to the houses, occupied the same spot a minute." The same objection may be made to other diseases of a kindred atmospheric origin, and we are not aware that any satisfactory answer to it can be given in the present state of our knowledge. In regard to the pathology, prevention, and treatment of the disease, Dr. Fountain's paper is replete with instruction.

As an epidemic, erysipelas has occasionally appeared in various other parts of the State. Dr. Sprague informs us that it prevailed in the southern part of Otsego County, in the autumn and winter of 1842–43, and that it raged there in two or three towns with fearful mortality. It seemed to be identical with the disease described by Dr. Sutton, of Indiana, Drs. Hall and Dexter, of Vermont

and New Hampshire, and Dr. Pebbles of Virginia.[1] Under a malignant form the disease, we are told by Dr. Corliss, prevailed in Washington County in 1849.[2] Various other notices of the disease, appearing in an epidemic form, have been published by physicians of different parts of the State.

There is another form of disease which has within a few years prevailed to a limited extent in some parts of the State of New York, and which has received the denomination of *cerebro-spinal meningitis*. A brief history of the disease, with an account of its pathological phenomena, is given us by Dr. D. G. Thomas, of Utica, and Dr. J. V. Kendall, of Clay, Onondaga County.[3] After adverting to its prevalence in various parts of Europe, Dr. Thomas says, that, "in March, 1848, it was epidemic in Alabama, Missouri, and Arkansas. About the same time it suddenly broke out in Sutton and Millbury, Massachusetts; and in several localities in Central New York, in 1850–51. It made its appearance in Elmira, N. Y., during the warm weather of February, 1857, and prevailed during the two succeeding months extensively in the western and central parts of the State." "Its usual rate of mortality has been from seventy to eighty per cent.," though in some localities it has been less than the former number, and in others, greater than the latter. In regard to its etiology, Dr. Thomas thinks there is abundant evidence of its malarious origin, while Dr. Kendall does not attempt to trace it to its efficient source. In the present state of our knowledge of the disease, it would perhaps be premature to consider it as a specific epidemic, and not as a modification of some well-known disease; and consequently we shall not attempt to assign it a place in our classification of epidemics.

In drawing his report to a conclusion, the writer feels that his labor has been that of accumulating facts, rather than that of showing their relations to one another, or of elucidating the philosophy of epidemics. To illustrate this latter subject, by the epidemic phenomena observed in the State of New York, would demand another and different survey of the whole subject.

[1] Trans. of the N. Y. State Med. Society, 1848, pp. 99 and 100.
[2] Ibid., 1850, p. 226. [3] Ibid., 1858.

ERRATA.

Page 7—23d line from top—for "a by" read "by a."
" 44—12th line from top—for "have" read "has."
" 55—33d line from bottom, in column of annual mean—for "3.49" read "41.87."
" 56—5th line from bottom, in column for number of years—dele "23."
" 57—9th line from bottom, in column of annual mean—for "32.90" read "33.03"
" 63—19th line from bottom—insert the words "general average" before the word "quantity."
" 64—8th line from top—for "ten years" read "periods varying from ten to twenty years."
" 66—12th line from bottom—for "hypohyetal" read "hyperhyetal."
" 67—8th line from top—for "33 inches" read "30 inches."
" " —9th line from top—for "54 inches" read "24 inches."
" 102—Bottom line—dele "and cholera."
" 159—18th line from top—for "or, in other words" read "and."
" 168—17th line from top—for "consisting of" read "constituting a."

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