

A contribution to the climatological study of phthisis in Pennsylvania.

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DR. PEPPER.

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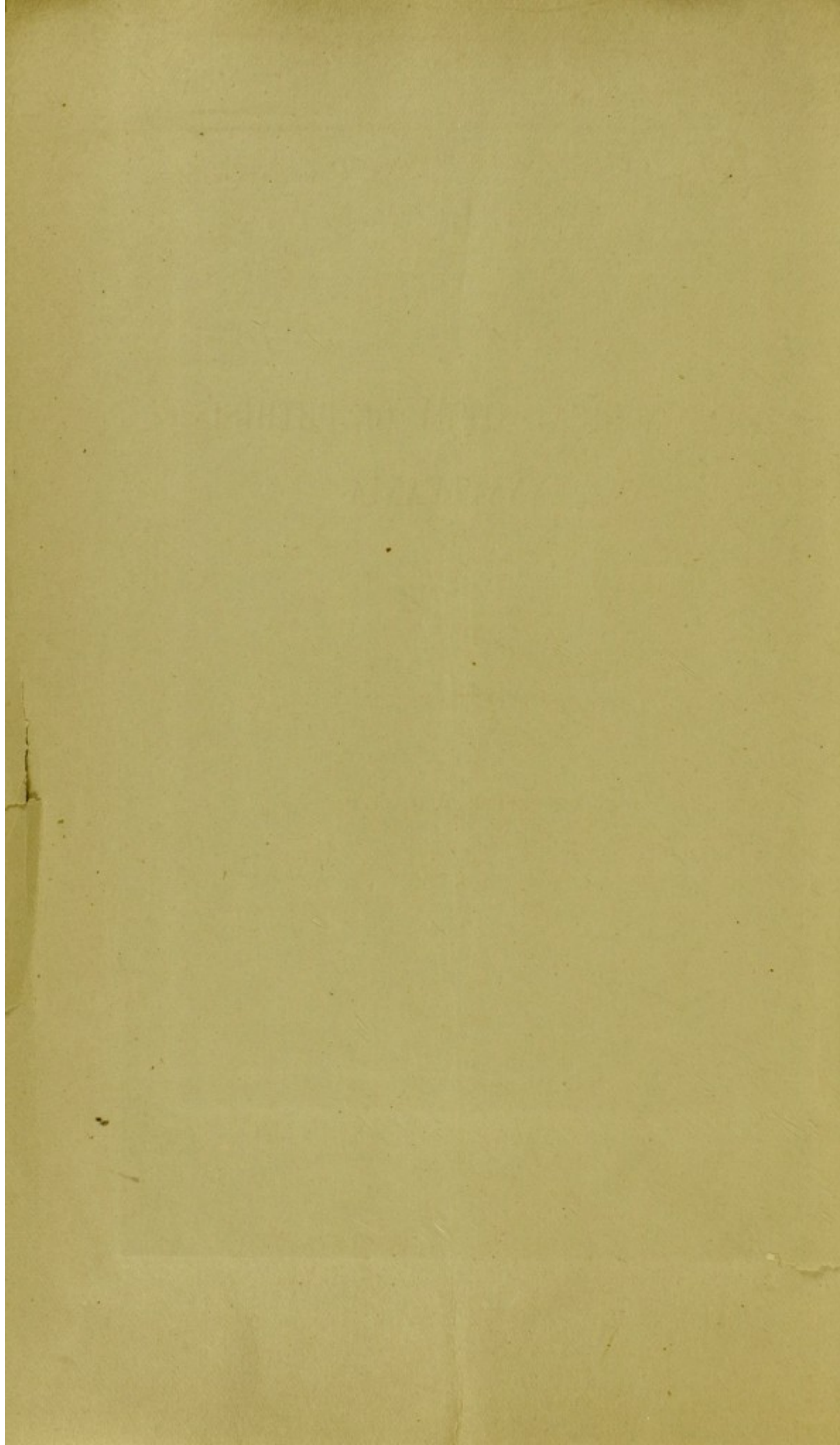
A CONTRIBUTION TO THE CLIMATOLOGICAL STUDY OF
PHTHISIS IN PENNSYLVANIA.

BY

WILLIAM PEPPER, M. D., LL. D.

PRESIDENTIAL ADDRESS DELIVERED AT THE THIRD ANNUAL MEETING OF
THE AMERICAN CLIMATOLOGICAL ASSOCIATION, HELD AT
PHILADELPHIA, MAY 10 AND 11, 1886.

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NEW YORK

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1887

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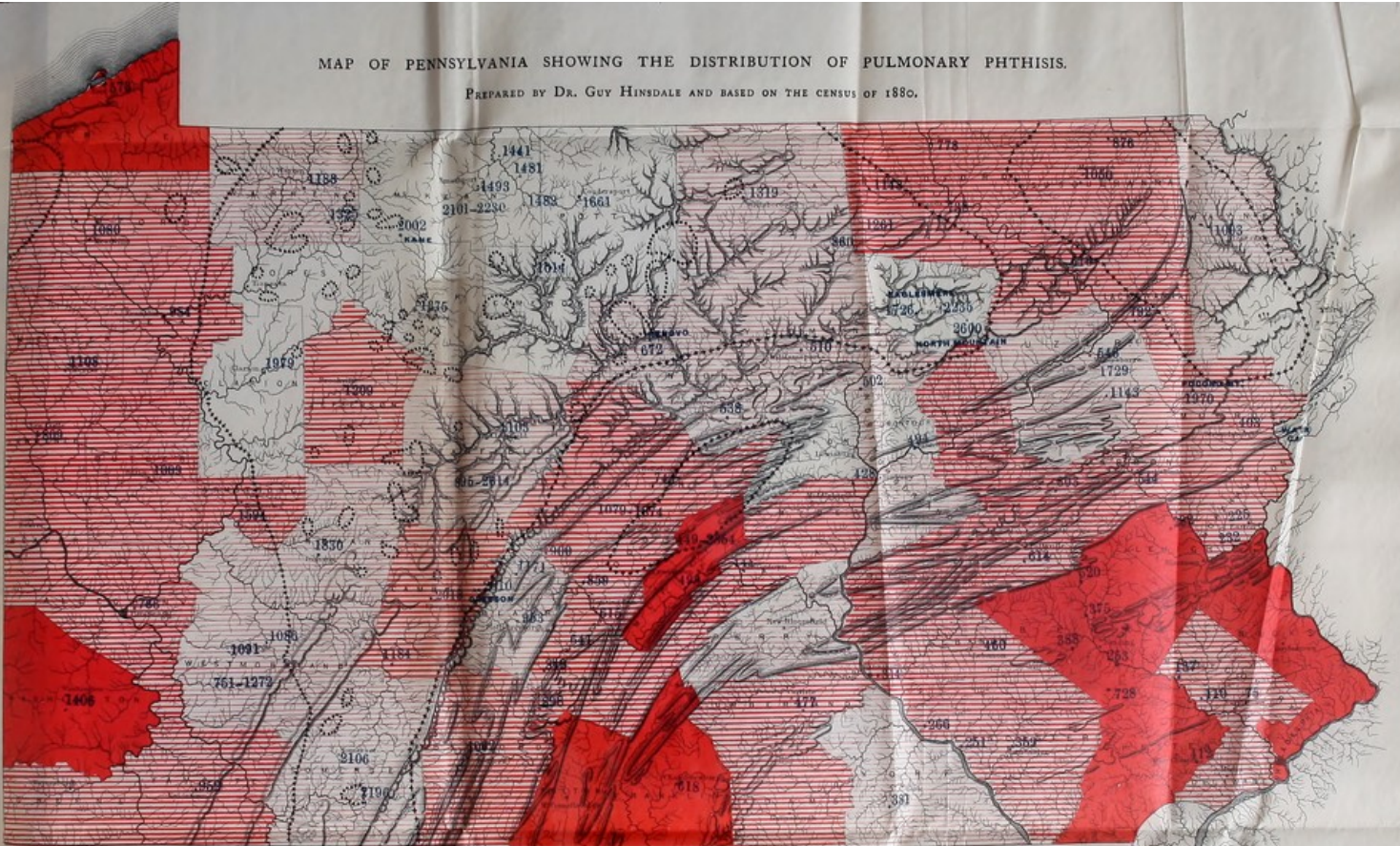
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MAP OF PENNSYLVANIA SHOWING THE DISTRIBUTION OF PULMONARY PHTHISIS.

PREPARED BY DR. GUY HINSDALE AND BASED ON THE CENSUS OF 1880.



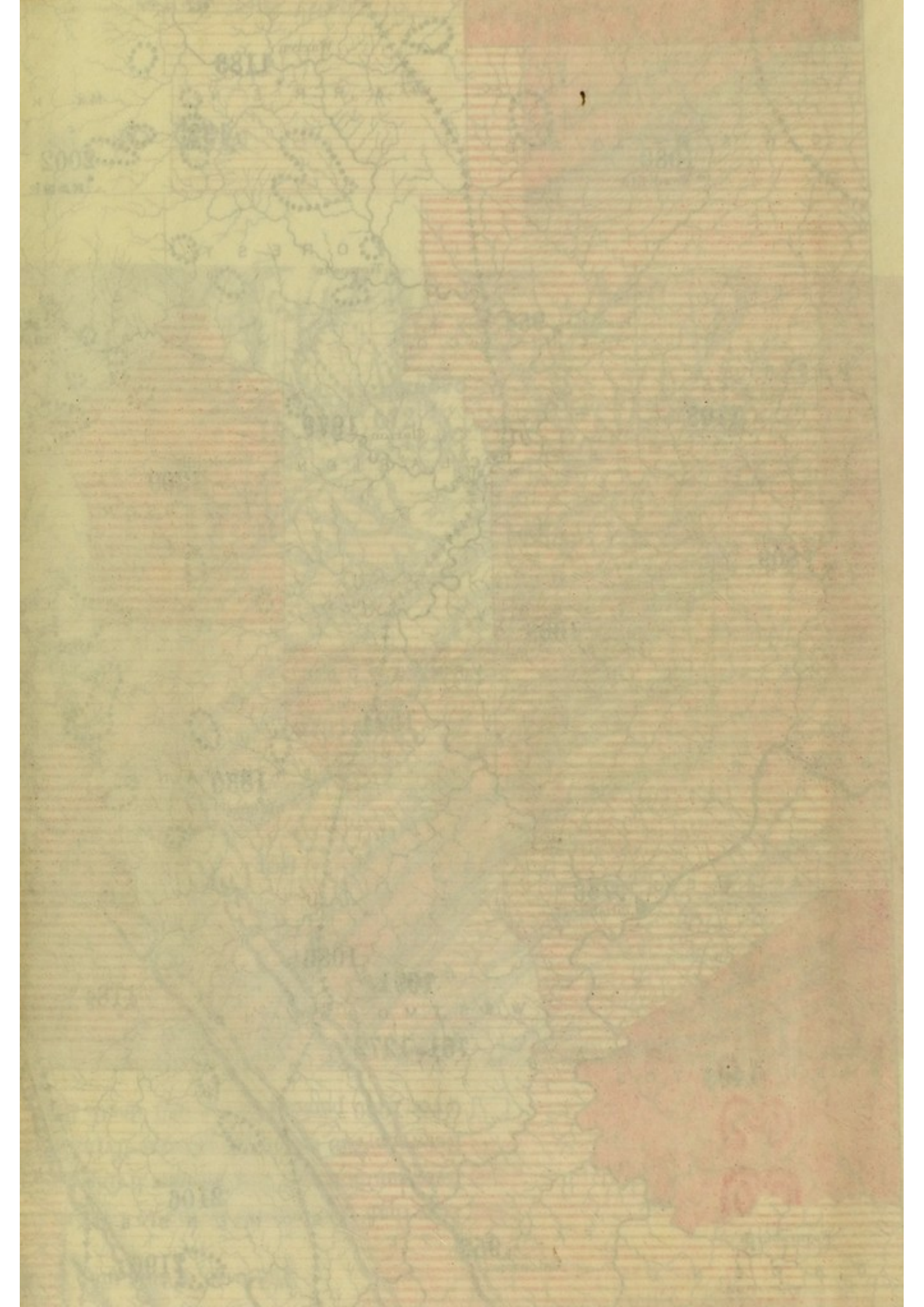
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- Less than 500 persons living to 1 death from Phthisis.
- ▨ Between 500 and 750 persons living to 1 death from Phthisis.
- ▩ Between 750 and 1000 persons living to 1 death from Phthisis.
- Over 1000 persons living to 1 death from Phthisis.

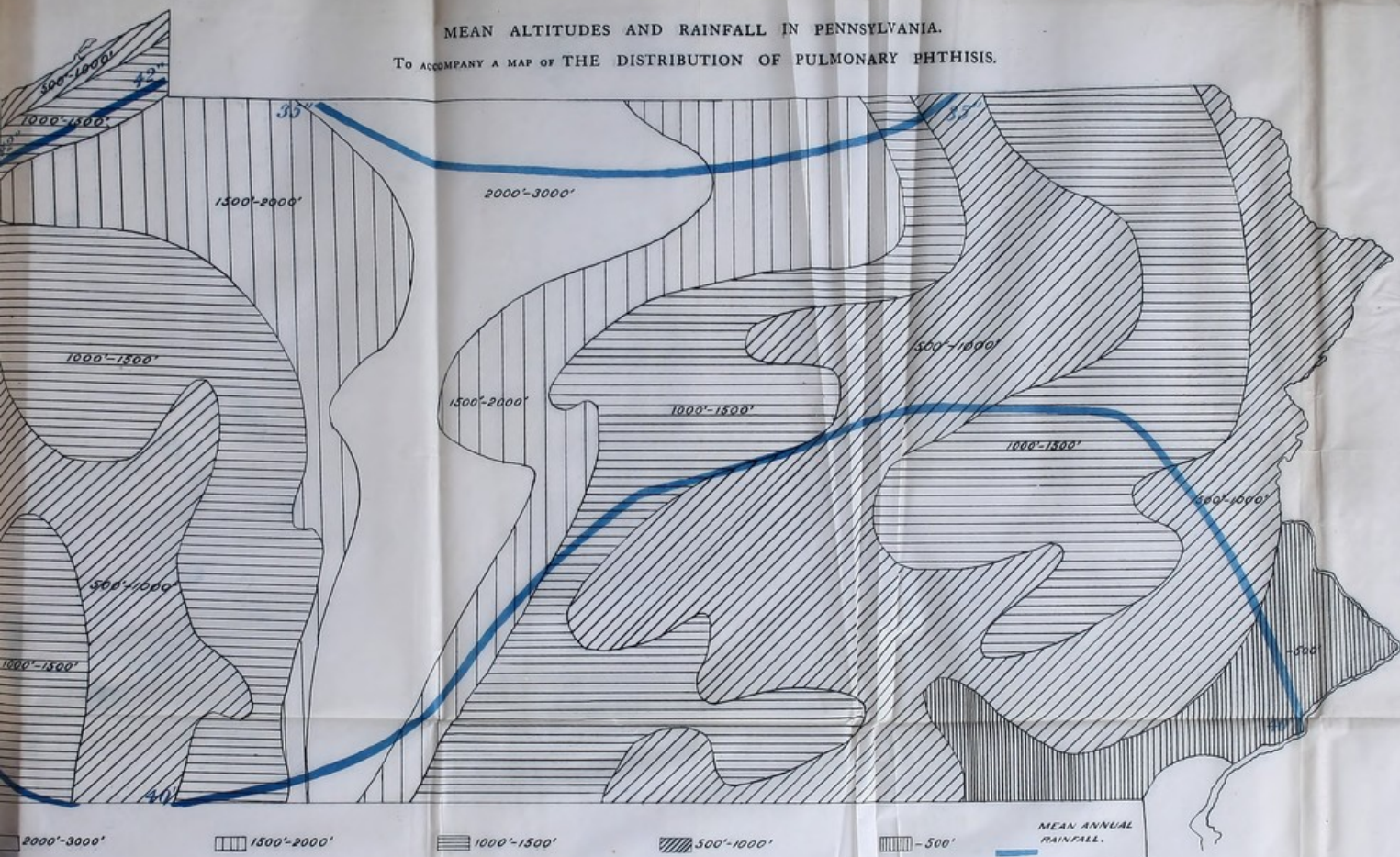
**** Areas of standing Hemlock.

***** Areas of standing Pine.

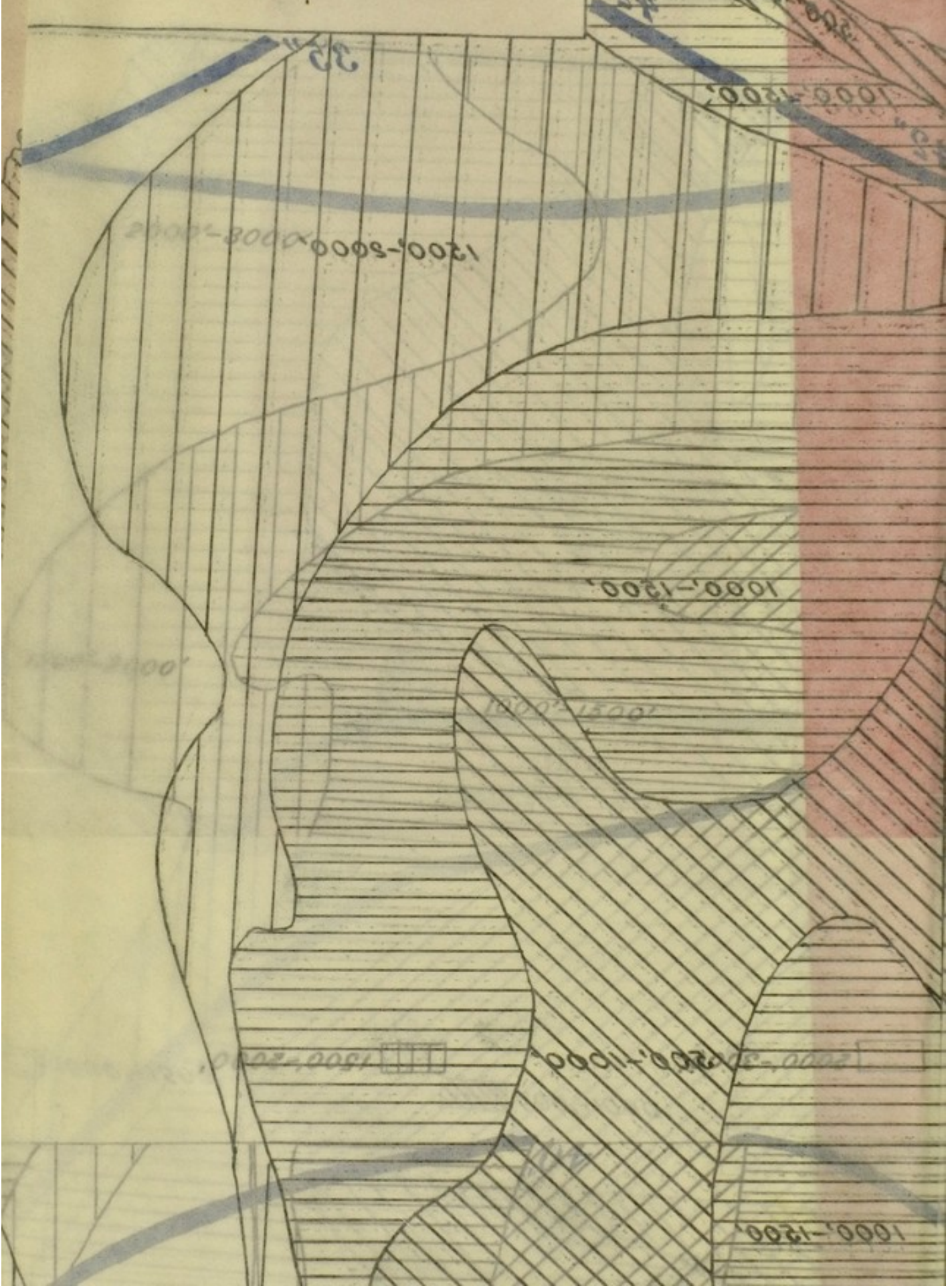
Figures in blue give elevation above tide.



MEAN ALTITUDES AND RAINFALL IN PENNSYLVANIA.
TO ACCOMPANY A MAP OF THE DISTRIBUTION OF PULMONARY PHTHISIS.



MEAN ALTITUDES AND RAINFALL
BY A MAP OF THE DISTRIBUTION



MEAN ANNUAL TEMPERATURE IN PENNSYLVANIA.
TO ACCOMPANY A MAP OF THE DISTRIBUTION OF PULMONARY PHTHISIS.



MEAN ANNUAL TEMPERATURE IN
TO ACCOMPANY A MAP OF THE DISTRIBUTION

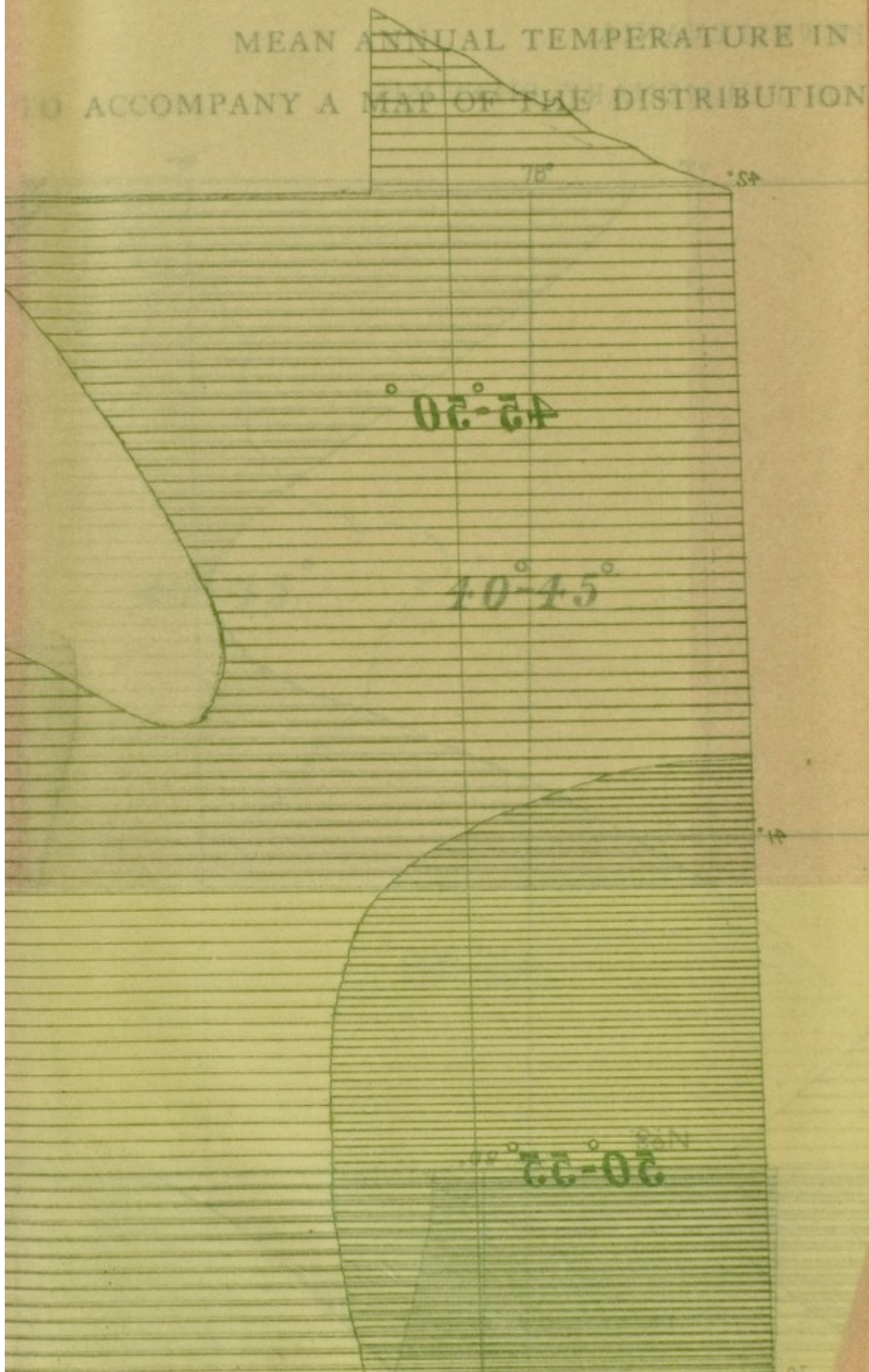
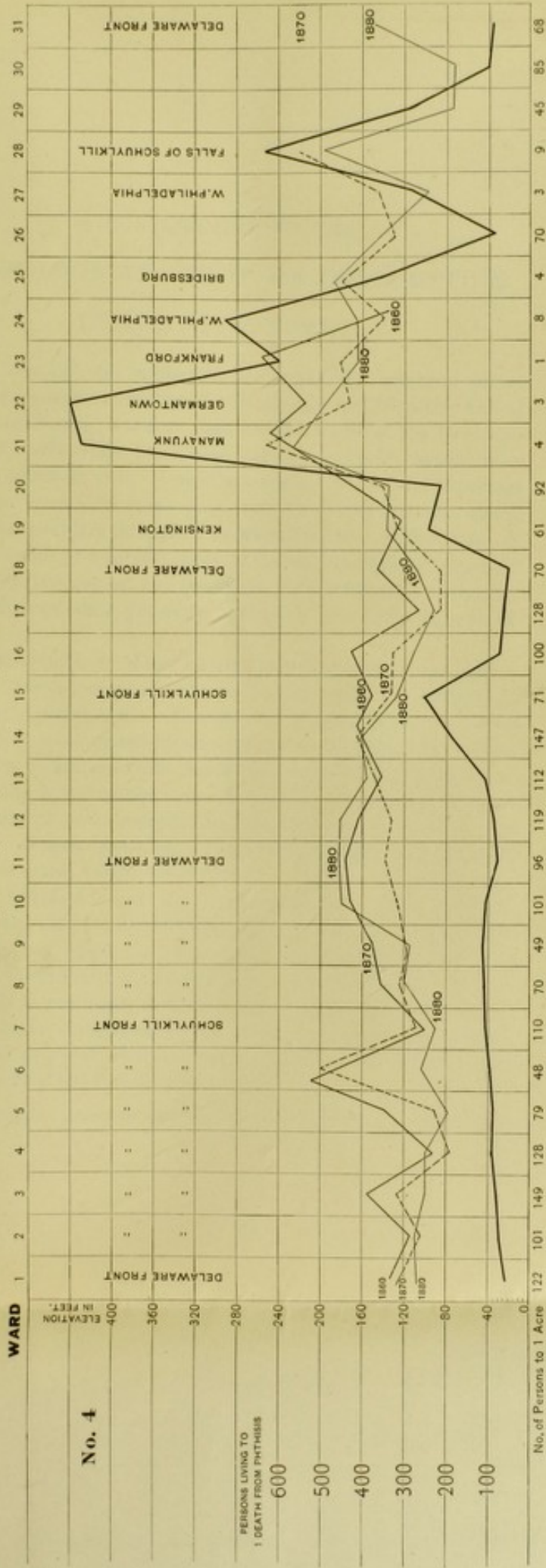


CHART SHOWING RELATION OF MORTALITY FROM PHTHISIS IN PHILADELPHIA TO ELEVATION AND DENSITY OF POPULATION, BY WARDS.
 FOR 1860, 1870, 1880.

Designed by Guy Hinsdale, M. D.



The heaviest line shows the highest elevation of wards. The remaining lines show the number of persons living to one death from phthisis.

THE HISTORY OF THE UNITED STATES

The history of the United States is a story of growth and expansion. From a small collection of colonies on the eastern coast, it grew into a vast nation that spanned the continent. The early years were marked by struggle and conflict, but the spirit of independence and self-determination prevailed. The American Revolution was a turning point, leading to the birth of a new nation. The years following were a period of rapid growth and development, as the United States expanded its territory and influence across the globe. The Civil War was a defining moment, testing the nation's unity and resolve. The Reconstruction era followed, a period of rebuilding and reform. The late 19th and early 20th centuries saw the United States emerge as a world power, with its influence extending to every corner of the globe. The 20th century was a period of great change, with the United States playing a leading role in the world. The Cold War was a defining feature, as the United States and the Soviet Union vied for global dominance. The end of the Cold War brought a new era of peace and cooperation. Today, the United States remains a leading power, with its values and ideals continuing to inspire people around the world.

The United States has a rich and diverse history, with many important events and figures that have shaped the nation. From the early days of exploration and settlement to the present day, the United States has always been a land of opportunity and hope. The American dream is a powerful force, driving people to pursue their dreams and make a better life for themselves. The United States has a long tradition of freedom and democracy, and these values continue to be the foundation of the nation. The American people are a proud and resilient people, and they have always overcome the challenges that have come their way. The United States is a land of great promise, and its future is bright.

The United States is a land of great diversity, with people from many different backgrounds and cultures. This diversity is one of the strengths of the nation, as it brings together people with different perspectives and ideas. The United States is a land of opportunity, where anyone can achieve their dreams. The American people are a proud and resilient people, and they have always overcome the challenges that have come their way. The United States is a land of great promise, and its future is bright.

A CONTRIBUTION TO THE
CLIMATOLOGICAL STUDY OF CONSUMPTION
IN PENNSYLVANIA.*

I HAVE selected this subject on account of the universal prevalence and terrible mortality of this disease, and from the feeling that any contribution, however slight, to the study of the local conditions which affect this prevalence and this mortality should have some value attached to it. I need not remind you of the important investigation conducted some years ago by Dr. Henry I. Bowditch upon this same subject as applied to Massachusetts. Suffice it to say that, as the result of a careful study of the answers made by resident physicians of 183 out of 325 townships then existing in Massachusetts, this distinguished physician arrived at the following conclusion:

“Medical opinion in Massachusetts, as deduced from the written statements of resident physicians in 183 towns, tends strongly to prove, though, perhaps, not affording perfect proof of, the existence of a law in the development of consumption in Massachusetts; which law has for its central idea that the dampness of the soil of any township or locality is intimately connected with, and probably as cause of, the prevalence of consumption in that township or locality.” It is, of course, evident that such a conclusion, if fully confirmed and established as a law, would be of vast and far-reaching importance. It does not interfere in any way with the operation of heredity, or of other predisposing or determining causes. It might have interesting relations, but could not present any incompatibility with the more recent doctrines of the bacillar nature of true tuberculous consumption. It is manifestly difficult to subject this theory to searching and conclusive investigation; but, so far as investigation has been made in other portions of this country or abroad, the evidence has tended to confirm Dr. Bowditch's position.

* Read before the American Climatological Association at its third annual meeting.

Independently of Dr. Bowditch, and without knowledge of the views which he had already expressed, Dr. G. Buchanan, of England, had arrived at almost identical conclusions.

The ninth and tenth reports of Mr. John Simon, Medical Officer of the Privy Council, contain the results of Dr. Buchanan's work, which was carried on in 1865, '66, and '67. Through this investigation it was discovered that in certain English towns where the drying of the subsoil had been accomplished by the construction of sewers, etc., and where the water-supply had been improved, the mortality from phthisis had decreased. In Salisbury the death-rate from phthisis had fallen 49 per cent.; in Ely, 47 per cent.; in Rugby, 43 per cent.; in Banbury, 41 per cent. In towns where no improvements had been made, or where the conditions were already good, there was no such corresponding change in the death-rate.

Dr. Buchanan summarizes the facts brought out in his investigation of phthisis in Surrey, Kent, and Sussex, as follows:

"There is less phthisis among populations living on pervious soils than among populations living on impervious soils."

"There is less phthisis among populations living on high-lying pervious soils than among populations living on low-lying pervious soils."

"There is less phthisis among populations living on sloping impervious soils than among populations living on flat impervious soils."

This connection between the influence of soil and phthisis was established by—

"1. The general agreement in phthisis mortality between districts that have common geological and topographical features of a nature to affect the water-holding quality of the soil.

"2. By the existence of general disagreement between districts that are differently circumstanced in regard to such features; and

"3. By the discovery of pretty regular concomitancy in the fluctuation of the two conditions from much phthisis with much wetness of soil to little phthisis with little wetness of soil."

I will proceed at once, then, to state that in the preparation of this paper I have pursued the method adopted by Dr. Bowditch in his studies of consumption in Massachusetts, which extended from 1854 to 1862, when he delivered his address before the Massachusetts Medical Society on Locality as one of the chief causes of consumption in New England. I think you will agree with me that the result possesses some interest, though I am forced to confess that one of the most striking features brought out has been the paucity of existing records upon a subject of such supreme impor-

tance to the community, and the great difficulty of obtaining accurate data even with the most cheerful and courteous co-operation of the profession. The present address is to be regarded only as the first crude and imperfect result of an investigation, which I hope to be able to continue to a much greater degree of completeness. It may not be without interest to give a short account of the physical characters of the area under consideration, in the preparation of which liberal use has been made of a highly interesting report on the topography of Pennsylvania, which was courteously written at my solicitation by Charles A. Ashburner, Esq., M. S., geologist in charge of the Geological Survey of Pennsylvania.

The State of Pennsylvania measures from east to west 290 miles; from north to south, 150 miles; having an area of over 45,000 square miles. It is a distinctly mountainous State. The Alleghany and Blue Ridge Mountains course diagonally through the central portion from the northeast corner to the southwest; upon the one side the drainage is toward the Atlantic seaboard, and upon the other toward the valley of the Mississippi.

Professor Lesley has suggested a topographical division of eastern Pennsylvania into the Southeastern or the Seaboard district, and the Middle or Appalachian district.

The former is bounded on the west and northwest by the Kittatinny or North Mountain. The latter is bounded on the southeast by the Kittatinny Mountain and on the north by the escarpment of the Alleghany Mountains. The valley of the southeastern district is underlain by the lower silurian limestone, forming rich, fertile soils, and, in the northwestern part of the district, by soils disintegrated from the Hudson River States and shales.

The Appalachian district of the eastern part of the State has been subdivided by Professor Lesley into the (1) Catskill or Pocono wilderness at its eastern end, (2) Anthracite Coal Region, (3) the open country of the middle Susquehanna, and (4) the mountains of the Juniata country, in the heart of which lies the Broad Top coal-basin.

The Pocono division is the continuation of the Catskill Mountains in New York southward into northeastern Pennsylvania embraced within the counties of Wayne, Pike, Monroe, and Lackawanna, and may be said to practically end in the Nesquehoning Mountain west of the Lehigh River. The northwestern part of this division, lying to the east and south of the eastern end of the Wyoming-Lackawanna Valley, consists primarily of an elevated plateau cut through by numerous streams running in many instances

in narrow and deep valleys. The elevation of the summits ranges from 1,200 to 1,800 feet above tide-level. The soils of the district are poor and cold; the region is sparsely settled, but is one of the most healthy sections of northeastern Pennsylvania.

Passing upward from the counties of the southeastern portion, we meet successive chains of mountains; first the Blue Ridge, stretching from Allentown, in Northampton County, to Chambersburg, Franklin County, varying in elevation from 2,000 to 1,000 feet; next the Blue Mountains, from Delaware Water Gap to Gettysburg, reaching an altitude of 2,000 feet. Between the Blue Mountains and the Alleghanics, still farther to the north and west, lies the valley of the Susquehanna River, the branches of which drain parallel chains of long and narrow mountain ridges of unusual uniformity. This Appalachian valley is an undulating plain having a width of from 10 to 18 miles, and is one of the most attractive portions of the State. Its elevation is from 200 to 600 feet.

A glance at the map will show where the Susquehanna has cut its way through successive chains of mountains. These notches at numerous points afford a passage to the Delaware, the Lehigh, the Schuylkill, and the Susquehanna, and in this way an area equal to two thirds of the State is drained across the whole breadth of these mountain chains.

Among these ridges and valleys are broad areas of table-land preserving the same general elevation of the ridges, in the neighborhood of 2,000 feet. Upon this table-land are found, on the north, Kane, Clermont, Williamsville, in McKean County. To the southward, in Indiana and Cambria Counties, we have Indiana, Ebensburg, Cresson; still farther south we have Somerset, Berlin, and Fairhope; in Sullivan County we have Laporte and Eaglesmere. Nearly all these points have an elevation of over 2,000 feet.

This area of table-land, comprising in the aggregate one fourth of the State, rises abruptly as one approaches from the east, and forms a marked barrier 175 miles in length.

Not only is the middle portion of the State more diversified, rivers and their valleys being interspersed through the mountain ridges, but there is a marked difference between its geological character and that of the remainder of the State; it is much older. According to the estimates of geologists, the mountain ranges were at one time ten times as high as they are at present. At no point in Pennsylvania do we now find elevations greater than 2,500-2,700 feet. The upper strata have been swept away from the whole Sus-

quehanna Valley region, leaving the old red sandstone and the older rocks of the Silurian age. When an attempt is made, mentally, to restore the coal-beds stretching from the anthracite region at Wilkesbarre and Scranton to the Pittsburgh coal-fields, together with the accompanying strata, not now seen in central Pennsylvania, we get some idea of the enormous extent of erosion in the middle of the State. According to the estimate of Professor Lesley, five miles of overlying strata had to be removed before the present formations were exposed.

Pennsylvania is noteworthy for its thorough drainage. There is scarcely a lake in its entire extent, and few swamps. The wet lands are of very small area, and are found in Crawford and Mercer Counties. They do not have an important bearing upon the health of communities. Many of these swamps are covered by laurel thickets, and most of them are less than a mile across their widest portion.

An illustration of the important relation which topography has to the health of inhabitants may be given as follows: McKean County is made up of high elevated plateaus, extensively serrated by rapidly descending narrow valleys having various directions. The valleys descending toward the north and northeast are exposed to the unfavorable storm winds which generally blow from that direction, particularly south of the great lakes. The valleys descending toward the south and southwest are shut off from these winds, and get the full benefit of the warmer winds, coming from the south and southwest, and which are more favorable to healthfulness.

The number of counties is 67, the number of physicians is about 5,000, as nearly as can be estimated. This brief statement indicates the large scope of the inquiry I have started upon. The purpose in view and the points to which it is proposed to direct special attention are shown in the following circular, which has been sent to fully 650 physicians throughout the State:

1811 SPRUCE STREET, PHILADELPHIA.

DEAR DOCTOR: At the meeting of the American Climatological Society to be held in Philadelphia in May, 1886, I propose to deliver the Presidential Address on "The Causes and Distribution of Consumption in Pennsylvania." I can obtain from the last census the population of each county and the mortality from consumption. I am having prepared elaborate maps showing the peculiarities of soil and climate of each county. But I need further facts, which can only be obtained from experienced physicians in each township. I have drawn up the following

questions, which appear to cover the points of chief importance. They are arranged so that in many cases an answer may be given by under-scoring a word or by a monosyllable; but, though aware of the labor involved, I beg you to co-operate in this investigation by affording the fullest information possible. Detailed statements of instances of special mortality in families or localities will be highly valuable. A sketch, even though rough, of the local conditions in the latter cases would be of great service.

The great clinical, sanitary, and industrial importance of this investigation will, I trust, justify this appeal for your prompt and cordial co-operation. It may be added that full acknowledgment will be made of all such kind assistance.

Yours respectfully,

WILLIAM PEPPER.

1. Name of town, and population (stating year)?
2. Height above sea level?
3. Location of town—(exposed, sheltered, warm, cold)?
4. What winds—north, south, east, or west—most prevalent?
5. What is the atmosphere generally—(cool, warm, dry, damp; do fogs occur)?
6. Annual amount of rain—(number of inches, great, small, medium)?
7. Annual amount of snow—(great, small, medium)?
8. Is there much shade from woods about the town; through the streets? Has it been necessary to cut down trees for health?
9. Soil—(geological structure, sewers, ponds, bays, meadows, marshes, hills, valleys)?
10. Cultivation of soil—(very rich, good, medium, poor)?
11. What winds are most troublesome to consumptive patients?
12. Is the town specially liable to sudden changes from heat to cold; and is there any marked difference between the temperature at noon and at night?
13. Employment of the citizens in general—farming, factories, mining, lumbering, etc.?
14. Nationality of the citizens—(American descent for several generations, Germans, Irish, Jews, Negroes, other nationalities)?
15. Is consumption prevalent or rare?
16. Is any part of the town peculiarly liable to the prevalence of consumption?
17. If so, what are the peculiarities of the spot or district?
18. Are there any individual houses where consumption has been specially frequent? If so, is there hereditary influence? And what are the conditions of the house as to dryness, dampness, amount of shade, etc.?
19. Is consumption specially prevalent or specially rare among any class or any race—specially Americans, Jews, Negroes—or any occupation?

20. Does consumption run an acute or chronic course in your cases?

21. Do you know of any cases of incipient consumption apparently cured by coming to or by going from your town or district (and, if so, what were the differences of the spots)?

22. Is consumption, as you see it, caused or promoted by hereditary influences (and in what percentage of cases)?

23. Can consumption be apparently prevented from occurring in children so hereditarily disposed, and by what means?

24. Have you any evidence in support of or against the contagious or infectious character of consumption?

25. Is malaria prevalent in your town? If so, is consumption specially prevalent in the malarial districts?

26. Is rheumatism prevalent in your town?

27. Is pneumonia prevalent in your town?

28. Is Bright's disease prevalent in your town?

The following resolutions were adopted by the State Board of Health and Vital Statistics of the Commonwealth of Pennsylvania, at a regular meeting held at Harrisburg, November 11, 1885:

Resolved, That this Board has learned with deep interest of the methodical and searching investigation into the territorial distribution of consumption in this State, now being prosecuted by Professor William Pepper; believing that it will not only add to our general knowledge of the causes of this most wide-spread and fatal of all diseases, but that it may also result in the discovery of regions of comparative exemption from its ravages within our own borders.

Resolved, That this Board bespeaks the cordial co-operation of physicians throughout the State in making this effort fruitful of results.

Resolved, That Professor Pepper be requested to put his deductions into such shape that the Board may be able to utilize them for the public good in its annual report.

It will be seen that the above questions aim at securing information about the general climatic topographical and geological relations of consumption, and especially about the influence of different local conditions rendering or tending to render the disease peculiarly rare or peculiarly prevalent; about the relations of occupation, race, and heredity to the occurrence and course of consumption and some other diseases as regards the above local and general causes. Considering the amount of time and labor required to answer carefully, even in the briefest manner, so many questions as the above circular contains, I feel that the fact of having received 120 replies representing 47 counties, many of them of elaborate character, is ample proof of the interest felt by the profession in this investigation, and calls for the warm expression of my thanks, which I now beg to make to

all of my correspondents. In addition to the material thus placed at my disposal, I have made liberal use of the mortality and vital statistics as prepared by Dr. John S. Billings for the census of 1880. Nor can I neglect this opportunity of referring to the great practical value of this colossal work. Despite the serious defects of the statistics resulting from the absence of any national system of registration of vital statistics such as is relied upon by all other civilized nations for the purpose of ascertaining the actual movement of population, the improved method employed in this tenth census and the ability shown by Dr. Billings in the arrangement and analysis of the results render the two volumes which have just appeared highly valuable to the profession and highly creditable to the genius and energy of their distinguished author. So far as concerns Pennsylvania, Dr. Billings's statistics are based upon 2,342 returns out of 4,661 registers of death sent to different physicians in this State.

I have also used all available published mortality returns in Pennsylvania, but it is a striking fact that there are none such provided save in Philadelphia and Pittsburgh.

With these data, and using Professor Lesley's topographical map as a basis, Dr. Guy Hinsdale, to whose intelligent and energetic co-operation this report largely owes its existence, has prepared for us maps showing the prevalence of consumption in Pennsylvania counties, and the relations between such prevalence and elevation, and mean annual temperature and rain-fall. It gives me pleasure also to acknowledge the kind co-operation of Dr. Hare in the collection and collation of material for this study.

As is doubtless known to you, the unit of locality used in the tenth census is the county; but, as it was impossible to give full statistics of the 2,605 counties in the United States, it was decided to give for the county only the total mortality at certain groups of ages and the number of deaths from a few diseases of special interest, and to do this only for counties having a population of 10,000 or upward. The more elaborate compilations were made for groups of counties within the limits of each State, which are called State groups. These groups were selected by Mr. Henry Gannett, the geographer of the census.

The State groups of counties can evidently be consolidated by States, or they can be combined into what the census calls grand groups, whose boundaries are determined by topographical peculiarities and not by State lines. Of these grand groups there are no less than twenty-one recognized in the tenth census, in only two of which

—viz., No. 6, the central Appalachian region, and No. 8, the interior plateau—does Pennsylvania appear, the important city of Scranton being in the former group, while in the latter the cities of Philadelphia, Pittsburgh, Allegheny City, and Reading are included. The counties of Pennsylvania are divided in the census into two groups, the first of which contains thirty-nine, viz.:

Adams, Bedford, Blair, Bradford, Cambria, Carbon, Centre, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Fayette, Franklin, Fulton, Huntingdon, Indiana, Juniata, Lackawanna, Lebanon, Luzerne, Lycoming, Mifflin, Monroe, Montour, Northumberland, Perry, Pike, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Wayne, Westmoreland, and Wyoming.

And the second twenty-eight, viz.:

Allegheny, Armstrong, Beaver, Berks, Bucks, Butler, Chester, Clarion, Crawford, Delaware, Elk, Erie, Forest, Greene, Jefferson, Lancaster, Lawrence, Lehigh, KcMean, Mercer, Montgomery, Northampton, Philadelphia, Potter, Venango, Warren, Washington, and York.

In the preparation of Map No. 1 it has been found desirable for the purposes of demonstration to divide these counties differently, and to make four groups, as follows:

Group I (Less than 500 Persons Living to One Death from Phthisis).—Berks, Bucks, Chester, Erie, Franklin, Fulton, Lehigh, Mifflin, Philadelphia, and Washington.

Group II (Between 500 and 750).—Adams, Allegheny, Armstrong, Beaver, Bedford, Bradford, Butler, Cambria, Carbon, Centre, Columbia, Crawford, Cumberland, Dauphin, Delaware, Fayette, Greene, Huntingdon, Jefferson, Juniata, Lackawanna, Lancaster, Lawrence, Lebanon, Mercer, Monroe, Montgomery, Northampton, Schuylkill, Snyder, Susquehanna, Venango, and Wyoming.

Group III (750 to 1,000).—Blair, Clearfield, Clinton, Indiana, Luzerne, Lycoming, Northumberland, Perry, Somerset, Tioga, Warren, Wayne, Westmoreland, and York.

Group IV (Over 1,000).—Cameron, Clarion, Elk, Forest, McKean, Montour, Pike, Potter, Sullivan, and Union.

Group No. 1 embraces those areas where there are less than 500 persons living for one annual death from consumption.

Group No. 2 embraces those areas where there are between 500 and 750 persons living for one annual death from phthisis.

Group No. 3 embraces those areas where there are 750 to 1,000 persons living for one annual death from phthisis.

Group No. 4 embraces those areas where there are over 1,000 persons living for one annual death from phthisis.

The same information which is displayed in this map by means of different degrees of shading is shown in tabulated form (see Table No. 2), with the addition of information as to the total population, the total death-rate per thousand, the number of persons to one square mile, and the number of square miles, the general character of the occupation of the population, and the mortality from malarial fever and pneumonia.

In considering the mortality from consumption, as shown by this table, it will be seen that there is not any striking disparity between that of the census group No. 1, which gives a rate per thousand of 14.9, and that of No. 2, which gives a rate of 13.2. This is noteworthy, since in the latter group the total population was 2,344,089, of which only 96,881 were living in the cities of Scranton, Pa. (45,850), and Paterson, N. J. (51,031), while in the interior plateau group, with a population of 5,714,683, and containing no less than 1,388,416 residents in cities (Philadelphia, 847,170; Pittsburgh, 156,389; Allegheny, 78,682; Reading, 43,278; and in cities out of Pennsylvania, 262,897), the rate of death from consumption per 1,000 population was only 14.9.

Equally remarkable is the composition of our first group of counties where there are less than 500 persons living to one annual death from phthisis, since it contains Philadelphia, with 129 square miles, and 6,567 inhabitants to the square mile.

GROUP 1.			GROUP 4.		
	Sq. mile	Persons per sq. m.		Sq. mile	Persons per sq. m.
Philadelphia.....	129	6,567	Clarion.....	570	71
Lehigh.....	360	183	McKean.....	1,000	42
Berks.....	900	125	Union.....	310	35
Bucks.....	590	116	Montour.....	600	33
Chester.....	760	110	Sullivan.....	430	19
Erie.....	770	71	Elk.....	770	18
Franklin.....	760	66	Pike.....	600	16
Washington.....	890	61	Cameron.....	400	14
Mifflin.....	380	52	Potter.....	1,070	13
Fulton.....	440	23	Forest.....	376	12

It is true that in Group 4, which comprises the counties with the lowest mortality from phthisis, and which we have placed by the side of Group No. 1 for comparison, the population is in every county very sparse; yet it seems evident that mere density of population has not a powerful influence in this question. The high gen-

eral death-rate in Philadelphia, 20.4 per thousand, is certainly attributable in large part to other causes. However, it will be observed that all of the counties with high mortality from consumption have very little elevation, and, further, are seated in the areas of largest annual rain-fall. This remark is not applicable to Washington County, the returns from which are so much at variance with the others as to suggest inaccuracy.*

It may be noted that in Erie County, which has considerable average elevation, the mortality may be influenced by the proximity of the lake, and by the presence of a considerable body of low, wet land.

Having alluded to the possible influence of rain-fall, it is proper to call attention to Map No. 2, which shows the general distribution of mean elevation and of mean annual rain-fall in Pennsylvania. The figures in black indicate the general elevation of the irregular areas in which they are placed, and which are further distinguished by the varied shading. Of course, in a State of such large dimensions and of such diversified surface as this, there are points in every county which depart widely from the general average here given; but, notwithstanding, it will be found that the data of this map accord quite closely with the most important facts, and give a good general impression of the characters of the different districts.

It will be observed at once that those portions of the State where phthisis is rarest are the most elevated, having a general altitude of 1,500 to 2,000, or, better still, of 2,000 to 3,000 feet; while, in proportion as we enter districts of lower general altitude, we find correspondingly increasing rates of mortality from consumption. In explanation of the lines indicating mean annual rain-fall, it must be said that the small area above the isohyetal line of 35" yields an annual precipitation of from 30" to 35"; the area between the line of 35" and that of 40", comprising about two thirds of the entire State, gives a mean annual rain-fall of from 35 to 40 inches, and the area below the line of 40 inches an average annual rain-fall of from 40" to 45". In the area of maximum rain-fall will also be found Erie County, where the average for a series of years has been 42 inches. Some general correspondence will also be noted between these areas of rain-fall and the areas of varying mortality

* As further evidence of probable inaccuracy in the returns from this county, it may be stated that the statistics from the Surgeon-General's office show ninety-two deaths from consumption among females, and only forty among males.

from consumption, the higher figures among the latter coinciding with areas of greater precipitation.

It will be seen farther on, in the more minute study we have been able to make of Philadelphia, that the influence of elevation and of density of population appears to be considerable, and in accordance with what we have above stated. Before leaving the consideration of the general physical features of the State, attention may be called to the areas on Map No. 1, inclosed respectively by lines of black dots or of small crosses, the former of which indicate areas of standing pine, and the latter areas of standing hemlock. Unfortunately, the destruction of our timber has been so unscientific and wanton that the statement of the actually existing forestation in this as in many other States has little value from a climatic and medical standpoint, and is of only commercial interest. It is probably near the truth to say that the areas of standing hemlock represent what would have been areas of pine but for the wholesale destruction of the latter. It will be seen that these great areas correspond quite closely, for the most part, with those of the most favorable climatic conditions, and the greatest immunity from consumption.

Opportunity has been taken to place on Map No. 1 a few of the well-known health resorts of Pennsylvania, such as Pocono, North Mountain, Eaglesmere, Renovo, Kane, and Cresson. The elevation of these and similar points which might be named is considerable—from Renovo, where the hotel actually stands about 1,200 feet above sea-level, to North Mountain, 2,600 feet. The natural beauties and advantages of these points are unsurpassed, and nothing is required but a clearer appreciation of their excellence as sanitary stations and better facilities of access and accommodations for visitors to render them as attractive and valuable as any health resorts on this continent.

As would be expected, the study of the isotherms yields results closely corresponding with those already stated as to elevation and rain-fall; and, as the influence of the mean annual temperature may be regarded as only incidental where it presents such limited variations as exist here, it is sufficient to call attention to Map No. 3, in which the isotherms and the respective areas they include are shown so as to be easily studied in connection with the facts given in the other maps.

Turning now from this general survey of the mortality statistics and climatic conditions of Pennsylvania, the more important question

arises whether the data at our disposal indicate marked differences in the distribution or prevalence of consumption in areas much smaller than the counties, and whether, if so, any connection can be traced between such varying degrees of prevalence and any definite local causes or conditions. I had originally thought of preparing a map showing the geological features of the State to be studied with the other maps already described. But, as Professor Lesley pointed out to me, all the main geological formations lie at such a depth below the surface that it can not be supposed they produce any material effect upon those living above them; and, on the other hand, the surface conditions are so numerous and diverse that it would be impossible to portray them even for a much smaller area than the one we are considering. It will be observed that the list of questions sent to physicians throughout the State included several which were framed with the special object of securing information as to local conditions which might thus affect the frequency and cause of consumption. Dr. Bowditch attributed the result of his investigation entirely to the presence in his circular of two questions suggested by Dr. John Ware, namely: "Is any portion of your town peculiarly liable to the prevalence of consumption?" and "If so, what, if any, are the peculiarities of the spot?" It will be seen that in my circular, which was prepared after consultation with Dr. Bowditch, I included these same two questions (see 16 and 17); and others were inserted in the hope of eliciting information of this special and definite character.

Let us now turn to a detailed study of the 120 answers which have been received, for which purpose they have been carefully tabulated under the heading of each question, and, further, an abstract of the answers from each county has been prepared, which is given in the appendix.

As the point of special interest in the investigation is most directly touched upon by Questions 15 to 19, inclusive, the result of the answers to these will first be considered. In response to the question, "Is consumption prevalent or rare?" there are 112 replies, of which 64 state that the disease is rare or very rare, 37 that it is prevalent, and 11 that it is moderately prevalent.

From the counties making Group No. 1, excluding Philadelphia, which will be separately discussed, there are 20 replies, of which 13 state that the disease is rare and 7 that it is prevalent. Yet it will be noted that these replies are all from counties which give the highest mortality from phthisis—a fact which shows conclusively

how wholly insufficient are the data at my disposal for enabling me to draw any general conclusions. From the counties making Group No. 4, the general statistics of which show an annual mortality from phthisis of more than a thousand living, I have been able to secure only four replies, one of which states that the disease is prevalent, one that it is moderately prevalent, one that it is rare, and one that it is very rare.

In regard to Question No. 16, "Is any part of the town liable to the prevalence of consumption?" I have received 109 replies, of which 86 are negative and 8 affirmative. The first of these affirmative answers is from Dr. George F. Horton, of Terrytown, Bradford County, who states that, although the disease is rare and 50 per cent. of the cases are due to heredity, it is comparatively frequent in that part of the town which is situated on the river and where malaria also is prevalent.

A second affirmative answer is from Dr. H. A. Arnold, of Merion Square, Montgomery County, who states that, although consumption is seldom met with and 75 per cent. of the cases are hereditary, there is one house in the hollow where three cases of consumption occurred within a short time. The special characters of this house will be considered shortly.

The third affirmative answer refers to South Bethlehem, with a population of 5,000 inhabitants, at an elevation of 400 feet. Consumption is not markedly prevalent, but a certain part of the town on made ground, lying low near a brook, which acts as an open sewer, is thought to be associated with the prevalence of the disease. It can not be said that any individual houses have been specially the seats of this disease.

The fourth affirmative answer is from Dr. H. H. Bordner, of Shamokin Dam, Snyder County, which is a small village of 300 inhabitants at an elevation of 800 feet. Low and swampy areas are associated with phthisis; so also are certain damp houses. Consumption is especially prevalent in malarial districts.

The fifth affirmative answer is from Dr. W. T. Bailey, of Dillsburg, York County, who says that while consumption is rare in this town, with a population of 500 and an elevation of 1,065 feet, there is a central part of the town where it is frequent. All of the houses in that area have damp cellars and yards.

The sixth affirmative reply is from Dr. J. C. Gable, of York, York County, who says that consumption is prevalent in the damp portions of the town, where the houses are all more or less damp.

The seventh affirmative reply is from Dr. T. J. Ward, of Ridgeway, Elk County, a town of 2,000 inhabitants, with an elevation of 1,437 feet. Consumption is moderately frequent, but nearly all the cases have occurred in the neighborhood of a tannery on the north side of the town near the Elk Creek.

Dr. R. Leonard, of Mauch Chunk, Carbon County, in a communication received too late to embody in the tables, says: "The mountain is so steep and high on the street as to put the dwellings on that side in the shade. At one point there are about twenty dwellings upon which the sun never shines for three months of the late fall and early winter. It is here that consumption especially prevails. There is a marked difference in the number of cases on the north and on the south sides of the street, the south side giving the greater number. The Second Ward, situated upon a bluff 200 feet above the First, is open and exposed to all winds. Here consumption is not so prevalent, though pneumonia and rheumatism are frequent."

The statistics obtained from Philadelphia may be taken as an eighth affirmative reply. This city has the largest population, many wards having from 120 to 150 inhabitants to the acre. It varies in elevation from 0 to 440 feet. Consumption is prevalent. A glance at Map No. 4 will show at once those wards having the greatest mortality from phthisis. They are the First, Second, Third, Fourth, Fifth, Seventh, Eighth, Ninth, Sixteenth, Seventeenth, Eighteenth, Twenty-seventh, Twenty-ninth, and Thirtieth. A study of this chart will also show that these wards are in general characterized by a low elevation, greater density of population, and, on reference to the chart of water-supply, water of inferior quality.

In a communication from Dr. F. F. Davis, of South Oil City, Venango County, occurs the following interesting paragraph bearing on this question:

"Oil City is built partly on the north side of the river and partly on the south side or left bank. On the north side, part lies low and wet, with insufficient sewerage, and part lies high on a hill—about 150 feet above the river. On the south side one part is on the second bottom of the river, 30 to 35 feet above the river, and has a porous soil underlaid by gravel; part is on the hill, 100 to 200 feet above the river. Consumption is about *as common in one part as another*. I think consumption causes about 20 per cent. of adult deaths. It did the year I kept the record for the Census Bureau."

It will thus be seen that the vast majority of my correspondents deny the existence of any center in their town where consumption is

specially prevalent, but that, in a few instances where such special localized prevalence is asserted to exist, the local conditions are those of dampness, bad drainage, and excessive soil moisture, which are generally believed to favor the development of the disease. It is evident, however, that, unless continued inquiries which I hope to make shall elicit additional information at variance with the general tenor of the replies thus far received, it must be conceded that the evidence available does not point to excessive soil moisture as the main causal condition of consumption in this State.

In regard to Question No. 17—"If there are any parts of the town peculiarly liable to consumption, what are the peculiarities of the spot or district?"—there are but seven who reply that they have noticed any such peculiarities, and these speak of damp yards and bad sewers, and low ground by the river-side.

In reply to Question No. 18:

As to any individual house where consumption has been especially frequent, there are ten replies. The evidence of these replies is not, however, entirely concordant. On the one hand, Dr. W. G. Stewart, of Newville, Cumberland County, writes that, in one house, five young persons from ten to seventeen years of age died of consumption. The parents were robust and healthy, and there were no hereditary influences. The house, however, was shaded by large and numerous trees and was damp, with no drainage; water stood in the cellar, and the house was built on what is called "spouty land," and, further, it was not well ventilated. In another house in the same town, with bad ventilation, wet cellar, and no drainage, there was a large family, with hereditary tendency, who died of consumption. Dr. W. D. Bailey, of Dillsburg, York County, in like manner describes a house with several repeated fatal cases of consumption where the local conditions of the house were very unfavorable.

Dr. H. A. Arnold, of Lower Merion, Montgomery County, describes a house in a hollow, fifty yards east of a brass mill, where in three cases, two of them children from fourteen to sixteen years of age without heredity, and one an adult of consumptive family, all ended fatally. The locality was damp, and especially was the air charged with vapor from the melted brass, so that the case is complicated by the possible action of these irritating particles as a cause. In the other instances it is distinctly stated that hereditary influences co-existed.

Dr. William P. Noble, of Upton, Franklin County, writes:

"There is one house in the town in which the members of an entire family have died from consumption, but in this instance there was an hereditary influence, with, perhaps, a local condition favorable to the development of the malady. The house is of stone, well shaded on the north, east, and south, and is cool and damp even in warm and dry weather. The grounds surrounding it, which are ample, are of a damp, marshy character, and occasionally I have noticed gaseous matters escaping from it which were quite perceptible to the smell. The family spoken of consisted of the parents and four daughters. The father died at the age of sixty, the mother at fifty, and the daughters between twenty and thirty. For a number of years I noticed that all the cats kept about the premises took consumption and died of it. The family now living in the house, with the exception of one daughter, has been free from any symptom of the disease. The daughter, eighteen years of age, had several slight hæmorrhages about one year ago, but I am not positive that they were of tubercular origin. She was in pretty fair health in the spring, at which time she went West. I learn that she has been enjoying good health since then."

Dr. J. E. Rigg, of Stonerville, Westmoreland County, writes :

"Mr. and Mrs. Lane came to this township when young, seemed to be very healthy, lived to be quite old, and died without any evidence of lung trouble. Nothing known of their family history. They lived almost entirely in the basement of a stone house, which was damp and very poorly ventilated. In this part of the house they raised six children ; all lived to manhood and womanhood. Since then four of the six died of consumption ; the other two know nothing of the four who remained here and died of consumption. Two of them married one man of very good family history, he being of good health. The man is now suffering from consumption, having lived with the two women in all about thirty years. The children of the four whose history we have (the grandchildren of the old couple, Mr. and Mrs. Lane, some ten in number), all have consumption ; some have died, others advanced, and others yet just beginning. Change of climate has been tried with some, but with little benefit.

"Their habits were good : as a rule, little shade about the house. Spring of water just outside the wall of the basement."

In an interesting series of cases which came under my own observation, I had the question of heredity and of local influences studied carefully by Dr. Judson Daland with the following results :

Mrs. Jane Kief Garrity's mother was eighty-three years old when she died after two weeks' illness. Exact cause unknown. Her father was eighty-three years old when he died of kidney disease. They both were vigorous and strong, as were the rest of their immediate family as far as Mrs. Garrity could remember ; they all lived and died in Ireland. She has

five brothers, who are living and healthy to the best of her knowledge. One sister died in 1879, when fifty years of age, rather suddenly, after four days' illness; the exact cause is unknown, but she had asthma and malaria, and was very anæmic when Dr. Reid saw her. The remaining sister is alive and healthy.

Mrs. Jane Kief Garrity is now fifty-two years old, has always been stout and hearty, and is so yet. She married when about eighteen years old, just one year after she left Ireland; never showed tendency to pulmonary disease. Began menstruating when about thirteen years of age. This function ceased about one year ago.

Mr. Robert Garrity married the above when he was thirty years old; never developed tendency to pulmonary disease; was always well and strong; always a hard worker in a mill, where he was exposed constantly to great extremes of heat and cold; was probably a regular drinker of whisky, though never to excess except in two instances. He occasionally suffered from abdominal (internal?) colic from over-indulgence in cold water when heated. He died in 1871, when fifty years of age, from the effects of a severe burn received at the mill.

His father died when over ninety years of age. He had no special disease. Probably simply died of old age. He was always a hard worker. No lung trouble whatever. His mother died rather suddenly when seventy years of age. Cause unknown. If she had had phthisis, Mrs. G. would have known it.

One brother died early of variola. The remaining two brothers are probably alive and well.

His four sisters are all living and healthy.

Mr. and Mrs. Garrity's Offspring.—1st. One boy was born in Pottsville about 1851, and died, after two days' illness of croup (?), when fifteen months old. All children subsequently were born in an old house on the west shore of the Schuylkill River, in Conshohocken, Pa. They moved to new house, their present home, in 1875-'76.

2d. Boy was born in 1857, lived ten months, and died of summer complaint.

3d. Lizzie was born in 1858 and seemed healthy. No serious illness. Menstruation began late, when eighteen years old. She worked in a woolen mill, the air of which is filled at all times with fibers, dust, etc., but Dr. Reid says the other two hundred girls did not develop pulmonary diseases more frequently than those having other occupations. Her fatal illness lasted about six months. (Age at death, twenty to twenty-two.)

4th. Mary was born in 1860. Always rather thin, but never sick. Began menstruating when sixteen or seventeen. Fatal illness began in March, 1882, and terminated (ten months) in January, 1883, in her twenty-second year.

5th. Mary Jane was born about 1863. Was stout and hearty. Menses began when fifteen years old. Began losing flesh before going to the mill,

where she remained one year. She died, when twenty-one years old, October 25, 1884, after six months' illness.

6th. Annie was born in 1864. Always well and strong. Worked two years in a mill. Died in December, 1882, when nearly nineteen years old, after six months' illness.

7th. Julia, born in 1866, worked in a mill until two years before her death, which occurred from phthisis in February, 1882, in her sixteenth year, after an illness of eight months.

8th. Robert, born in 1868. Always well and strong; is tall and seems strong. Chest rather poorly developed, shoulders overhang, stoops; pulmonary resonance good everywhere. Now working in an iron mill about as his father did. Now seventeen years old.

9th. Katie, born in 1870, and therefore fifteen years old, always strong and well. Now looks the picture of health and strength. Stout, well developed; menstruates. Chest full, well shaped, and expands well during inspiration.

All of the girls had small waists—so much so as to suggest tight lacing. All the cases began in the same way, with slight hacking cough, irregular fever (partially influenced by ext. cinchonæ fld., or Warburg's tr.), rapid pulse (90–110–120), pains in the chest, which expectoration would increase; only occasional slight attacks of hæmoptysis; profuse night-sweats; and cessation of the menstrual flow. Gastric digestion poor.

The disease would begin at one apex, infiltrate that lung, and then infect the other. Toward the last, cavities would form.

While sick they were carefully nursed and placed in separate rooms, rendering the notion of contagion improbable.

Careful cross-examination failed to associate the beginning of these cases with any direct exciting cause other than the mill.

Dr. Reid believes all the cases were complicated by malaria.

The average duration of the disease was six months, except in Maggie's case, which lasted nine months.

Topography, Hygiene, Drainage, etc.—The house in which the children were born was situated on the west bank, about one hundred feet from the Schuylkill River. The situation is exceedingly bad, all the drainage being on the surface, and emptying into the river. Once or twice a year there would be a freshet, and this particular spot is so situated that the swift current strikes the shore with great force and deposits six or more inches of thick, bad-smelling mud. After each freshet there would be an outbreak of intermittent fever. In this neighborhood there are cases of malaria, more or less, all the time.

The drinking water was obtained from a well, and was poor in quality. The soil is so porous that it would be easy for matter to drain into it.

Twenty families were also exposed to the above unfavorable influences, but pulmonary diseases were no more frequent than elsewhere. They moved to present house about 1868 or 1870.

The house where these cases developed is situated within a few feet of the top of a steep hill, about 600 or 700 feet from the river and 80 to 90 feet above the level of the river. The ground is *dry*, composed chiefly of shale and small, flat pieces of stone. The cellar is perfectly dry and clean. The drainage is all above ground, and the cess-pool is some distance from the house. The rooms are all clean, large, airy, and well ventilated, though all the ceilings are low—about seven and a half feet high.

The drinking water is obtained from a well, and seems to be of good quality. I could find no source of contamination.

This house and its location seem to me to be particularly healthful (excepting the low ceilings).
JUDSON DALAND.

As would be expected, the answers to many of the questions bearing upon points of climate and topography are so varied as to render it impossible to draw any conclusions from them. Thus, in regard to the prevalent winds in those localities where consumption is frequent, it is only when, as in certain locations, the trend of mountain ranges or of rows of high hills, is such as to render towns in the inclosed valleys accessible to the winds which sweep through these valleys from certain quarters, that it can be said that the prevailing direction of the winds has a definite bearing upon the tendency to pulmonary disease.

A glance at Map No. 1 will show that this remark applies to a number of interior counties, as Fulton and Mifflin, which are traversed by parallel mountain ranges, so as to favor this effect of the wind.

Dr. Davis, of Venango County, writes :

“Our winds are very variable, sometimes blowing from different directions two or three times in a day.” “The winds most dreaded by our consumptive patients are, when an east wind has been blowing (or one from the south), the wind suddenly changes to the north, producing a sudden fall of temperature.”

While, however, the evidence is thus meager and conflicting in regard to the influence of local conditions upon the origin and prevalence of consumption in various parts of the State, the responses to Question 22—“Is consumption, as you see it, caused or promoted by hereditary influences, and in what percentage of cases?”—are strikingly uniform. This question is answered more or less fully in 94 of the communications I have received; in 87 the reply is affirmative; in only seven instances does the writer deny the existence of heredity in his cases of consumption. The percentage of cases in which heredity has been noted is stated in 31 replies. Only once is it

given as low as 25 per cent., 6 times as 50 per cent., 12 times at from 60 to 75 per cent., 7 times at from 80 to 90 per cent., and as existing in every case in three replies. This concurrence of belief in the great power of hereditary influence upon the development of consumption is, of course, in accord with general belief, though I confess it is more uniform and positive than I had expected to receive.

As bearing upon the current discussion of the contagious or infectious character of consumption, the replies to Question 24 are interesting. This question was, "Have you any evidence in support of or against the contagious or infectious character of consumption?" There were 45 affirmative replies.

Dr. William D. Bailey, of Dillsburg, York County, relates an instance in which a house had been built in an excavation in a hillside and which had a small yard on the east and south; this yard is always damp. As the house is in the shape of the letter L, little or no air can sweep through it; neither do the rays of the morning sun reach it until high up.

"In this house I have attended two cases of consumption—sisters. Both terminated fatally; the eldest died after suffering about three years; the younger slept with her, and soon after her death took it and died in about five years after. I observed what I thought alarming symptoms in a third sister, but forbade her sleeping with the affected sister, and now she is in reasonably good health. I can trace no hereditary taint in the family."

Dr. C. B. Wood, of Monongahela City, Washington County, Pa., is a firm believer in the contagious character of consumption, and offers the following evidence:

CASE I.—Three children in a negro family died of consumption, all under twelve years of age. The father and mother died of the same disease a few years later.

While the children were sick and dying, a robust young man—negro—whose parents are strong, healthy people, boarded with this consumptive family, during which time he was taken sick, and in his case were present all the symptoms of consumption excepting hæmorrhage and those symptoms found after there is an actual destruction of lung-tissue. He was sick about three months, was greatly emaciated, and I thought must surely die, but he recovered, and is strong and healthy to-day, after five years.

Treatment.—Change of boarding place, cod-liver oil, syr. hypophos. cp., rich milk, and a little good whisky.

CASE II.—A young woman aged twenty-six, unmarried, came to her

aunt's to live, or rather to die, as she was in the last stages of consumption.

A cousin of the consumptive slept with her. After several weeks' attendance I was asked to see the girl (whose age was eighteen). She complained of pain in apex of right lung, had a cough, had been having night-sweats, loss of appetite, and physical signs of disease in the lung.

I at once ordered her not even to stay in the same room with the consumptive, placed her under treatment, and she recovered and is living to-day in good health.

CASE III.—Mr. A., a farmer, died of consumption. His wife, whose family history was excellent, was taken sick shortly after her husband's death, and died of consumption within two years.

CASE IV.—Now under my care. Young woman, married four years ago. Husband had hæmorrhages previous to marriage. Two years after marriage went to Mexico to practice medicine, was taken worse, and died of consumption. The wife was with him probably two and a half years altogether of their married life. Her history on father's side not very good, on mother's side excellent. But, when I remember what a picture of health she was previous to marriage, I can not but believe that her husband at least caused the development of her present disease, consumption, if latent, if he did not sow the seed. She spent the last two winters in Boston, and is now in Monongahela City with her mother. Her present condition is alarming, and she is now undoubtedly in the second stage of consumption.

Dr. J. J. Koser, of Shippensburg, Cumberland County, relates a case in which consumption occurred in a lady thirty-six years of age, apparently contracted by nursing a relative of her husband's, who died of consumption about a year before she consulted Dr. Koser. She was then moderately far advanced in disease. She had no history of consumption in her family, but, on the part of her husband's family, there was a history of consumption, and, about a year and a half after death of the wife, the husband died of the same disease. They had three children who are apparently healthy at the present time.

Dr. Carr, of Schuylkill County, writes:

"I have known several women who were married to consumptive men, and several men who married consumptive women. The children on both sides were apparently healthy till they began to arrive at the age of puberty, when they showed signs of consumption, thus showing an hereditary taint; the parents who were healthy being in good health, while those that were suffering from consumption have died; and many of the offspring died of well-marked consumption, in its acute form, as they arrived at the ages of eighteen or thereabouts."

Question No. 19—"Is consumption specially prevalent or specially rare among any class or race—especially Americans, Jews, negroes—or any occupation?" Twenty-five stated that no class was specially affected, or that all classes were equally affected; 21 stated that the disease attacked chiefly Americans; 14, negroes; 5, Irish; 2, Germans; 3, Swedes; 1, Indians (Carlisle); 4, miners; 3, axe-grinders; 2, cotton-factory operatives; 1, stone-cutters.

PHILADELPHIA.

More careful attention has been paid to Philadelphia, because here alone has it been possible to secure such data as are required for an intelligent study of the distribution of consumption.

It is to be hoped that, if this report contributes to nothing else, it will aid in bringing our authorities to appreciate the lamentable absence of all careful records of mortality outside of this city. Even in Pittsburgh the mortality returns, which were secured through the courtesy of Dr. W. H. Mercur, are defective in not giving reports from the individual wards, though in other respects interesting and valuable. And in not one of the smaller cities have I been able to learn that complete mortality returns are regularly printed and published. I have even been assured by my correspondents, in some cities of 50,000 to 70,000 inhabitants, that it is entirely possible for a corpse to be interred without a physician's certificate as to cause of death, and without official registry of burial.

In approaching the study of consumption in Philadelphia, several tables were prepared, which are given in the appendix. During the past twenty-six years the mortality from phthisis in this city has been about 60,000 out of a total mortality from all causes of about 400,000. The uniformity with which the rate of 14 per cent., as that of the proportion of deaths from phthisis to total mortality from all causes, is maintained year after year is remarkable.

Table No. 2 shows the proportion of the deaths from consumption occurring at different periods of life.

The same excessive mortality from this disease among negroes, which is noted at every part of the State where any considerable number of this race reside, is conspicuous in the returns from Philadelphia. The total mortality of negroes from phthisis during the past twenty-four years has been 4,327, while the average annual negro population during this time, of about 25,000, would have yielded a mortality from consumption of only 1,900 deaths were the rate the same as among the rest of the community. The mortality

returns are not sufficiently minute to enable any statement to be made as to the mortality of the various individual foreign elements which contribute largely to our population. In 1880 the deaths from phthisis among the foreign-born were 1 in 266. To state the case in another way: In the foreign population the mortality from phthisis for twenty-five years has been 18,189, whereas the average death-rate from phthisis, as determined from the whole community, would have rendered 15,125 the proper total of deaths from phthisis for the foreign-born. It is evident that, if the deaths from phthisis among negroes and among the foreign-born were deducted from the total, the mortality from this cause among the white native-born citizens of Philadelphia would appear truly as being much smaller than is commonly regarded.

The deaths from phthisis among the native white population are 9.3 per cent. of the total mortality, and, excluding negroes and foreign-born, there is one death from this disease in every 506 of the population.

It has been found impossible to obtain complete statistics as regards the mortality from phthisis among the Jews, a point of considerable interest in consequence of the prevalent notion that this race is remarkably exempt from that disease. I am indebted to the kindness of Dr. Isaac Leopold for the following figures, which give the burial records for the past ten years of a Jewish cemetery and of a Jewish beneficial society. They show that, of 611 deaths, 58, or 9.5 per cent., were due to phthisis, while in the entire community the proportion is 15.4 per cent.

A chart has been prepared by Dr. Hinsdale showing the relation which the mortality from phthisis in Philadelphia in each ward, during the years 1860, 1870, and 1880, bears to elevation and density of population. The position of the wards is noted as to river frontage, rural districts, etc.

It is remarkable that the greater mortality from phthisis coincides with low elevation and greater density of population. Another table shows that the wards where phthisis is more frequent are supplied with water from the poorer pumping stations.

In an article on "Consumption in New England," by Dr. E. P. Hurd, of Newburyport, Mass., published in the "Boston Med. and Surg. Jour.," March 29, 1883, several interesting facts are brought out. In Newburyport, during twenty-five years, there has been an average population of 13,500. It is the type of an old seaport and fishing town, having a nearly stationary population of an old Ameri-

can ancestry. It is cold and chilly. During this period the deaths from phthisis were one sixth of the total mortality, or one in 285 of the population. He shows that in 1880, among those of American parentage, there was one death in 351; among those of foreign parentage, one in 136.

Dr. J. Curtis, in a study of phthisis in Boston made forty years ago, found that between 1821 and 1848 the deaths from phthisis were to total deaths as 1:5.76.

Hayward found that in New York city between 1820 and 1850 the ratio was 1:5.54, or 18 per cent. of the total mortality.

Dr. E. M. Snow found that in Providence, R. I., between 1840 and 1854 the deaths from phthisis were one in 209 of total population; between 1856 and 1881 they were 16.69 per cent. of the total mortality, or one in 317 of the total population. He also shows that in 1880, among those of American parentage, there was one death in 435; among those of foreign parentage, one in 268.

The ratio in Philadelphia in 1880 was one in 316 of the total population, which, it is to be borne in mind, is by far the worst ratio found in Pennsylvania. The deaths from phthisis are 15.4 per cent. of the total mortality.

I am also able, by the kindness of Dr. Mercur and of Dr. Snively, of Pittsburgh, to include among these statistics the very careful records of the mortality from phthisis in that city. They extend from 1875 to 1886, and show that this disease is not so frequent in Pittsburgh as it is in Philadelphia.

Calculations from these statistics show that the deaths from phthisis during eleven years were 9.2 per cent. of the total mortality. There was, in the year 1880, one death from consumption for 497 persons living. The corresponding figures for Philadelphia are 15.4 per cent. and 316 persons living for one death from phthisis.

Among the foreign-born in Pittsburgh there was one death in every 327 persons living; among the negro population there was one death for 367 persons living.

SUMMARY OF REPLIES FROM 120 PRACTITIONERS IN 47 COUNTIES OF PENNSYLVANIA.*

BERKS COUNTY.—Two replies. Mohnsville; population, 500. Sheltered. West winds prevail. Air cool and damp. Fogs occur occasion-

* I take this opportunity to express anew my sense of obligation to the numerous correspondents whose valuable replies to my circulars and letters can not be adequately presented here.

ally. It is a town with many shade-trees. There are ponds, meadows, hills, and valleys. The soil is of medium quality. There is a considerable fall of temperature at night. The people are engaged in farming and in factories, and are chiefly American and German. Phthisis is rare. There has been only one death from phthisis in four years in this town. It assumes a chronic course and is hereditary. There is no malaria, and only occasionally rheumatism, pneumonia, and Bright's disease.

Reading; population, 43,278 (1880); elevation, 280 feet. Sheltered and warm. The air is warm and dry. Fogs are rare. There is not much shade outside the town, but there is abundance in the streets. No trees have been cut down for health. The rock is limestone and there are many fissures providing ready underground drainage. There are deposits of clay. There are few marshes. There are hills to the east and south. No marked changes in temperature. The population is mixed, and is engaged chiefly in factories. Consumption is moderately prevalent, and possibly more so in the newer districts. Cotton-factory employees and marble-cutters are especially prone to phthisis. The disease usually runs a chronic course. There is one death from phthisis for 389 persons living. The general death-rate is 15.8 per thousand. Phthisis is both caused and promoted by hereditary influences in the majority of cases. Malaria is prevalent, but has no relation to phthisis except as it may bring about "consumption from congestion." No prevalence of pneumonia, rheumatism, or Bright's disease.

BUCKS COUNTY.—Three replies. Falls Township; elevation, 40 feet. Sheltered. Northwest and southwest winds prevail. The air is warm and dry; fogs occur. Rain-fall, 42 inches. Snow, 30-40 inches. Little shade. There are meadows. Soil, clay and gravel; of medium quality. No marked atmospheric changes. The people are of American descent and engaged in farming. Consumption is rare. There is a house where consumption has been especially prevalent: it is a stone house on a dry knoll with little shade. The disease is chronic, and the reporter's cases are in females chiefly. Seventy-five per cent. are hereditary. Malaria is prevalent, but consumption is not specially prevalent in malarial districts. Rheumatism is prevalent. Pneumonia and Bright's disease are not.

New Britain; population, 150. Sheltered. West winds prevalent. Soil very rich, sandy, and well cultivated. Northeast winds troublesome to consumptives. No great atmospheric changes. People engaged in farming and of American descent. Moderate amount of consumption. The disease is usually chronic; most cases are hereditary, the exciting cause being malaria in nearly every case. In two cases attendants contracted phthisis. Malaria is prevalent. Rheumatism, pneumonia, and Bright's disease are not.

No. 3. Point Pleasant; population, 300. In a sheltered position on the Delaware River. Fogs occur. There is abundant shade. There are hills and valleys. Soil of medium quality. East winds troublesome to consumptives. No marked atmospheric changes. The people are Ameri-

cans, Germans, and Irish, and are engaged in farming and lumbering. The disease is usually acute; it is hereditary, but skips generations; it may be propagated from husband to wife. Malaria occasional. No prevalence of pneumonia, rheumatism, or Bright's disease.

CHESTER COUNTY.—Five replies. Three reports from West Chester; population, 8,000; elevation, 412 feet; exposed; mean annual temperature, 50°. Northwest and southwest winds prevail. The air is dry and there are few fogs. Rain-fall, 48.4 inches. Small amount of snow. The streets are well shaded, but there are no woods near. The soil is a loam from decomposed igneous rock. There is clay. There are swamps, but the land is generally well drained; but few sewers. The soil is rich. Southeast winds are troublesome to consumptives. There is no great liability to sudden atmospheric changes. There is a great fall of temperature at night. The people are engaged in farming. Consumption is moderately prevalent. It pursues a chronic course, is hereditary, and is frequent among negroes. The reporter thinks the disease is contagious. No prevalence of malaria, rheumatism, pneumonia, and Bright's disease.

Another report from West Chester says that east winds trouble consumptives the most, and that there is no great fall of temperature at night; also that phthisis is not prevalent, but that a few houses in the country that are low and shaded seem to be particularly associated with phthisis. The reporter, Dr. Jacob Price, has known cases cured by removal to elevated western localities; he says heredity is a strong factor, and that contagion occurs; on the other hand, that liberal diet and out-of-door life may prevent the disease in children predisposed to it.

A third reporter estimates the hereditary cases at 25 per cent., says the disease is not specially prevalent, and believes in contagion.

No. 4. Unionville; elevation, 350 feet. Sheltered, warm and cold. West winds prevail. Atmosphere is variable. The soil is good and is on a Silurian and Laurentian base. There are ponds, meadows, hills, and valleys. East winds are troublesome to consumptives. There are sudden atmospheric changes. The people are engaged in farming and are of American descent. Phthisis is rare; it is chronic; hereditary in 75 per cent. No malaria. Rheumatism is prevalent. Pneumonia is not prevalent. There are a few cases of Bright's disease.

No. 5. Springfield; elevation, 557 feet. Exposed and cold. Fogs occur. It is not shaded. Soil is good and is clayey. Marked changes in temperature. Occupations are farming and mining. Consumption is rare. No part of town or house is liable. The disease is both acute and chronic. East winds trouble consumptives. Ninety-five per cent. due to heredity. Children can be protected by good hygiene. No evidence in support of infection. No malaria. Little rheumatism and pneumonia or Bright's disease.

ERIE COUNTY.—Erie; population, 27,730; elevation, 573 feet. One annual death from phthisis in 433 inhabitants. Situation exposed. Mean annual rain-fall, 42 inches. Mean annual temperature, 49.3°.

FRANKLIN COUNTY.—Three replies. No. 1. Greencastle. Consumption is rare. In over 1,200 patients the reporter has only 15 cases of phthisis, 3 of which had hereditary taint. No part of his town peculiarly liable to the disease. The employment is farming. Americans and negroes, with a few Irish and Germans, suffer. No particular houses are afflicted, unless in cases of decided humidity. Course is always chronic in his practice. Phthisis is hereditary, but in 20 per cent. of his cases (three cases) there was no heredity, the cases occurring in girls at puberty. He states that disordered menstruation is the most common cause of the disease where no heredity exists. He has never seen the disease in males without heredity. He has never seen it prevented, and knows of no reason for believing it to be contagious. Malaria is not prevalent. Rheumatism is quite prevalent. Pneumonia not prevalent, nor Bright's disease.

No. 2 writes from Upton; population, 165; elevation, 693 feet. It lies in an exposed, cold situation. Atmospheric changes are great. Employments are agricultural and mechanical. Citizens are Americans for several generations. Consumption is rare, and no part of town is peculiarly liable. There is one house in which a whole family have died from this malady, hereditary influences and other unsanitary causes being present. Consumption does not affect any class or nationality in particular, and the disease is as often acute as chronic. No cases have been affected by going from or coming to the town. Fifty per cent. of cases are due to heredity. Reporter has no doubt that children with hereditary influence can be saved by hygienic precautions. Has no evidence as to infectiousness. No prevalence of malaria. Rheumatism is frequent. Pneumonia not very frequent. No prevalence of Bright's disease.

No. 3. Chambersburg; population, 9,000; elevation, 605 feet. Sheltered; temperature moderate. Northwest winds prevail. Air signally moist; not foggy. Limestone. Soil good. Phthisis not very prevalent. Not liable to sudden changes from heat to cold. Trades, factories and farming. Americans, Germans, and negroes form the population. No part of town is peculiarly liable. There have been particular houses afflicted; hereditary influence present; surroundings good. The disease occurs most in negroes and mulattoes, and among these is very fatal and rapid. Runs chronic course in whites; acute in negroes. Patients have had hæmorrhages here, have gone to Colorado, and have recovered; on returning, been ill again; but, on going West, have recovered. Seventy-five per cent. due to heredity. Can be prevented by hygienic measures. *Has plenty of evidence of infection.* Thinks it much more frequently contagious than is generally believed. No prevalence of malaria, rheumatism, or pneumonia.

No. 4. St. Thomas; population, 550; elevation, 800 feet. Town is dry. No sudden changes from heat to cold. People farmers; of American descent for several generations. Consumption is prevalent. No parts of town or houses are peculiarly liable. It is not more prevalent in one

race than another. It runs a chronic course. No cases have been caused by coming to town. It is promoted by hereditary influence. No prevalence of malaria, rheumatism, pneumonia, or Bright's disease.

FULTON COUNTY.—No replies.

LEHIGH COUNTY.—No replies.

MIFFLIN COUNTY.—Four replies. No. 1. Milroy; population, 750; elevation, 600 feet. Town is exposed and cool; is liable to sudden changes in temperature. The air is cool and damp. Fogs seldom occur. Agriculture and mining, factories and lumbering, are the pursuits. Germans and Irish form the population. Consumption is very rare. No part of town is liable particularly. Phthisis runs an acute course; "but few cases have occurred in many years." No cases of the disease have been cured or made worse by coming to this town. Milroy is located at the foot of the Seven Mountains, on the south side of the mountains and east end of Kishicoquillas Valley. The ground or soil on which it is built is all of made earth or wash from the mountains, to a depth of an average of twenty feet—the greatest depth is about forty feet—and of mountain soil, sand and pebbles, with large boulders. There are caverns. There is a mountain stream of considerable size flowing rapidly through the town, and sinking under a limestone ridge near the center of the town, making its appearance again in a much larger stream two miles south of Milroy. I have been informed that one entire family, except one member, a female about forty years of age, died of consumption. The family consisted of father, mother, four daughters, and one son. Another family consisted of father, mother, four daughters, and three sons. Three of the daughters died of consumption. There was, in my opinion, nothing to indicate hereditary disease in either case. "I have not seen any cases of hereditary influence in twenty years, or since my sojourn here."

In a practice of over forty years, Dr. Harshberger has seen cases prevented by proper diet and regimen, cod-liver oil, iron, etc. No proof of infection. No malaria, pneumonia, rheumatism, or Bright's disease.

No. 2. Lewistown; population, 4,000; elevation, 800 feet. Not exposed. Disease is not prevalent. There are often rapid changes from heat to cold. Soil alluvial; limestone. Has had but six cases in large practice in a year. Negroes are most often affected. Phthisis is not prevalent, and no part of the town or houses peculiarly liable to its prevalence. It runs a chronic course generally, and is promoted by heredity. The reporter has never seen any case benefited by going from or coming here, but believes that the disease can be prevented in childhood by hygienic measures. No evidence that it is contagious. Malaria is slightly prevalent in autumn.

Twenty-six, 27, and 28, negative answers.

No. 3. Newton Hamilton. Town sheltered and cold. South and west winds prevail. Air is cool and damp and foggy. Much shade. Town liable to sudden changes of temperature. Occupation, farming. Phthisis prevalent. No part of town is liable. He knows of a house peculiarly

liable, where there is hereditary influence. No race particularly liable. Phthisis almost always promoted by heredity. No evidence as to infection. Malaria is very prevalent. Twenty-six, 27, and 28, negatively answered.

No. 4. McVeytown; population, 700; elevation, 522 feet. Exposed. On the Juniata River. Soil alluvial; clay. Not liable to sudden changes of temperature except in summer. Fogs from August to November. Population, Americans and a few negroes. Consumption is rare. No part of town or any house is liable. Phthisis is somewhat prevalent among negroes. Runs chronic course. All cases are inherited. Can be prevented by hygienic measures. No evidence in support of contagion. Malaria is prevalent. No relation to phthisis. Rheumatism, both acute and chronic, is prevalent. Pneumonia and Bright's disease not prevalent.

PHILADELPHIA COUNTY.—See page 23.

WASHINGTON COUNTY.—One reply. Monongahela City; population, 3,000; elevation, 749 feet. Sheltered. East and west winds prevail. In winter and spring there is much damp weather, with heavy fogs in winter and late autumn. There are sudden and extreme changes of temperature; in summer the mercury often reaches 98°, and in winter -18° F. There is a medium amount of rain and snow. There is shade in the streets; trees should be cut down. Soil alluvial and good. East winds troublesome to consumptives. The people are engaged in farming, factories, and mining; they are of American descent, mining population, mixed. Phthisis is said to be "not prevalent to any great extent, and yet we have quite a number of cases, chiefly hereditary." No part of the town and no house and no race are associated particularly with phthisis. This disease runs a chronic course. The reporter, Dr. C. B. Wood, says: "Some cases have been benefited by going to the Pacific coast; others to Texas; others to the Northwest. None benefited by coming here; on the contrary, I think it an injury to them." In ten years Dr. Wood has met with but one acquired case, and he believes that incipient phthisis can be cured or prevented by out-door life, keeping away from school, proper diet, ventilation, and medicine. Dr. Wood is a firm believer in the contagious nature of consumption, and offers four cases in proof. Malaria and Bright's disease are not prevalent; rheumatism and pneumonia are.

N. B.—The returns as given in the census from this county are so much at variance with those from neighboring counties that there is almost certain and flagrant inaccuracy. The report gives 92 deaths from consumption among females and only 40 among males.

Group II.

ADAMS COUNTY.—No. 1. Dr. Pearson writes: "York Sulphur Springs is situated in the northern part of Adams County, at the foot of a mountain-range, in what may be called a rolling country. It is about

800 feet above sea-level, with a population of about four hundred, and is protected on the north and west by the foot-hills of South Mountain. I have practiced here since 1850. My practice takes in a scope of ten or fifteen miles in Adams, York, and Cumberland Counties, and includes both mountain and valley. Forty years ago the country was heavily timbered. Since then much of the timber has been cleared away, land and buildings improved, and inhabitants live much more comfortably than years ago. And, as a result of these improvements, diseases of all kinds have diminished. Although not more subject to consumption than other localities, I have found it to prevail alike in mountain and valley. Our population is mainly native-born, descendants of German and Scotch-Irish, so that I have had no opportunity of observing the disease in different race or nationality, but do not think there would be any material difference.

"I can hardly say that consumption is a prevalent disease. Yet it is seldom that there are no cases in the country. I have not found it to prevail in any particular house or any particular locality, but affecting the poor and affluent alike in mountain and vale. The great majority of cases are undoubtedly hereditary. I have known whole families carried off by it.

"Hereditary cases are generally considered chronic, and run their course very slowly, while cases not hereditary are acute, and are called by country people 'galloping consumption.' One prolific cause of the disease when not hereditary is neglected amenorrhœa among young females.

"I have met with no case of prevention of the disease when hereditary; it may be baffled, and life and health prolonged, but will almost invariably make its appearance at some time, and such cases are generally rapid in their course.

"I have found the most satisfactory results as a prevention in the young from the use of the hypophosphites, with cod-liver oil, malt, and like remedies.

"I have not met with any reliable evidence of the disease being contagious or infectious. Cases have occurred where, the husband or wife having died of consumption, the survivor soon followed from the same cause. But in these cases there was as much probability of a hereditary tendency as of contagion.

"I have not found malaria to have much influence on the disease, but, our country not being a malarial one, I have not had much opportunity to determine.

"I have known of no cases that were benefited by coming into or leaving this locality.

"Rheumatism is not very prevalent, but prevails to some extent in damp or very changeable seasons.

"Pneumonia prevails to some extent during winter and spring, is mostly caused by exposure and sudden changes of temperature from

damp to cold, and *is a fruitful cause of acute consumption*. Bright's disease is becoming quite prevalent."

No. 2. Two reports from Gettysburg; population, 3,100; elevation, 545 feet. On a knoll between two ridges. Rather sheltered but dry, with a moderate amount of shade in town. Few fogs. Soil red shale; good. South and northeast winds troublesome to consumptives. Phthisis is rare, and no part of the town suffers more than another. No houses in particular suffer. Phthisis is catarrhal and acute. A very small percentage of cases is due to heredity. It can be warded off by plenty of good food, etc. No evidence in support of infection. No malaria. Pneumonia and rheumatism moderately frequent. Bright's disease very rare.

Dr. J. W. C. O'Neal does not seem to think consumption at all rare. He speaks of one house, the cellar of which was in bad condition, where there were many cases of phthisis. There was heredity, and the habits of the people were sedentary.

The disease is most prevalent among Americans, and runs a chronic course. Is hereditary, and arises frequently from pneumonia. Children can be saved by hygienic measures. It is not contagious. No malaria; 26, 27, and 28 negative.

No. 4. Bonneauville; population, 118. The disease is rare. In spring and fall, town is cold and damp, with rapid and great changes in temperature. Farming. American descent for several generations. Where the disease has been in any particular house or part of town it has been due to heredity. It is most prevalent among those of German descent. It runs a chronic course. All reporter's cases have hereditary taint. Much can be done for such children by guarding them carefully. Reporter has evidence of infection. Malaria is not prevalent. Rheumatism is common in spring and autumn. Pneumonia common. Bright's disease is not prevalent.

No. 5. McKnightstown; population, 160; elevation, 600 feet. Is exposed and cold, with infrequent fogs and west winds prevalent. The disease is prevalent, but no part of the town suffers more than another. Dr. Elderdice speaks of a house where the conditions are good, where there is hereditary influence, and where phthisis has been frequent. It is not particularly prevalent in any race. It runs an acute course. About sixty per cent. of cases are due to heredity. Prevention is possible in children. Dr. Elderdice considers it contagious in many cases. Malaria is prevalent, and consumption is also in malarial districts. Rheumatism and pneumonia are prevalent. Bright's disease is not.

No. 6. Littlestown; population, 1,000; elevation, 700 feet. Is exposed, with occasional fogs. Farming is the general employment, all citizens being of American descent. Consumption is rare. No portion of town or any house seems to be particularly associated with phthisis. It runs an acute course, and is promoted by heredity. Dr. Seiss does not believe it can be prevented in children predisposed. He has evidence in

support of infection. No prevalence of malaria, rheumatism, pneumonia, or Bright's disease.

ALLEGHENY COUNTY.—See Pittsburgh (page 24).

ARMSTRONG COUNTY.—Two replies. No. 1. Kittanning; population, 1,800; elevation, 809 feet. Sheltered. Fogs seldom occur. Medium amount of snow. Not too much shade. Soil good. East winds troublesome to consumptives. No great atmospheric changes. Citizens engaged in mills, etc. Moderate amount of consumption. There are some cases of heredity. The disease is usually chronic and hereditary. The reporter, Dr. Alter, says that in one instance a perfectly healthy wife nursed a husband for six months; after his death she had a cough and slight hæmorrhage, but recovered. Another wife died within a year after her husband had died from phthisis. No hereditary tendency in either case. No prevalence of malaria, rheumatism, pneumonia, or Bright's disease.

No. 2. Worthington; population, 150; elevation, 1,100 feet. Sheltered, but cold. No excess of shade. Great changes in temperature. The occupations are farming, factories, and mining. American descent, with Germans and Irish. The disease is rare. No part of town or any house peculiarly liable. No nationality in particular suffers. The disease runs a chronic course. All cases are hereditary. Children may escape through care. No prevalence of malaria, rheumatism, or Bright's disease. Pneumonia is prevalent.

Dr. John K. Maxwell says: "I have for forty years believed that I have seen evidence of the contagiousness of this disease. The wife of a consumptive husband, or the husband of a consumptive wife, almost invariably dies of consumption, although belonging to healthy families themselves. I am unable to say whether this is owing to contagion or infection, but in a long experience I can recall but two exceptions to the rule, in both of which apoplexy was the cause of death."

BEAVER COUNTY.—One reply. Beaver Falls; population, 8,000; elevation, 600 feet. The town is sheltered by high, wooded hills. West winds prevail. The air is damp and fogs prevail. Soil gravel. Southeast winds troublesome to consumptives. There are marked changes of temperature. Population mixed; engaged in factories. Grinders and polishers are prone to phthisis. The disease is chronic and hereditary. Persons have been cured by going away to a warm, dry climate. There is some malaria. Rheumatism is rather prevalent. Pneumonia prevails during some winter seasons more than others. Bright's disease is not especially prevalent.

BEDFORD COUNTY.—One reply. Bedford; population, 3,000; elevation, 1,200 feet. Sheltered, but cold. Fogs occur. Much shade. No trees cut for health. Liable to sudden changes—heat and cold. Lumbering, farming, and manufacturing are the occupations. All nationalities represented. Consumption is prevalent. No spot in town particularly liable. There are houses particularly liable. No occupation exempt from disease. Most

common among Americans and negroes. Seventy-five per cent. are due to heredity. Runs both acute and chronic course, generally the latter. Children can be saved by strict regularity in food and clothing. No malaria. Rheumatism and pneumonia common, and prevalence of Bright's disease.

BRADFORD COUNTY.—Three replies. No. 1. Terrytown; population, 2,000; elevation, 600 feet. The air is cool at night; warm by day. Damp by reason of frequent fogs along the Susquehanna. Westerly winds prevail. Southeast winds are troublesome to consumptives. Soil good. Sudden changes of temperature are quite common. Farming and mining are the occupations. Inhabitants largely New Englanders. Consumption is rather rare; it is more common along the river, where malaria prevails; phthisis is chronic, lasting from two to twenty years, and affects all classes alike. In a practice of over fifty-five years Dr. George F. Norton finds that over fifty per cent. of cases are constitutional and hereditary. He does not believe that hereditarily predisposed children can be rescued from phthisis, but its advent may be postponed. He believes in contagion. Malaria is very prevalent along the river. Neither rheumatism nor pneumonia is prevalent, and Bright's disease has not been met with.

No. 2. Athens; population, 3,000; elevation, 750 feet. Sheltered by hills. Warm in summer, cold in winter. Damp, with dense fogs. Considerable shade in town; too much in places. Soil rich. South winds bad for consumptives. Occupations farming, mining, etc. Consumption is rather rare. One house, where heredity was present, was associated with phthisis. More frequent among Irish than Americans; more frequent still among negroes. Some cases are acute, others chronic; most cases are acute. It is due to heredity in seventy-five per cent. of cases. It can be prevented by hygienic measures. Has evidence in support of infection. Malaria common. Rheumatism is frequent, also pneumonia. Bright's disease rare.

Dr. E. P. Allen, who has practiced over forty years, writes:

"I have seen a few cases where the husband died of consumption and the wife's death followed in a few years, from three to five, and could trace no hereditary influence to attribute the disease.

"I have known a father, two daughters, wife, three sons, comprising every member of family, to die of consumption, though from the death of the father to the death of last member of family was thirty-eight years. Another family, consisting of five sons and two daughters, all of whom died in a period of twenty-three years. The father did not die of consumption, but from an injury on the head, several years prior to death of first child. The mother is still living and healthy. Heredity on side of father. A number of other cases might be reported quite as strong. No unsanitary conditions about houses or premises could be detected, such as shade from trees or dampness. Both families lived on farms on dry and elevated land.

"Malaria made its appearance about eight years since, after an absence

of fifty or sixty years, when it is said to have been quite prevalent. It has been declining the past three years, and is now rarely seen, though the word malaria is often improperly applied to sickness. Consumption is not very prevalent in the malarial district.

"Rheumatism is rather a frequent disease.

"Pneumonia may prevail at all seasons of the year among us, but it is far more frequent and fatal during the months of March and April than at any other period of the year. Its victims are mostly active business men past forty years of age.

"Bright's disease occurs now and then, but it is not a frequent disease."

No. 3. Troy; population, 1,500; elevation, 1,148 feet. Sheltered by mountains. North, south, and west winds prevail; east winds rare. Fogs rare. Soil good; subsoil, clay. Few marshes. The population is American, German, and Irish, and is engaged chiefly in farming and lumbering.

Consumption rare and chronic; cases of phthisis cured by removal to this county. Phthisis always hereditary. No malaria. Rheumatism, pneumonia, and Bright's disease prevalent.

Dr. Dare writes that Bradford County is damper than Sullivan, Tioga, and Potter Counties, owing to retention of water in clay subsoil. Fogs prevail along the valleys, and especially the Susquehanna. Dr. Dare speaks of a family of Smithfield, near Troy, of which all the children have died of consumption. The house is on an elevated ridge, "but damp in consequence of the clay subsoil."

Dr. Dare's own case is an instance of the benefit of removal to Bradford County. He resided in Chester, Delaware County, in 1857, was then thirty-five years of age, and had pulmonary hæmorrhage, being the only survivor of six children, all but one having died of consumption between the twentieth and thirty-fifth year. The family lived in Cumberland County, N. J. "After being prostrated one year I came to Troy, Bradford County, Pa. Since then I have had but one hæmorrhage, which occurred the following summer, and since that time I have been perfectly well." "The other members of my family were all attacked with pulmonary hæmorrhage as I was, and died in about one year after. I can see no reason, if I had remained in that section of the country, why I would have fared any differently."

BUTLER COUNTY.—No reply.

CAMBRIA COUNTY.—Two replies from Johnstown; population, 2,500; elevation, 1,200 feet. The town is sheltered and comparatively warm. Northwest winds prevail. The air is cool and damp, and there are sudden changes of temperature. There are high hills. Soil is of medium quality. Consumption is said to run a chronic course, and, in a majority of cases, is hereditary. No prevalence of malaria, but rheumatism, pneumonia, and Bright's disease prevail.

No. 2 says there are fogs in the autumn. There is much shade, and

there are sudden changes from heat to cold. Mills and mines occupy citizens, who are German, Irish, English, and Pennsylvania Dutch. Phthisis is rare. No part of town liable, nor any house. It runs an acute course. Not entirely due to heredity. No evidence in support of infection. No malaria. No prevalence of rheumatism, pneumonia, or Bright's disease.

CARBON COUNTY.—One reply. Weatherly; population, 3,000; elevation, 1,200 to 1,500 feet. The town is sheltered and cold. East and west winds prevail. Air cool. Fogs occasional. There is a great deal of snow. Not much shade. Hills and valleys. Sudden changes of temperature. People of American descent, Irish, and Germans, engaged in manufacturing. Consumption rare. No part of the town and no race liable to the prevalence of consumption. Disease chronic and hereditary. Malaria not prevalent. Rheumatism and pneumonia are prevalent, and there are some cases of Bright's disease.

CENTRE COUNTY.—Three replies. Two (Phillipsburg and Zion) state that phthisis is rare; one (Bellefonte) that it is moderately rare, not prevalent. The latter town has a population of 3,200; it is said to be in a sheltered but cold situation, liable to sudden changes of temperature and occasional fogs. Elevation, 733 feet. No particular parts of the town or individual houses are especially associated with phthisis. The course of phthisis is chronic, and the disease is hereditary excepting in the cases of axe-grinders. Rheumatism is moderately prevalent. Malaria, pneumonia, and Bright's disease rare.

No. 2. Phillipsburg, 28 miles west of Bellefonte, has a population of 5,000, and an elevation of 1,450-1,500 feet. It is in a valley sheltered by hills, and is warmer than the surrounding country; dry; free from fogs. Phthisis always takes a chronic course. Malaria was traced in three instances to a local, temporary cause—the plowing of swampy ground. Many cases of malaria were cured by residence in this county.

Rheumatism, pneumonia, and Bright's disease uncommon.

No. 3. Zion; population, 100; elevation, 883 feet. Exposed and cold; northwest winds prevail; fogs are rare; changes of temperature are marked. Phthisis is hereditary in 75 per cent., chronic, and frequent in axe-grinders. Rheumatism and pneumonia are prevalent; Bright's disease rare.

Farming, mining, and lumbering are carried on in this county.

COLUMBIA COUNTY.—One reply. Catawissa; population, 2,400; elevation, 477 feet; sheltered; northwest winds prevail. The air is damp and cold and there are fogs; rain-fall and melted snow, 39 inches; snow, 50 inches. There is a great deal of shade, and trees have been cut down for health. Soil very rich. East winds troublesome to consumptives. Marked atmospheric changes. People engaged on farms and railroads—Americans, Germans, and Irish. Consumption is rare and chronic; hereditary in 75 per cent. of cases. Malaria is prevalent, but phthisis is not

prevalent in malarial districts. Rheumatism prevails; pneumonia and Bright's disease do not prevail.

CRAWFORD COUNTY.—Two replies from Titusville. Population, 8,000; elevation, 1,194 feet. Town sheltered and is warmer than the hills about it. Both reports state that the atmosphere is damp, that sudden changes of temperature occur, and that there are some fogs. One report states that east and north winds are the more troublesome to consumptive patients, and that the disease is more frequently acute, with no evidence of infection; the other report states that southwest winds are the more troublesome, and that the disease is usually chronic and that there is presumptive evidence to prove infection, all of which goes to show that doctors will occasionally disagree. Consumption is not infrequent; rheumatism is prevalent; pneumonia and Bright's disease occasional. Trees have been cut down in the streets. All occupations exist and all nationalities are represented. The Swedes are prone to die of phthisis; the Jews rarely.

CUMBERLAND COUNTY.—Two replies. Both agree as to the prevalence of consumption and its chronic course, that easterly winds are the more troublesome in this disease, and that the large majority of cases are hereditary. Rheumatism is prevalent.

No. 1. Shippensburg; population, 3,000; elevation, 660 feet. Some shade-trees have been cut down; the atmosphere is damp and fogs occur. Great changes of temperature occur, and there is a marked difference between the temperature at noon and night. The industries are diversified. The people are chiefly of American descent; negroes are numerous. Pneumonia is prevalent and Bright's disease prevails to some extent.

No. 2. Newville; population, 1,900; elevation, 526 feet. The town is exposed and cold, but dry and free from fogs. The underlying rock is limestone and slate, and farming is the chief occupation. The people are largely of Scotch-Irish descent. Negroes and Indians (Carlisle), having once contracted phthisis, rapidly succumb.

For further information see letters of Dr. John J. Koser and Dr. W. G. Stewart (pages 13 and 20).

DAUPHIN COUNTY.—No reply.

DELAWARE COUNTY.—Two replies. No. 1. Media. Consumption rather prevalent. Soil red; a clayey loam. All nationalities represented. Occupation farming. Elevation low. Fogs occasional. Malaria and rheumatism rare. Pneumonia frequent in winter. Bright's disease infrequent.

No. 2. Clifton Heights; elevation, 154 feet. Sheltered. Drained by Darby Creek and Ridley Creek. Country undulating. Soil good. Manufactories. Phthisis somewhat prevalent. In one house one sister and four brothers died of consumption. They all passed the age of thirty-five years. Course slow. Hereditary history. Roomy frame house, dry, on elevated ground; grove on the south. Irish children predisposed, from being put at work in factories at an early age. Here the course of the

disease is quite rapid. Hereditary in 90 per cent. Reporter thinks the disease may be prevented to some extent. Malaria near brick-yard. No prevalence of rheumatism, pneumonia, or Bright's disease.

Q. No. 24. A man and wife lived together for twenty-five or thirty years and reared a large family of children. At the age of forty-eight years the wife had her first attack of hæmorrhage of the lungs and developed well-marked consumption. At that time the husband was a stout, ruddy-faced Irishman, apparently in perfect health. In the course of a year he became consumptive and died before the wife. One son has since died of the same disease.

No. 3. Upland; population, 2,500; near the Delaware River. Fogs are frequent. There is a good deal of shade. Many cellars have water a large part of the year. Soil clayey. East and northeast winds troublesome in consumption. Consumption not very prevalent; occasionally hereditary and generally chronic. Cases have been cured by removal to Georgia pine-lands and to Maryland. Malaria is more or less prevalent, but bears no relation to phthisis. Rheumatism, neuralgia, bronchitis, and pleurisy are common.

FAYETTE COUNTY.—Five replies. All report phthisis prevalent. In no place is there a report of excessive shade. The population is mixed and engaged in farming, coal-mining, and manufactures.

No. 1. Uniontown; population, 5,000; elevation, 950 feet. Exposed; cold. Southeast and northwest winds prevail. There is not much fog; the air is cool and damp. Limestone. Soil good. Northwest winds troublesome to consumptives. Considerable changes of temperature. Phthisis chronic. Americans and negroes affected. Hereditary. Rheumatism and pneumonia prevalent, Bright's disease not; no malaria.

No. 2. Brownsville; population, 4,200; elevation, 774 feet. Sheltered. West winds prevail. Fogs rise from Monongahela River in spring and autumn. Average rain-fall, nine years, 36.07 inches. Limestone; clayey loam. No ponds or marshes. Good drainage. Rich soil. East winds troublesome to consumptives. Reporter says phthisis is "more rare among negroes than any other class." Phthisis both acute and chronic. Two cases have apparently been cured by going to California and one to Colorado. Reporter believes in infection. Malaria and pneumonia not prevalent. Rheumatism and Bright's disease are prevalent.

No. 3. New Haven; population, 1,000; elevation, 920 feet. Sheltered and warm. Westerly winds prevail. Fogs occur in the spring and autumn. At other times the air is dry. Southeasterly winds most troublesome to consumptives. Great atmospheric changes. Americans and negroes suffer. Disease chronic and acute. Cases have been cured by removal to our mountains or going West. Hereditary in 60 per cent. No malaria. Catarrhal pneumonia prevalent; croupous, rare. Bright's disease rare; rheumatism prevalent.

No. 4. Vanderbilt; population, 1,000; elevation, 1,200 feet Sheltered and warm; in a valley. Soil good. Northeast winds troublesome to

consumptives. Phthisis chronic. Malaria, rheumatism, and Bright's disease not prevalent. Catarrhal pneumonia prevalent.

No. 5. Dunbar; elevation, 995 feet; sheltered north and west. Cool, dry; no fogs. South winds troublesome to consumptives. Marked changes of temperature. One house particularly associated with phthisis; it is damp and shady. Americans chiefly affected. The disease is usually acute. Reporter has evidence in favor of infection. Malaria, pneumonia, and Bright's disease not prevalent. Rheumatism prevails.

HUNTINGDON COUNTY.—One reply. Orbisonia; population, 1,100; elevation, 750 feet. Consumption occasional. The town is exposed and cold. West and southwest winds prevail; the former are the more troublesome to consumptive patients. The air is cool and damp, and fogs and sudden changes of temperature occur. There are some ponds. The soil is of medium quality; farming and mining are the chief pursuits. The people are for the most part Americans. Phthisis runs an acute course, and about half of the number of cases are said to be hereditary. No malaria or Bright's disease. Rheumatism is prevalent. Pneumonia moderately so.

JEFFERSON COUNTY.—No reply.

JUNIATA COUNTY.—No reply.

LACKAWANNA COUNTY.—Two replies from Scranton. Population, 70,000; elevation, about 750 feet. Mortality from phthisis 7.33 per cent. of total mortality. No fogs. Sudden changes of temperature. All nationalities represented; engaged chiefly in factories and mining. One reporter thinks phthisis is usually chronic and believed to be acquired, though hereditation has been noticed by the second, and his cases are acute. One reporter instances a case where a healthy wife was infected by a diseased husband. No malaria. Rheumatism, pneumonia, and Bright's disease are prevalent.

LANCASTER COUNTY.—Seven replies. One refers to consumption as very rare; two say it is rare; two, rather rare; one, prevalent to a limited extent; one, rather frequent. All excepting one (Manheim) describe their towns as exposed. The land is rich; the people are occupied in farming, are thrifty, and largely of German descent. Easterly winds are uniformly recognized as most troublesome to consumptive patients. Rheumatism prevails and malaria is not infrequent, excepting, of course, in Paradise, where the reporter not only states that consumption is rare, but denies the prevalence of rheumatism, pneumonia, Bright's disease, and says there is no malaria.

No. 1. Ephrata; population, 1,500. Situated on the north side of Ephrata Mountain, 384 feet above tide. In eleven years' practice Dr. McCaa found no cases of acquired phthisis, and states that the few inherited cases he has met with have moved there from other places. Rheumatism and neuralgia prevail owing to change of temperature.

No. 2. Bird-in-Hand; population, 350; elevation, 359 feet. The air is cool and damp, and there are occasional fogs; there is a liability to

sudden changes of temperature. Phthisis is more common among Americans and runs an acute course. Half of the cases are hereditary, and Dr. Miller believes the disease to be contagious. There are no houses, and there is no portion of the town, where the disease especially prevails.

Nos. 3, 4, and 5. Bainbridge; population, 669; elevation, 271 feet. The streets are well shaded; the atmosphere is spoken of as warm and dry, and few fogs occur. No unusual changes of temperature are spoken of by any of the observers. One says that all the cases are hereditary; the second that 80 per cent. are so; the third says that half are hereditary; all agree that the disease is chronic, and do not believe that it is infectious.

No. 6. Manheim; population, 2,000; elevation, 402 feet. Town sheltered and warm. It has been necessary to cut down trees for health. There are some ponds and marshes. Phthisis both acute and chronic. It is hereditary and sometimes contagious; Dr. Dunlap has strong evidence of this.

Malaria prevails to a limited extent, as well as rheumatism and pneumonia. Bright's disease occasional.

No. 7. Paradise; population, 110; elevation, 359 feet. Fogs occur occasionally. The town is not liable to sudden changes of temperature. Dr. A. H. Smith does not believe the disease can be prevented in children hereditarily predisposed. He has treated but two patients in seven years—one, aged five years; the other, aged six years and a half. Both were females living within half a mile of each other at the base of a mountain. Neither family was strumous.

LAWRENCE COUNTY.—No report.

LEBANON COUNTY.—One reply. Lebanon; elevation, 466 feet. Sheltered. South and east winds prevail. The air is cool and dry. Fogs do not occur often. There is shade in the streets, and trees should be removed. Limestone. The soil is very rich. East winds are troublesome to consumptives. There are great atmospheric changes. The people are engaged in factories; they are of American descent and German. Consumption is prevalent. There are houses in which consumption has been especially frequent. They are damp, but hereditary influence is present. There are private sewers with drainage into underground fissures. Consumption is generally chronic, and is hereditary in one half the cases. Malaria is not prevalent to any degree, and has no relation to phthisis. Rheumatism and pneumonia are prevalent. Bright's disease is not.

MERCER COUNTY.—Two replies. In neither place is malaria, rheumatism, pneumonia, or Bright's disease prevalent.

No. 1. Sharpsville; population, 1,819; elevation, 948 feet. The town is exposed and cold. North and east winds prevail. The atmosphere is damp. Fogs occur. The soil is good, being largely alluvial. Sandstone. South winds trouble consumptives. The people are employed in iron manufacturing, among whom are German and Irish. Consumption is

said not to be very prevalent, and pursues a chronic course. It is hereditary in about half the cases. The reporter thinks that children hereditarily predisposed can be rescued from phthisis by removal to a dry and equable climate of high elevation.

No. 2. Sharon; population, 7,000; elevation, 950 to 1,150 feet. It is sheltered in a deep valley and warm. North and west winds prevail. The atmosphere is cool and damp. Fogs seldom occur. Few streets shaded. The country is hilly. Northerly winds are the most troublesome to consumptives. The town is liable to extreme changes of temperature. The people, mostly Irish with some Germans and fewer Americans, are engaged in the iron industry. Consumption is rare; when it does occur it is chronic. The disease is generally hereditary, but occasionally acquired. One patient from Sharon has been cured by going to Colorado. Malaria is very prevalent; it is thought to act as a preventive rather than as a cause. Neither rheumatism, pneumonia, nor Bright's disease can be said to be prevalent.

Mercer, the county-seat, having in 1870 a population of a little more than one fourth that of Sharon, furnished about *the same* number of fatal cases of phthisis. It is said to be a well-known fact in the county that consumption is more prevalent in Mercer than in Sharon. The town is fourteen miles east of Sharon, situated on the top of a hill 450 feet above Sharon. The wind sweeps the town. The population of the former is largely native American; Sharon, largely foreign. The reporter (Dr. E. Griswold) inclines to the opinion that the general use of bituminous coal as a fuel and for manufacturing purposes secures a certain degree of immunity from phthisis.

MONROE COUNTY.—No report.

MONTGOMERY COUNTY.—Three replies. No. 1. Merion Square; population, 500; elevation, 600 feet. The town is exposed and cold. North and west winds prevail. The atmosphere is cool and dry. East winds are the most troublesome to consumptive patients. There are sudden changes of temperature. The people are of American descent for several generations, and there are many Irish; they engage in farming chiefly. Consumption is seldom met with; it assumes a chronic course. Seventy-five per cent of the cases are reckoned as hereditary. Reporter does not believe in contagion. No prevalence of malaria, rheumatism, pneumonia, or Bright's disease.

As to a house especially associated with phthisis, and notes as to preventive treatment, see Dr. H. A. Arnold's letter.

No. 2. Bryn Mawr. There is a large "floating" population. It is a fashionable resort ten miles from Philadelphia. Elevation at railroad station 416 feet above the sea. The place may be said to be moderately cold and exposed. The prevailing winds are southerly in summer and from the northwest in winter. East winds disturb those subject to phthisis. There are no fogs. The air is cool and dry. The country is hilly. The soil is dry and of micaceous schist. East winds are the most

troublesome to consumptive patients. There are sudden changes from heat to cold. There are Americans, Hiberno-Americans, and Irish. Consumption is rather rare. The report says that if any portions of the town are liable to the prevalence of phthisis it is the lower parts along the streams. Phthisis is hereditary in probably nine tenths of the cases, and is generally chronic. The reporter, Dr. Sargent, believes that by cleanliness, fresh air, good food, daily exercise, cool sleeping apartments, cool bathing, and frictions, the disease may be prevented in children hereditarily predisposed, and that there may be contagion by neglect of the above measures. There is a slight amount of malaria. Rheumatism is moderately prevalent; so is pneumonia. Bright's disease is not prevalent.

No. 3. Perkiomen; population, 2,515. The town is partly exposed, partly sheltered. West winds prevail. The air is cool and dry, except in valleys where there are streams; there it is foggy. Woods scanty. The soil is good; red shale. The people are engaged in farming. Consumption is chronic. Of the total deaths, about 16 per cent. occurred from phthisis and intercurrent pneumonia. Dr. Wolfe thinks that malaria acts as an exciting cause in those predisposed to phthisis. No prevalence of rheumatism, pneumonia, or Bright's disease.

No. 4. Conshohocken; population, 5,000; elevation, 210 feet. Town is exposed and cold; fogs sometimes occur. There is not too much shade. The town is not subject to sudden changes. People work in factories. All nationalities represented. Phthisis not prevalent. Occurs most frequently among Irish. The disease is unquestionably promoted by heredity. The reporter, Dr. Stiles, has known the disease to occur in wives who have nursed sick husbands, no heredity or family history accounting for the disease, which proved fatal in wives after the death of husbands.

Malaria is prevalent, but bears no relation to phthisis. Rheumatism, pneumonia, and Bright's disease are all prevalent.

NORTHAMPTON COUNTY.—Two replies. No. 1. Easton; population, 11,924 (1880). The principal part of the town is 190 feet above tide, a portion is from 290 to 300 feet above. The older part is sheltered, the newer part exposed. The wind during one year was from the northwest on 102 days; southwest, 150 days; northeast, 58 days; southeast, 23 days; north, 19 days; south, 5 days; east, 3 days. The atmosphere is warm. Fogs occur rarely. There is moderate shade in the streets. The rock is limestone. The older town is on diluvial soil—very rich. East and northeast winds troublesome to consumptives. The people are chiefly Americans; there are a few Irish, Jews, and negroes. Consumption is comparatively rare, mostly hereditary. The Americans are more liable to it, and of these, stone-cutters. The disease is generally acute, sometimes chronic, usually hereditary. The reporter, Dr. Traill Green, has no evidence in favor of contagiousness. Rheumatism is prevalent; malaria, pneumonia, and Bright's disease are not. General death-rate to 1,000, 16+.

No. 2. South Bethlehem; population, 5,000; elevation, 400 feet.

Sheltered. North and west winds prevail. The atmosphere is generally cool and dry. Fogs occur occasionally. The rain-fall is stated to be about forty-four inches. There is sandstone overlying limestone. The drainage is by cess-pool. The soil is good. Easterly winds are most troublesome to consumptives. No great liability to sudden changes. The people are largely occupied in factories. Consumption is not marked. A certain portion of the town, on made ground near a brook acting as an open sewer, is thought to be associated with phthisis; but that can not be said of individual houses. The disease is usually acute. In one very marked case the patient was cured by going to southern Colorado. Malaria is not especially prevalent; rheumatism is; pneumonia and Bright's disease are not.

SCHUYLKILL COUNTY.—Six replies. Five say that consumption is rare; one says it is not very prevalent. They usually speak of the liability of miners to the disease.

No. 1. Pottsville; population, 12,000; elevation, 614 feet. The town is sheltered by surrounding hills. The wind is usually southwest in clear weather. The air is cool and dry. There are no fogs. The country is hilly and dry, and woods are nearly destroyed. The soil is of medium or poor quality. East winds are troublesome to consumptives. The town is liable to sudden changes of temperature, and there is a decided difference between the temperature at noon and at night. The chief occupation is coal-mining. All nationalities are represented. Phthisis is hereditary in nine tenths of the cases. Rheumatism is prevalent; malaria, pneumonia, and Bright's disease are not.

No. 2. Mahanoy City; population, 10,000; elevation, 1,343 feet. The town is sheltered between two mountains, but is cold. At Mahanoy Plane the mean annual temperature for 1885 was 50.58°. The rain-fall was 52.24 inches. Fogs occur occasionally. The soil is poor. Easterly winds are troublesome to consumptives. The town is especially liable to sudden changes of temperature. The people are largely miners of all nations. The disease is chronic, and can not be averted except by change of climate. Malaria and Bright's disease are not prevalent; rheumatism and pneumonia are.

No. 3. St. Clair; population, 4,000; elevation, 752 feet. The town is exposed and cold. Northwest winds prevail. The air is cool and dry; no fogs. No woods. The country is hilly, and the soil gravelly; good drainage. Mixed population. Phthisis is usually acute. The reporter does not believe it to be contagious. Rheumatism, pneumonia, and Bright's disease are prevalent; malaria is not. (See Dr. Carr's report of hereditary cases, page 21.)

No. 4. Tremont; population, 3,000; elevation, 762 feet. The town is sheltered. North and west winds prevail. The air is cool and dry, and there are few fogs. Woods scarce. The country is hilly, and the soil gravelly of poor quality. North and northwest winds disturb consumptives the most. Changes of temperature at times marked; usually a

heavy fall at night. Americans are the more liable to phthisis, the disease usually taking a chronic course. The reporter, Dr. J. W. Bird, cites two cases in which wives nursed consumptive husbands, and soon fell sick and died of the disease; also one case in which the husband, who had to nurse his wife, is now (March, 1886) sick, unable to work, and will eventually die of tuberculosis.

Malaria, rheumatism, pneumonia, and Bright's disease are not prevalent.

No. 5. Schuylkill Haven; population, 3,300; elevation, 625 feet. The town is sheltered in part by mountains. Northwest and southeast winds prevail. Mean annual rain-fall, 1880 to 1885, 38.85 inches. Woods scarce. The soil is clay and red shale; of medium quality. People employed in factories and shops. The people are of German and Irish origin. Phthisis is usually chronic. Rheumatism is prevalent; pneumonia and Bright's disease are not. Malaria prevailed for five years, owing to dredging a canal and dumping mud within the town. The intermittent character has given place to the remittent.

"Our town is on the left bank of the Schuylkill River, the greater part of it four miles below Pottsville. It lies in a valley running east and west, broken by hills, mountains bounding it north and south, about three miles apart. Soil principally red shale and clay; natural drainage good.

"Surface drainage of town good, but many cellars have water during wet months. The upper part is built on hill and inclined plane; the lower part is very level; simply enough inclination for surface water to run off by little artificial aid. Cellars often filled with water; sanitary condition of town otherwise very good. Malaria was unknown here till five or six years ago, when it appeared suddenly to a great extent. Schuylkill Canal runs through the town. For many years past the canal was annually dredged, and deposit thrown within town limits. About a year ago malaria disappeared almost as suddenly as it came, the fevers changing to a remittent type instead of intermittent, and less under the control and power of the cinchona alkaloids. During the last year new and extensive excavations have been made by the Pennsylvania Railroad extension, which did not renew malaria. The lower part of town was the main locality affected during the five years. It had the fogs and prevailing winds somewhat modified by the consecutive mountain boundary south and east. Had scarcely any typhoid fever during the reign of malaria. No severe epidemics of any form in the five years since I have been here. Had diphtheria last spring in some families; many cases assumed the croupous form. If there is any disease prevailing more than other common diseases, it is naso-pharyngeal catarrh.

"Respectfully,

C. LEUKER."

No. 6. Pine Grove; population, 1,200; elevation, 520 feet. The town is exposed to north winds. Southwest winds prevail. The air is said to be damp and foggy. The amount of rain is put at 42 inches, and there is a great deal of snow. The town is shady and cool in summer. The

country is hilly, and the rock is slate. The soil is of medium quality. East winds are troublesome to consumptive patients. Sudden changes of temperature are frequent. Phthisis, in what few cases there are, takes a chronic course; it is always hereditary. Malaria and Bright's disease are not prevalent; pneumonia and rheumatism are.

SNYDER COUNTY.—Two replies. Shamokin Dam; population, 300; elevation, 800 feet. The town is exposed and cold. The prevalent winds are north and west. The atmosphere is cool and damp; fogs occur. There is a great deal of snow; not much shade. There are sewers in the town. There are neighboring ponds and marshes. The soil is a sandy clay. The town is especially liable to sudden changes of temperature; there is a marked fall at night. The people are engaged in farming and lumbering; these are of American descent for several generations, and there are Germans. Consumption is very prevalent. In some families all die of it before the fortieth year. Three such families have but one representative remaining; the latter is forty years of age, and is dying of consumption. The offspring die between the twentieth and thirtieth year. The intermarriages prove that it is hereditary. A few of the family left years ago for Colorado, where they are stout and hearty.

The low and swampy areas and individual houses are associated with phthisis. These houses are damp. Consumption is prevalent among Americans, is usually acute, and is promoted by hereditary influences.

Malaria is prevalent, and consumption is especially prevalent in malarial districts. Rheumatism and pneumonia are also prevalent; Bright's disease is not.

No. 2. Freeburg; population, 700; elevation, 509 feet. Sheltered. North and west winds prevail. The air is cool and dry, at times warm; fogs at times. Shade in streets. Trees have been cut down around some houses. Ponds, marshes, hills, and valleys. North winds troublesome to consumptives. People engaged in farming; of American descent and Germans. Not much consumption. Phthisis hereditary; infectious. Little malaria. Rheumatism, pneumonia, and Bright's disease not prevalent.

SUSQUEHANNA COUNTY.—Three replies. No. 1. Susquehanna; population, 4,000; elevation, 914 feet. The town is sheltered. North, south, and west winds prevail. The place is cold in winter and warm in summer. Few fogs. There is not much shade in the streets. The natural drainage is good. There is a loam of medium quality, with gravelly subsoil. The town is built on side-hills. Southerly winds are the most troublesome to consumptives. There are sudden changes of temperature. The people are employed in factories and machine-shops; about half are Americans, three eighths Irish, and one eighth Germans. Consumption can be said to be neither prevalent nor rare, and in nearly all cases is chronic, and in one half the cases hereditary. No evidence of contagion. There is only a slight amount of malaria, and no prevalence of rheumatism, pneumonia, or Bright's disease.

No. 2. Great Bend; population, 1,500; elevation, 884 feet. The town is cold. North and south winds prevail. The atmosphere is cool and damp. There is a medium amount of rain and snow. There is much shade from woods about the town, and there are hills and valleys. The soil is of medium quality. South winds are troublesome to consumptives. The town is liable to sudden atmospheric changes. The people are employed in farming and lumbering; they are Americans, Germans, and Irish. There is a moderate amount of consumption, which assumes both an acute and a chronic form, and in three fourths of the cases is hereditary. Malaria, rheumatism, and pneumonia are prevalent; Bright's disease is not.

No. 3. Montrose; elevation, 1,053 feet. The town is exposed. West winds prevail. The air is cool and dry, and fogs are rare. There is a great deal of snow. There is not much shade from woods. The country is hilly, and the soil good. East winds are most troublesome to consumptive patients. Atmospheric changes marked. The people are engaged in farming and in factories. The people are chiefly of American descent. Phthisis is prevalent, particularly so among negroes. Neither pneumonia, malaria, nor Bright's disease prevails. Rheumatism is prevalent.

·VENANGO COUNTY.—Six replies. Two from Oil City; population, 9,500; elevation, 1,008 feet on the flats; but the town is built on its seven hills. It is exposed and cold. Northwest winds prevail. The air is cool, and fogs are occasional. There is a great deal of snow, and not much shade. There are many hills and valleys. The soil is very poor. North and northwest winds are troublesome to consumptives. There are sudden atmospheric changes, amounting at times to 40° in six hours or less. The people are attracted by the oil-wells from all sides. This reporter, Dr. McCulloch, says phthisis is rare, generally acute, and largely hereditary, perhaps altogether so. From an experience of thirty-eight years' practice, the doctor believes phthisis to be infectious. Malaria and Bright's disease are not prevalent; pneumonia and rheumatism are.

The second reply from Oil City says consumption is prevalent, and describes the place as sheltered by hills. Phthisis hereditary in 72 per cent. of cases. In other respects the two accounts harmonize. The reporter, Dr. F. F. Davis, adds that the winds are very variable, sometimes blowing from different directions two or three times in a day; in summer from the southwest, and in winter from the northwest. When an east wind has been blowing, or one from the south, and there is a sudden change to the north and a sudden fall of temperature, consumptives suffer. Americans suffer most; Jews never. A majority of the cases are hereditary. Consumption is as common in the hilly portion of the city as in the lower and more wet portion. (See Dr. Davis's letter, pages 15 and 20.)

Three replies from Franklin; population, 6,000; elevation, 954 feet. The place is sheltered. Westerly winds prevail. The air is damp, change-

able, and fogs occur. The mean rain-fall (1875 to 1880), 40.9 inches. There is a medium amount of snow. Not much shade. There are hills and valleys. The soil is a sandy loam, with gravel, and is of medium quality. Southwest and northwest winds are most troublesome to consumptives. There are decided atmospheric changes. The people are attracted by the oil wells, and are of all nationalities. All agree that consumption is rare. No especial house or race is associated with phthisis. Hereditary influence is noted as in nearly 100 per cent. of cases, and the disease is chronic. Some patients have been benefited by a sojourn in South Carolina, Florida, Colorado, and California. The total death-rate from all causes is 11.7 in 1,000.

Dr. Stephen Bredin writes:

"In a practice of twenty-five years I have known several families afflicted with infectious consumption.

"The W. family. A son, aged about thirty-five, a worker in walnut-wood rails and stairing, returned home after a hæmorrhage, and in the last stage of consumption. After his death, his sister in attendance took the disease, as did also two other members of the family, aged, respectively, about twenty-six, twenty-eight, and thirty. None of the large family non-resident took the disease. The house was well lighted, well warmed, not shaded. Circumstances above the average. The father robust, the mother spare in flesh, and nervous in temperament. The surroundings were a rich alluvial, well-cultivated soil, with a rather low, ill-drained meadow of forty acres or so in front. No consumption in or about the neighborhood until the arrival of the sick son.

"McK. family. Father stout, but afflicted with a fistula in ano all his life. Mother large, raw-boned, healthy, but spare, a constant weaver by occupation all her life. House an old, badly kept frame, fronting south on a low alluvial but well-drained meadow. No shade, badly lighted, ventilated, and warmed. Two sons, robust men, engaged in the business of oil-well drilling, and thus much exposed, returned home and died of consumption. Three sisters and one brother, all adults and apparently well, carried off by consumption in succession.

"D. family. Father stout. Mother thin but healthy. House new frame, well lighted and ventilated, poorly warmed. Close on the north and west side large, tall white-oak timber; soil stiff clay, rich alluvium. Son afflicted with chronic diarrhœa, malarial probably; after recovery, declined and died of consumption in six months. Two sisters taken, and both died of a rapid consumption on the same day. Another taken afterward. By my advice, family removed into another county; no more deaths; has returned and occupied the same farm for a period of years with no more deaths. House better warmed, and timber entirely cut away.

"R. family. Husband had cough and extreme pallor; family history bad, having lost three or more relatives with consumption. Wife's family history good; spare in habit, with nervous temperament. Under my

treatment for a long time for palpitation and hypertrophy of the heart, having been afflicted previous to marriage. Mother of five children, youngest, one year old, developed, after weaning this child, a quick consumption. Autopsy revealed extensively diseased lungs. The husband survived her one year, dying in New Mexico of consumption."

No. 5. Emlenton; population, 1,100; elevation, 850 feet. The town is sheltered; west winds prevail; the air is damp and fogs occur frequently. There are woods about the town, but not much shade in the streets. The country is hilly and the soil is poor. There are sudden changes of temperature. The people are occupied in farming and mining for oil. They are largely of American descent. Consumption is prevalent and chronic; hereditary in one half the cases. Malaria is becoming prevalent; rheumatism and pneumonia prevail; Bright's disease does not.

Dr. J. E. Hall writes that the town is situated in a narrow valley and on a side-hill on the east bank of the Allegheny River, 89 miles above Pittsburgh. The town is sheltered from west winds by a hill covered with hemlock on the west bank of the river. Acute phthisis is rarely seen. The doctor thinks that the gas from the oil-wells is injurious to persons in whom consumption is well marked, but is perhaps beneficial in the early stages; also in bronchitis. However, the gas is not considered an especially valuable therapeutic agent.

Group III.

BLAIR COUNTY.—One reply. Hollidaysburg; population, 5,000; elevation, 953 feet. Sheltered. West winds prevail. The air is cool and dry. Fogs are infrequent. There is a medium amount of snow. There is shade in the streets. Soil good. Northeast winds troublesome to consumptives. The people are engaged in factories and in mining, and of various nationalities. Phthisis not prevalent, but is more frequent among Americans and negroes; hereditary and chronic malaria not prevalent nor associated with phthisis. Rheumatism and pneumonia prevail in winter and spring. Bright's disease not prevalent.

The town is situated on a hill-side. Rock, limestone. There are several sewers. No ponds or marshes. Meadows are dry. The town is surrounded, at a distance of one to ten miles, by an "amphitheatre of mountains."

CLEARFIELD COUNTY.—Four replies. Two from Clearfield; population, 3,000; elevation, 1,103 feet. The town is exposed and cold, though sheltered on east and west. Fogs occur frequently in the autumn. The site of the town is nearly level, having been at one time a swamp. The streets are shaded, so as to make the air rather cool and damp. The soil is of medium quality. There is an alluvial deposit ten to fifteen feet deep. At the bottom is a substratum of gravel; rock below and sand above. East winds are very troublesome to consumptives. There are sudden changes of temperature. The difference between noon and night is often very marked. The mid-winter temperature is steadily low. The

people are engaged in agriculture and lumbering; they are of American descent chiefly. There are some Irish and Germans. Consumption pronounced by one observer to be rare and chronic, and by the other to be prevalent and acute. Both acknowledge heredity. The cases are largely among Americans, except in stone-cutters' consumption, where race does not protect. Dr. Hartswick believes that consumption is infectious, having met with a number of instances where the husband, wife, sister, or nurse has apparently contracted the disease after long and constant watching at the bedside. No malaria; rheumatism, pneumonia, and Bright's disease prevail.

No. 3. Houtzdale; population, 2,500; elevation, 1,800 feet. The town is exposed and cold, situated on a hill-side. North and west winds prevail. The air is cool and dry; there are occasional fogs. There is not much shade. The soil is a loam and clay, of medium quality. North and east winds are troublesome to consumptives. There are great changes of temperature. The people are engaged in mining and in lumbering. They are Americans, German, and Irish. Phthisis is said to be comparatively frequent, and is both acute and chronic. Patients have been cured by going South. Dr. Todd furnishes the following history of a case of tuberculosis of left lung: "In 1880 I went to southern Texas and gained twenty-five pounds in weight. One year since, after an attack of typhoid fever and pneumonia, I weighed but one hundred and forty-five pounds, a loss of fifty pounds. I now weigh two hundred pounds, and am free from cough, night-sweats, and other indications of phthisis. Relief due, I am confident, to change of climate, use of cod-liver oil with hypophosphites, and whisky. Last winter I spent several weeks in St. Augustine, Fla." The majority of cases are hereditary. There is some malaria, but it does not appear to have any relation to consumption. Rheumatism and pneumonia prevail. Bright's disease does not, although there are some cases.

No. 4. Curwinstown; population, 1,300; elevation, 1,141 feet. The town is very much sheltered by hills. The prevailing winds are north-west and east. Atmosphere cool, often damp; not much fog. There are woods near the town and abundant shade in the streets. The soil is poor, sandy, gravelly, and slaty; there is a clay subsoil. Drainage excellent. There are no ponds, bogs, or meadows. Very little marsh land. Hills. East winds trouble consumptives. Changes of from 40° to 50° occur in twenty-four hours, and a marked fall at night. The people are of American descent, engaged in farming and in lumbering. There are some coal-mines and a few factories. Consumption is said to be very prevalent and hereditary. A family is instanced, living ten miles from Curwinstown, dwelling near the river in a very sheltered spot, where the sun shines but a few hours each day. The atmosphere is very damp and foggy. Four or five members of the family have died there, and more are likely to die, of phthisis. The disease is as frequently acute as chronic. There is little success in preventing consumption. No malaria. Very little Bright's disease; some pneumonia; more rheumatism.

CLINTON COUNTY.—No reply.

INDIANA COUNTY.—One reply. Indiana; population, 3,000; elevation, 1,300 feet. The town is exposed, on elevated ground. There are low hills on the west, north, and east. Temperature averages in July, 78°. In January, 32°. West winds prevail. Atmosphere changeable; dry. No fogs. Snow seldom lies long on ground. Not much shade. Soil, loam and slate, with clay. Rock, micaceous sandstone. Few ponds or marshes. East winds most troublesome. Sometimes severe changes in temperature. Farming is the chief occupation. Some lumbering and mining. Population mixed. "Consumption is becoming prevalent"; it is acute and chronic. Some cases have been cured by moving to the West and Northwest. Hereditary in nine tenths of the cases. The reporter, Dr. W. Anderson, is satisfied that consumption is contagious or infectious. No malaria. Rheumatism prevalent. Pneumonia prevalent in winter and spring. Bright's disease occasional.

LUZERNE COUNTY.—Two replies. No. 1. Wilkesbarre; population, 35,000; elevation, 480 feet. The city is in a long valley sheltered by mountains rising 1,200 feet above the valley. The city is hot in summer, cold and variable in winter. The winds are westerly and south-westerly. The air is often damp and foggy. The rain-fall averages 42 inches. Heavy snow-storms. There is shade from woods outside the town and in the streets. The soil is medium, alluvial, covering the carboniferous shales, slate, and clay. There are sewers. Few marshes or ponds. Hills. North and northeast winds are troublesome to consumptives. There are sudden atmospheric changes. The nights in hot weather are cool, even chilly. The occupation of the people is chiefly mining for coal. Phthisis is not very prevalent. There are individual houses where the disease has been frequent, but there has also been an hereditary influence. Such houses have usually had damp cellars or have been in the vicinity of standing water. In an extensive practice, Dr. Mayer has never seen an instance where nurse, husband or wife, mother or sister, contracted the disease during or shortly after its occurrence, progress, or ending. Malaria is prevalent. Dr. Mayer thinks that the congestions of malarial disease are probably frequent factors in developing phthisis in those who inherit a tendency to it, and he has frequently seen this occur. He has no evidence that malarial troubles are antagonistic to pulmonary consumption. Bright's disease is prevalent; so also is rheumatism. Cyclic albuminuria due to malaria is frequently observed.

Dr. Mayer adds:

"Nationality: About 40 per cent. American descent; 30, Irish and Welsh, with some English; 20, Germans; 2, negroes; 4, Jews; and 4, Poles and Huns.

"Consumption very rare among the Jews. Have only known of three deaths from it in twenty-five years among that race, and two of these were in the same family. It is very common among negro hybrids, particularly quadroons or octaroons. It is also most common among the na-

tive-born children of Irish and Welsh parents, who work in the mines or chutes, and in those of several generations of American descent; among young women working in dry-goods stores, and those in factories handling cotton and woolen goods.

"I have known of at least ten cases of incipient phthisis apparently cured by going from this district. A minority, say one third of these, by going to Florida, Texas, southern Georgia, etc.; two thirds by the change to the climate of Minnesota or that of the region about Denver. I never knew of a patient benefited by coming here from another locality.

"In spite of the repeated urgings of our doctors, our stupid town authorities have never given us a board of health, and in most of our cemeteries a doctor's certificate is not required before burial. I can find in the offices of the different cemeteries here no reliable records of the causes of death."

No. 2. Kingston; population, 1,600; elevation, 600 feet. The town is exposed. Westerly winds prevail in winter. Fogs occur. The soil is alluvial and very rich. Mining is the chief occupation, and all nationalities are represented. Phthisis is rare among the native Americans; common among the Irish miners. Hereditary influence is recognized, and miners suffer; the disease is both acute and chronic. Patients have been cured by going to California. The reporter, Dr. Corss, thinks the disease is infectious. Malaria is prevalent, but seems to have nothing to do with phthisis.

Dr. Corss says:

"The dust from anthracite coal is fine and impalpable, hanging in a black cloud over every breaker. It induces a form of consumption in which asthma is a prominent symptom. The miners who cut the rock tunnels suffer from a disease known among them as rock-miners' consumption; of this the prominent symptom is a shortness of breath, not generally asthmatic, but more like miliary tuberculosis. Rock-mining is considered more dangerous than coal-mining."

LYCOMING COUNTY.—One reply. Williamsport; population, 2,800; elevation, 700 feet. Sheltered. West and northwest winds prevail. The air is cool; there are no fogs. There is not much shade outside the town, but in the streets, and trees have been cut down for health. The soil is alluvial clay. There are meadows, marshes, and hills. The soil is rich on the low ground, poorer on the hills. East and northeast winds are troublesome to consumptives. There are marked atmospheric changes. The people are engaged in factories and in lumbering. Five per cent. are of German birth, 2 per cent. Irish, 1 per cent. Jews, 7 per cent. negroes. Consumption is prevalent. The reporter, Dr. Hill, has known whole families to die of consumption, but they have not all lived in one house. Hereditary tendency has extended to the third generation, though a majority of cases furnish no history of ancestral phthisis. Americans and negroes are particularly liable, and one half the cases terminate in six months. Dr. Hill believes patients may be cured by removal to high table-

lands and pine forests; also, in contagion. There is a good deal of chronic malaria. Phthisis is not prevalent in malarial districts. Rheumatism, pneumonia, and particularly disturbances of all mucous membranes, are prevalent. Bright's disease does not prevail.

NORTHUMBERLAND COUNTY.—No reply.

PERRY COUNTY.—Two replies. No. 1. Newport; population, 2,500; elevation, 400 feet. The town is sheltered and warm. West winds prevail. Fogs occur. Not much shade. There are neighboring meadows, marshes, and hills. The soil is of medium quality and alluvial. East winds are troublesome to consumptives. Sudden changes of temperature are not frequent. People engaged in factories and in trade, and are of American descent. There is a moderate amount of phthisis, chiefly chronic and hereditary. Malaria is not especially prevalent, but seems to be an exciting cause of phthisis in those predisposed to it. Rheumatism, pneumonia, and Bright's disease are not prevalent.

No. 2. Landisburg; population, 400; elevation, 740 feet. Exposed. West winds prevail; air cool; fogs occur. Not much shade. Hills and valleys; poor soil. Southerly winds troublesome to consumptives. Liability to sudden atmospheric changes. People engaged in farming, and of American descent. Phthisis rather rare; usually acute. Rheumatism prevalent; pneumonia to a moderate extent. Bright's disease not prevalent.

SOMERSET COUNTY.—No reply.

TIOGA COUNTY.—Five replies. All pronounce consumption rare. The report from Arnot, a town of 4,600 inhabitants and at an elevation of 1,700 feet, says: "No resident ever had it here." In Arnot north and south winds prevail. The atmosphere is dry; fogs do not occur. There is a medium amount of snow; not much shade. There are ponds and meadows, hills and valleys. The chief occupations are coal-mining and lumbering. The people are of American descent, Germans, Irish, Poles, and Hungarians. There is some malaria; pneumonia and Bright's disease are not prevalent, but rheumatism is frequent from reckless exposure. The reporter, Dr. D. C. Matins, writes: "I have known many persons apparently in a decline cured entirely by inhaling the dust of these mines with the smoke from lard-oil lamps and burning powder, and drinking the water impregnated with sulphates." The doctor speaks of the frequency of miners' asthma and, from an experience of over two hundred autopsies, of the occurrence of "healed cavities."

No. 2. Wellsboro; population, 3,500; elevation, 1,300 feet. The town is sheltered. West and northwest winds prevail. Air cool; fogs rare. Streets shaded. Soil good. Sudden atmospheric changes. People of American descent and Germans. Phthisis chronic and more prevalent among negroes; usually hereditary. Rheumatism is prevalent; no malaria or Bright's disease; some pneumonia.

No. 3. Blossburg; population, 2,800; elevation, 1,348 feet. Sheltered. North and south winds prevail; air cool; no fogs. Surrounding hills

wooded. The soil is a clayey loam of medium quality. No great atmospheric changes. Phthisis hereditary. Two houses (the best in town) have had several cases of phthisis; three wives and two daughters of Americans in two years past have been under reporter's care. The disease is chronic and hereditary. Malaria not prevalent. Rheumatism and pneumonia are not uncommon.

No. 4. Osceola; population, 800; elevation, 768 feet. Sheltered by hills on the north and south. West and east winds prevail. Rain and snow medium; little woods. There are meadows and valleys. The soil is very rich. South and east winds trouble consumptives. No great changes of temperature. The people are engaged in farming and are of American descent. Phthisis is chronic and in 80 per cent. is hereditary. The reporter, Dr. Humphrey, thinks he has evidence in support of infection. Malaria and Bright's disease are not prevalent. Rheumatism and pneumonia are.

No. 5. Cherry Flats; population (village), 110; sheltered. West winds prevail. Air is cool and dry. Not much shade. Meadows, hills, and valleys. Soil good; red shale. South winds troublesome to consumptives. There are sudden changes of temperature. Chief occupations are farming and lumbering. People of American descent and Welsh. Phthisis chronic; hereditary in two thirds of cases. Infectious in rare cases. Little malaria. Rheumatism and pneumonia are prevalent. Bright's disease is not.

Dr. H. G. Martin reports a patient with incipient phthisis cured by going to Colorado, where he has lived twenty years. On three occasions he has returned home, but at these times cough recurs. In thirty years' practice, and twenty-five of that an extensive practice, "I have treated but ten or eleven cases; one of them was of twenty years' standing when I first saw the case, and the patient lived nineteen years. One other case ran for fifteen years. I have a case at present of four years' standing, and the patient may die of old age. She is Irish; the rest have all been Americans."

WARREN COUNTY.—Two replies. Irwin; population, 2,000; elevation, 800 feet. The town is exposed and cold. Northwest winds prevail. The air is cool and dry. Small amount of snow. There is not much shade outside the town, but some in the streets. There is a liability to sudden atmospheric changes. The people are largely foreign of every nationality. Phthisis is only moderately prevalent. In two houses there have been six cases; all hereditary; one case acute. It is prevalent among Americans and is mostly chronic. The reporter, Dr. Humphrey, does not believe that the disease can be prevented in children hereditarily predisposed. He says he has known cats become tubercular from eating sputum. Malaria is not prevalent; pneumonia moderately so. Bright's disease rare. Rheumatism prevalent.

No. 2. Sheffield; population, 1,500; elevation, 1,100 feet. Sheltered and warm. West winds prevail. Air cool and damp; fogs occur. Medium

amount of snow and rain. There are ponds and marshes, hills and valleys. Soil good. North winds troublesome to consumptives. The people are engaged in factories and in lumbering. They are of American descent, German, Irish, and Swedes. Consumption is prevalent; Americans chiefly affected; usually chronic; three fourths of cases hereditary. Some malaria. Rheumatism, pneumonia, and Bright's disease are prevalent.

WAYNE COUNTY.—One reply. Honesdale; population, 7,000 (1880); elevation, 1,000 feet. In the county it ranges from 714 to 2,040 feet. Surface very irregular. There are hills and valleys; lakes and ponds numbering 76. Town exposed northwest and south; sheltered east and west. Northwest winds prevail. Air cool and dry; at times damp. Fogs occur. Average rain-fall for last five years, 38 inches. Average snow-fall, 73 inches. In 1857-'58, snow-fall, 27 inches; in 1867-'68, 115 inches. Storms come with northeast, east, and southeast winds. Trees about the town; have cut trees in streets. Soil good to medium; red shale. Liability to sudden atmospheric changes; sometimes a fall of fifty degrees between noon and night. People engaged in farming and lumbering, of American descent, German, and Irish. Phthisis rare in town, prevalent in country. Individual houses damp, associated with phthisis. The disease is acute; hereditary influence marked. Malaria prevalent in town, and consumption especially so in malarial districts. Rheumatism, pneumonia, and Bright's disease are prevalent in the county, but not in town.

WESTMORELAND COUNTY.—Three replies. No. 1. Ligonier; population, 700; elevation, 1,250 feet. Average general mortality, 18 in 1,000; from consumption, for thirteen years, one in 16.48 of total mortality.

Loughlinstown; population, 192. One death from phthisis in 4.03 of total mortality.

Stonerville; population, 400; elevation, 750 feet. The town is sheltered, located in a flat. The air is cool and dry. Fogs seldom occur. The soil is clay over limestone. There are hills, valleys, and meadows; no sewers, ponds, bays, or marshes. The soil is very rich. East or southeast winds are troublesome to consumptives. There are sudden atmospheric changes, and there is a moderate fall of temperature at night. The people are farmers and miners, and are American, German, and Irish. Consumption is rare; hereditary in 80 per cent. and chronic. Americans of Irish and German descent have suffered the most. Miners are particularly affected.

Dr. Rigg, in the case of a lady patient, when there was little or no improvement in Stonerville, sent her to New Mexico, to a warm location, 2,500 feet high. After staying one year, she came back seemingly cured. At the end of six months the old trouble returned. She was then sent to Somerset County, Pa., to an altitude of nearly 2,500 feet. She has been there eighteen months, and seems to be perfectly well.

Pneumonia and Bright's disease are prevalent. No prevalence of rheumatism.

No. 3. West Newton; population, 2,500; elevation, 782 feet. Town sheltered. South, east, and west winds prevail. Air dry; fogs do not occur often. Not much shade. Hills and valleys. Soil medium and good. Northern winds troublesome to consumptives. There is a liability to changes of temperature. The people are engaged in factories and in mining. They are of American descent, German, and Irish. Consumption is rare and of chronic form and hereditary. The reporter, Dr. Robinson, thinks he has evidence in favor of infection. Malaria and Bright's disease not prevalent. Rheumatism and pneumonia moderately so.

YORK COUNTY.—Six replies. One says consumption is rare, and four say that it is prevalent. Dr. J. C. Gable and Dr. A. A. Long, of York, report: population, 20,000; elevation, 450 feet. Sheltered. West winds prevail. Air damp and variable. Fogs occur. Streets well shaded, but no trees. Soil very rich. South and east winds troublesome to consumptives. Liability to changes of temperature. The people are engaged in farming and in factories; they are Americans, chiefly of German descent. Dr. Gable states that the damp portions of the town are associated with phthisis. All houses more or less damp. Americans and negroes liable to phthisis; the latter is generally chronic, and in three fourths of cases hereditary. Malaria is prevalent, and consumption is prevalent in malarial localities. Rheumatism, pneumonia, and Bright's disease are more or less prevalent.

Dr. Gable relates the case of Mr. W. H. K., who died of phthisis after an illness of two years and a half. His wife, of healthy stock, was his constant attendant, and lived in the same room with him. Before his death she showed prodromes of phthisis, and died one year after the husband.

No. 3. Hanover; population, 3,000; elevation, 600 feet. West winds prevail. Air cool and dry. Fogs rare. Rain-fall has been thirty-eight inches. Not much shade. Meadows and valleys. Good soil; limestone. East winds troublesome to consumptives. No liability to sudden atmospheric changes. People engaged in farming and in cigar factories; of American descent. Phthisis frequent in American "well-to-do" families. The disease is chronic, and nearly always hereditary. Reporter does not believe in infection. Malaria and rheumatism not prevalent. Pneumonia prevails, and Bright's disease is increasing.

No. 4. Wrightsville; population, 2,000; elevation, 300 feet. Exposed to both heat and cold. Northwest winds prevail. Atmosphere generally cool; fogs frequent. Little shade. Limestone. Hills north and south. Ponds and marshes north. River east; creek south. Soil very rich. Liability to great atmospheric changes. People engaged in cigar factories, quarries, lime-kilns, saw-mills, etc. American-born outnumber negroes, Irish, and Germans. Houses near water more closely identified with phthisis. The proximity to water believed to induce consumption. The houses associated with phthisis are damp and cold. Phthisis more frequent among the poor; it is acute and chronic, and generally hereditary. The

reporter, Dr. Rebman, thinks he has seen children hereditarily predisposed saved from phthisis by protection from cold and wet, etc. Consumption is more prevalent in miasmatic districts. Rheumatism and pneumonia prevalent; Bright's disease especially so.

No. 5. Dillsburg; population, 500; elevation, 1,065 feet. Sheltered. North and west winds prevail. Shade in the streets. No liability to sudden atmospheric changes. People engaged in farming and mining; of American descent. Consumption rare. There is a central portion of the town having damp cellars and yards where consumption is frequent. These localities not influenced by heredity. Phthisis chronic; not at all hereditary. The reporter believes that consumption can be prevented from occurring in children hereditarily predisposed by removal from family influences, and "plenty of good whisky." He also believes that phthisis is infectious. No malaria. Rheumatism, pneumonia, and Bright's disease not prevalent.

No. 6. Hallam. In a limestone valley, ranging from one to two miles wide, extending west from the Susquehanna. A range of low hills of slate and limestone and flint, north and south, near Wrightsville. Springs and running streams numerous. Through the valley and on the north side of the valley consumption is seldom seen; but on the south side it is frequent. Reporter can not explain why.

In summer, the air is warm and often damp and foggy; in winter, cold and dry. Timber covers about one sixth of area. Consumption frequent, chronic, and hereditary. There is a good deal of malaria; no relation to consumption. Rheumatism and Bright's disease are not frequent. Pneumonia is prevalent.

Group IV.

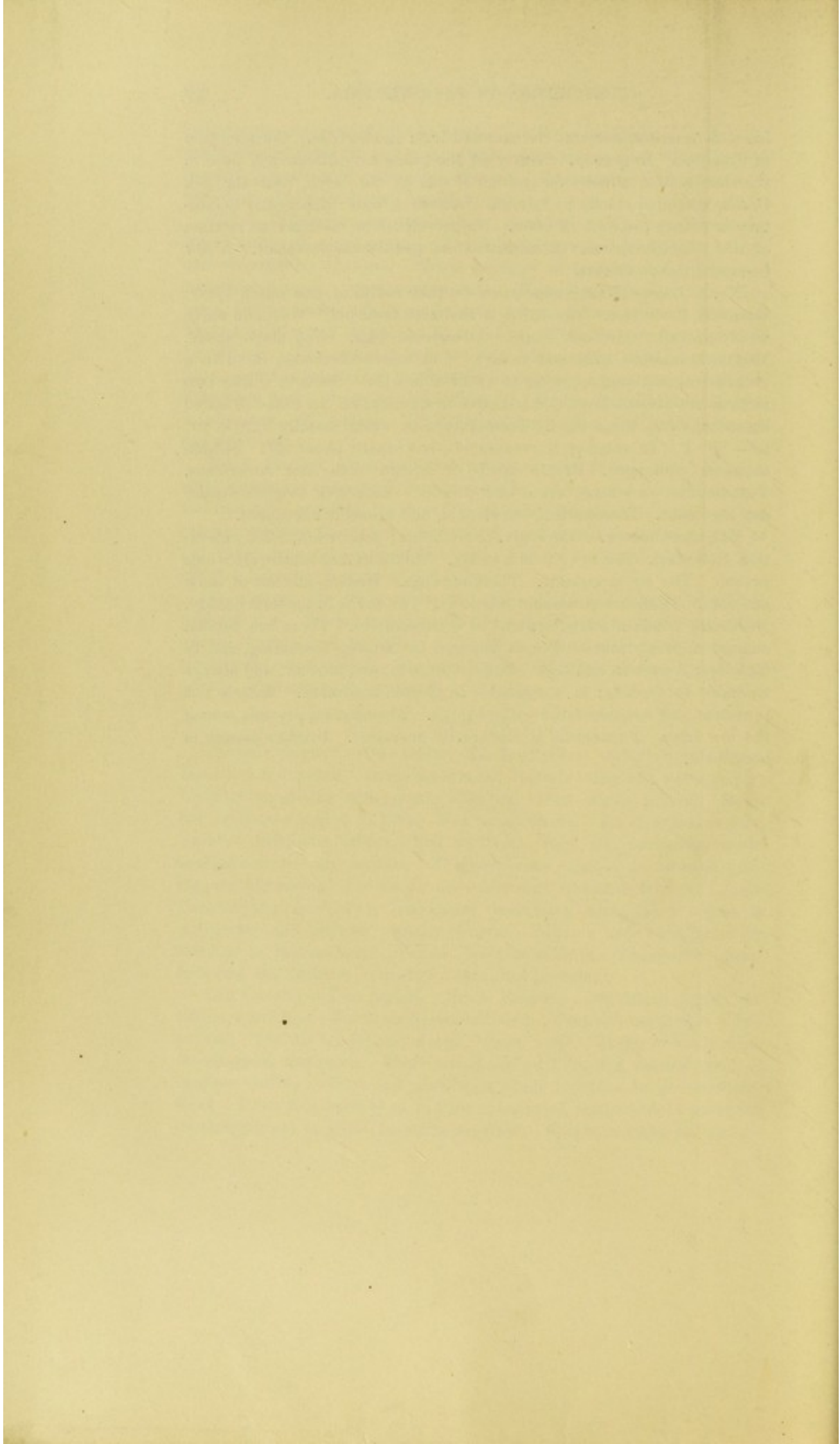
CLARION COUNTY.—One reply. No. 1. Clarion; elevation, 1,947 feet. The town is exposed. In spring and fall there is foggy and wet weather. Liability to sudden atmospheric changes. West winds prevail. Rain-fall, forty-two inches in 1885. Not much shade. There are meadows, marshes, hills, and valleys. Soil medium. West and northwest winds troublesome to consumptives. The people are engaged in farming, mining, and lumbering. The people are Americans, Germans, Irish, and Jews. Consumption moderately prevalent; increasing each year; occurs in Americans and negroes; usually chronic. Patients have been cured by removal to San Antonio, Texas. No true malaria. Pneumonia occurs in spring and autumn. Bright's disease not prevalent.

ELK COUNTY.—Two replies. No. 1. Ridgway; population, 2,000; elevation, 1,437 feet. Town sheltered, but cold. West and northwest winds prevail. The air is cool and damp. Fogs occur. There is shade from woods about the town. There are meadows, hills, and valleys. Soil of medium quality. West and northwest winds troublesome to consumptives. There is a liability to sudden changes of temperature; great fall of temperature at night in warm weather. People engaged in lumber-

ing; of American descent, German and Irish and Swedes. Consumption of "medium" frequency. Nearly all the pulmonary disease has been in the vicinity of a tannery on the north side of the town, near the Elk Creek, inhabited chiefly by Swedes. Disease chronic; apparently hereditary in twenty per cent. of cases. No prevalence of malaria; no relation of this to consumption. Rheumatism and pneumonia prevalent. A few cases of Bright's disease.

No. 2. Dagus Mines; population (within radius of one mile), 3,000; elevation, 2,000 feet. The town is sheltered and cold. West and north winds prevail. Air cool, damp. Occasional fogs. Not much shade. Meadows, marshes, hills, and valleys. One marsh northwest of town a mile and a half long, a quarter to a half mile wide. Snow in winter two to four feet deep on level, and lasts five to six months. In 1884-'85 lasted six months less three days. Temperature in winter usually from $+10^{\circ}$ to -20° F. In summer it reaches 95° , but usually about 75° . Sudden changes. Soil poor. People chiefly of foreign birth; few Americans. Consumption very rare; acute and chronic. Malaria or Bright's disease not prevalent. Rheumatism, pneumonia, and bronchitis frequent.

McKEAN COUNTY.—One reply. Smethport; population, 1,500; elevation, 1,500 feet. The town is in a valley. Northeast and southwest winds prevail. The air is variable. There are fogs. Medium amount of snow and rain. There are ponds and meadows. The soil is of medium quality. Northeast winds are troublesome to consumptives. There are sudden changes of temperature. People engaged in farming, lumbering, and in factories; American and Irish. Consumption is rare, chronic, and always traceable to syphilis; it is amenable to specific treatment. Malaria not prevalent, and not associated with phthisis. Rheumatism prevails among the low Irish. Pneumonia is moderately prevalent. Bright's disease is occasional.



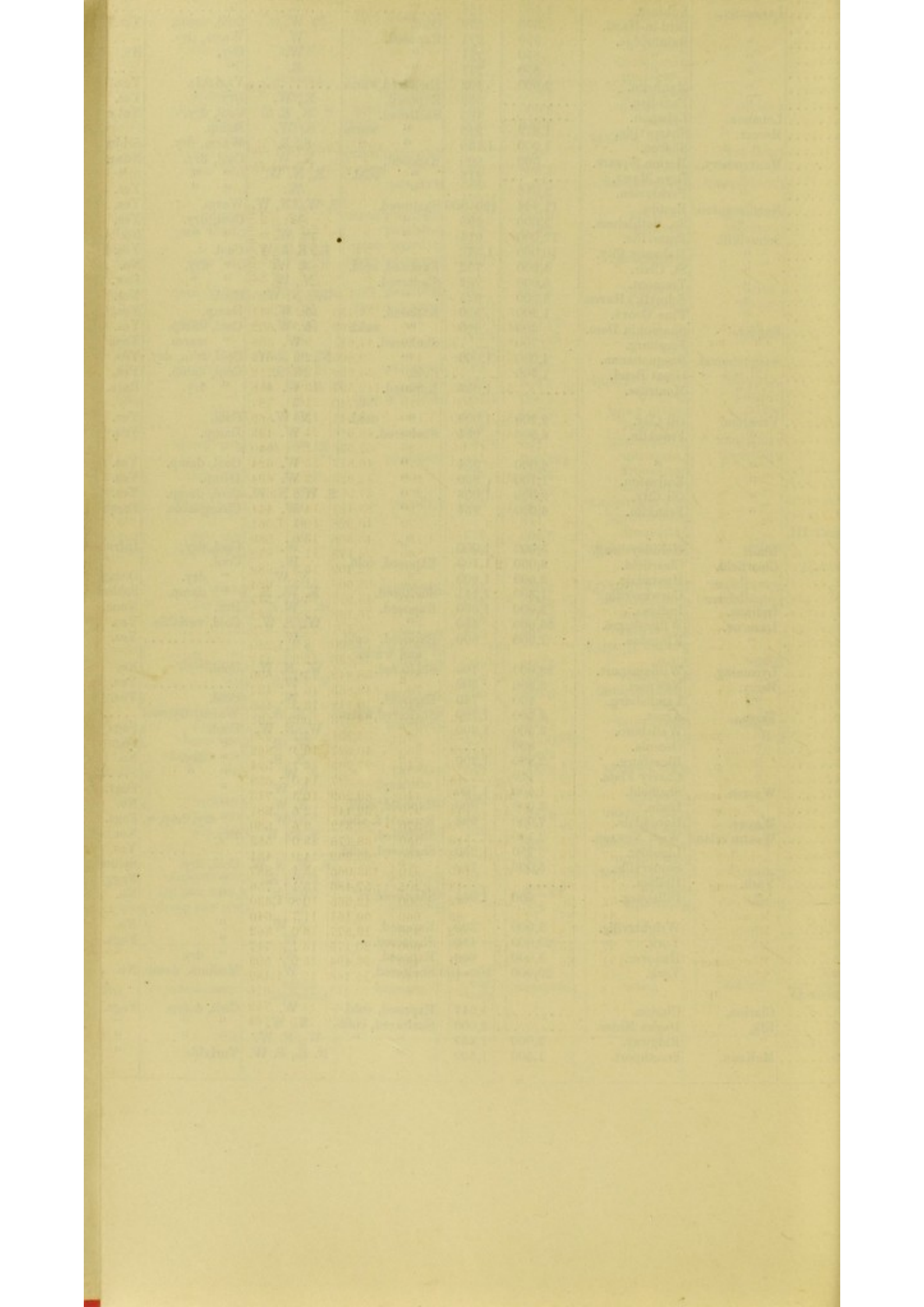


TABLE II.

Mortality from Phthisis, Pneumonia, Malarial Fever. General Death-rate and Density of Population in Pennsylvania, by Counties, based on the Census Reports for 1880. Prepared by Guy Hinsdale, M. D.

	Phthisis.	Pneumonia.	Malarial fever.	Occupation.	No. of persons to sq. mile.	Area in square miles.	Population, 1880.	Total death-rate per 1,000.	Persons living to one death from phthisis
Adams.....	60	26	5	Agg.	62	530	32,455	15.1	541
Alleghany.....	563	369	18	Min.	469	760	355,869	13.5	632
Armstrong.....	81	24	..	Ag.	79	610	47,641	9.7	588
Beaver.....	64	22	2	Min.	88	450	39,605	12.9	618
Bedford.....	49	29	3	....	35	1,000	34,929	12.3	712
Berks.....	269	128	11	Ag.	125	900	112,597	15.4	418
Blair.....	67	56	3	....	104	510	52,740	11.7	787
Bradford.....	88	77	8	Ag.	50	1,160	58,541	13.4	665
Bucks.....	162	55	6	Ag.	116	590	68,676	14.2	423
Butler.....	82	48	2	....	65	820	52,536	11.6	640
Cambria.....	75	55	..	....	70	670	46,811	15.4	624
Carbon.....	46	27	2	Min.	80	400	31,923	12.5	694
Centre.....	62	38	1	....	31	1,230	37,912	11.8	611
Chester.....	189	110	11	Ag.	110	760	83,481	14.0	441
Clarion.....	38	26	2	....	71	570	40,328	10.7	1,061
Clearfield.....	49	44	3	Ag.	39	1,130	43,308	13.0	883
Clinton.....	30	22	7	....	30	860	26,178	11.7	872
Columbia.....	47	46	11	....	67	480	32,409	15.3	689
Crawford.....	106	53	3	....	68	1,000	68,607	11.3	624
Cumberland.....	84	58	14	Ag.	83	550	45,977	13.8	547
Dauphin.....	110	121	20	....	147	520	76,148	15.6	692
Delaware.....	109	43	4	....	300	190	56,101	12.2	515
Elk.....	10	10	..	Lm.	18	770	12,800	8.0	1,280
Erie.....	131	88	4	....	71	770	54,688	12.9	417
Fayette.....	83	49	3	Ag.	71	830	58,842	13.1	696
Franklin.....	114	56	8	....	66	760	49,855	16.1	437
Fulton.....	25	14	..	....	23	440	10,149	13.5	406
Greene.....	50	16	2	....	46	620	28,273	10.6	565
Huntingdon.....	57	29	4	....	28	900	33,954	14.1	595
Indiana.....	47	21	1	....	49	830	40,527	10.4	862
Jefferson.....	47	14	1	....	44	640	27,935	14.1	594
Juniata.....	29	32	6	Ag.	46	400	18,227	14.0	629
Lackawanna.....	128	93	6	Min.	200	440	89,269	10.3	713
Lancaster.....	240	102	8	Ag.	144	970	139,447	12.6	581
Lawrence.....	49	29	4	....	90	370	33,312	9.6	680
Lebanon.....	66	24	3	Ag.	110	350	38,476	13.0	583
Lehigh.....	137	48	4	....	183	360	65,969	14.0	481
Luzerne.....	150	183	24	Ag.	145	910	133,065	15.1	887
Lycoming.....	76	66	5	....	48	1,205	57,486	13.1	756
McKean.....	32	26	9	Lm.	42	1,000	42,565	10.8	1,330
Mercer.....	84	87	12	....	85	660	56,161	11.7	640
Mifflin.....	54	18	3	....	52	380	19,577	16.0	362
Monroe.....	27	13	1	Ag.	33	600	20,175	13.1	747
Montgomery.....	191	86	8	Ag.	201	480	96,494	15.0	505
Montour.....	13	22	12	....	110	140	15,468	12.2	1,189
Northampton.....	114	84	8	....	185	380	70,312	13.5	616
Northumberland.....	70	61	18	....	115	460	53,123	14.0	759
Perry.....	36	24	13	....	58	480	27,522	12.3	764

TABLE II.—Continued.
Mortality from Phthisis, Pneumonia, Malarial Fever.

	Phthisis.	Pneumonia.	Malarial fever.	Occupation.	No. of persons to sq. mile.	Area in square miles.	Population, 1880.	Total death-rate per 1,000.	Persons living to one death, from phthisis.
Philadelphia	2,677	957	61	Mis.	6,567	129	847,170	20.4	316
Pike . . . . .	..	..	..	Lm.	16	600	9,663	....	...
Potter	12	13	..	Lm.	13	1,070	13,797	15.0	1,149
Schuykill	183	126	4	....	155	840	129,974	15.0	710
Somerset	36	12	..	....	30	1,100	33,110	17.4	764
Snyder	30	40	3	....	55	320	17,797	18.6	593
Sullivan . . . . .	..	..	..	Lm.	19	430	8,073	....	...
Susquehanna	65	49	3	....	49	830	40,354	13.8	620
Tioga	50	50	2	Ag.	41	1,120	45,814	12.2	916
Union	16	5	..	....	55	310	16,905	7.6	1,056
Venango	74	37	5	....	66	660	43,670	12.0	590
Warren	31	18	5	....	31	910	27,981	10.6	902
Washington	132	45	2	Ag.	61	890	55,418	13.8	420
Wayne	35	26	5	....	45	740	33,513	12.8	957
Westmoreland	94	60	3	....	75	1,040	78,036	12.3	830
Wyoming	31	20	1	....	39	400	15,598	14.4	503
York	97	63	7	Ag.	82	920	87,841	10.7	905
Remainder	15	18	..	....	....	....	22,895	10.0	1,526
Remainder	1	4	..	....	....	....	4,385	7.0	4,385
State	8,069	4,208	207	....	....	45,215	4,282,891	14.9	530
CITIES.									
Pittsburgh	293	197	6	....	....	....	156,389	21.0	533
Alleghany	88	58	7	....	....	....	78,682	11.2	894
Erie	64	47	7	....	....	....	27,730	17.6	433
Scranton	56	42	1	....	....	....	45,850	9.6	818
Reading	111	33	6	....	....	....	43,278	15.8	389

101	71	100	128	70	61	92	4	3	1	8	4	70	3	9	45	85	68	10
102	105	281	251	650	742	734	713	181	427	972	136	748	117	635	14	519	713	129
103	32,091	20,067	23,264	20,441	38,828	29,963	17,159	17,173	23,985	23,738	...	...	Includes almshouse.	...	...	...	...	565,529
104	386	417	261	365	310	356	612	520	631	339	...	...	...	...	...	371	...	674,922
105	44,650	19,256	21,347	26,366	45,240	56,642	13,861	22,605	20,888	24,932	18,639	36,603	19,385	10,377	See 20th w.	...	...	674,922
106	337	291	236	271	337	343	631	411	455	351	465	312	365	546	...	292	...	674,922
107	47,865	17,802	20,451	29,354	43,887	43,207	19,699	31,798	26,522	46,057	36,104	35,138	23,284	34,442	40,787	29,100	31,308	846,980
108	332	323	217	222	315	357	579	496	402	407	469	362	264	492	283	281	377	314
109	106	34	32	27	99	89	430	440	240	292	133	38	114	255	113	40	37	...
110	10th Ward.— Schuylkill Front.	16th Ward.— Delaware Front.	17th Ward.	18th Ward.— Delaware Front.	19th Ward.— Kensington.	20th Ward.	21st Ward.— Manayunk.	22d Ward.— Germantown.	23d Ward.— Frankford, etc.	24th Ward.— West Phila- delphia.	25th Ward.— Bridesburg, etc.	26th Ward.— Schuylkill Front.	27th Ward.— West Phila- delphia.	28th Ward.— Falls of Schuyl- kill.	29th Ward.	30th Ward.— Schuylkill Front.	31st Ward.— Delaware Front.	CITY.
111	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
112	83	48	89	56	125	84	28	33	38	224	38	...	...	...	...	...	...	...
113	54	72	69	125	101	27	38	33	19	14	23	...	...	...	...	...	...	...
114	125	49	78	51	95	92	38	36	52	198	23	...	...	...	...	...	...	...
115	145	51	86	55	107	109	30	66	41	238	25	...	...	...	...	...	...	...
116	108	42	71	62	110	104	39	61	51	235	31	69	...	...	...	...	...	...
117	101	56	69	64	102	119	37	46	44	210	28	65	...	...	...	...	...	...
118	102	59	63	55	87	133	23	45	53	60	28	73	127	...	...	...	...	...
119	115	49	75	87	123	130	27	33	40	64	37	93	131	9	...	...	...	...
120	110	48	77	72	134	130	20	43	41	63	35	99	102	10	...	...	...	...
121	132	66	90	97	134	165	27	55	48	71	40	117	178	19	...	...	...	...
122	147	42	75	70	181	184	23	54	51	66	39	110	162	14	...	...	...	...
123	136	43	57	88	179	130	31	49	50	66	53	121	188	19	49	...	...	...
124	127	44	77	106	187	109	25	59	56	95	47	132	190	22	76	...	...	...
125	145	29	82	91	224	140	34	55	68	85	55	134	151	28	73	...	...	...
126	114	43	89	79	204	119	27	54	49	96	51	162	166	36	100	...	...	...
127	157	56	85	93	159	131	40	68	40	119	82	122	245	42	97	66	74	...
128	120	59	74	115	130	97	25	60	48	88	74	76	204	42	86	66	76	...
129	141	49	79	100	143	108	49	65	56	110	87	97	167	49	102	75	79	...
130	136	34	88	110	143	105	41	60	75	91	70	85	186	64	116	75	69	...
131	144	55	94	132	139	121	34	64	66	113	77	97	163	70	144	103	83	...
132	142	62	81	107	133	117	28	74	60	141	89	110	177	78	128	96	95	...
133	138	61	71	104	141	142	53	89	85	13	118	114	223	68	130	80	101	...
134	153	48	83	113	134	139	33	80	59	149	124	121	200	87	141	104	80	...
135	126	48	76	104	170	115	55	95	56	148	112	114	223	73	139	97	95	...
136	136	38	67	87	149	157	40	111	55	147	116	107	205	93	136	89	95	...

TABLE III
Summary of the results of the experiments on the effect of the concentration of the solution on the rate of the reaction.

Concentration of the solution	Rate of the reaction	Concentration of the solution	Rate of the reaction
0.1 M	0.01	0.1 M	0.01
0.2 M	0.02	0.2 M	0.02
0.3 M	0.03	0.3 M	0.03
0.4 M	0.04	0.4 M	0.04
0.5 M	0.05	0.5 M	0.05
0.6 M	0.06	0.6 M	0.06
0.7 M	0.07	0.7 M	0.07
0.8 M	0.08	0.8 M	0.08
0.9 M	0.09	0.9 M	0.09
1.0 M	0.10	1.0 M	0.10

TABLE IV.

Philadelphia—1861-'73:

Total mortality.....	201,221
Phthisis.....	26,864
Per cent.....	13.35
Phthisis.	Per cent.
1807-'26.....	15.04
1826-'46.....	14.48
1847-'60.....	13.26
1861-'73.....	13.35
1874-'83.....	14.86
1807-'73.....	14.17
Pittsburgh, 1875-'85.....	9.2
Scranton, 1885.....	7.33

TABLE V.

1873.				1881.			
WARD	Persons living to one death from any cause.	WARD	Persons living to one death from any cause.	WARD	Persons living to one death from any cause.	WARD	Persons living to one death from any cause.
9	72.30	7	43.52	22	60	8	44
23	65.68	17	43.38	12	59	16	42
13	63.55	28	43.20	23	57	25	41
14	61.03	25	42.26	21	57	19	40
16	59.00	5	42.19	14	55	28	40
10	55.90	3	42.17	9	55	17	40
8	55.57	26	42.12	10	55	11	40
22	54.20	18	40.43	15	55	1	39
6	53.61	24	39.51	13	54	3	37
21	52.30	1	37.47	30	50	27	37
12	51.60	4	36.32	20	49	7	37
15	50.79	19	31.35	6	48	18	36
20	48.99			24	47	2	35
27	48.70			29	46	5	32
2	46.42			26	44	4	31
11	44.71			31	44		

1873. One death from phthisis in every 318 of the population. Deaths from phthisis in each month, arranged in the order of their mortality:

March.....	258	July.....	195	April.....	175
February.....	243	May.....	185	September.....	150
January.....	227	November.....	184	August.....	142
October.....	220	June.....	181	December.....	132

TABLE VI.

Consolidated Abstract of Deaths in Pittsburgh, from Phthisis, for the eleven years ending 1885.

POPULATION.	NATIVITY.						AGE.										TOTAL BY SEXES.		Deaths from all causes.	
	UNITED STATES.				Foreign.															
	White.		Black.																	
	Male.	Female.	Males.	Females.	Male.	Female.	Under 5 years.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Males.	Females.	Total, both sexes.		
1875	76	77	14	8	69	72	18	27	106	66	41	35	16	6	1	159	157	316	2,957	
1876	68	85	9	12	94	57	...	55	93	63	44	30	35	5	...	171	154	325	2,896	
1877	53	95	9	9	79	50	8	30	84	80	45	22	16	9	...	141	154	295	3,408	
1878	72	88	6	12	71	60	...	32	99	80	51	30	16	1	...	149	160	309	3,068	
1879	60	71	3	6	66	47	1	21	84	65	37	23	16	5	1	129	124	253	2,923	
156,389..	1880	68	97	6	7	76	60	...	42	97	81	41	31	20	2	...	150	164	314	3,410
	1881	86	96	8	5	89	62	...	28	106	87	65	29	26	5	...	183	163	346	4,493
	1882	67	77	12	12	85	60	1	26	90	78	57	37	20	4	...	164	149	313	4,090
	1883	85	77	16	15	80	65	1	30	101	94	48	43	19	2	...	181	157	338	3,318
	1884	92	86	15	10	92	58	...	39	110	82	65	34	21	2	...	199	154	353	3,753
185,000..	1885	82	91	19	13	105	70	1	36	128	96	57	37	21	4	...	206	174	380	3,840
Total.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,892	1,710	3,542	38,156

Deaths from phthisis to total deaths, eleven years, 9.2 per cent.

Persons living in 1880 to one death from phthisis, 497.

Pittsburgh, 1873-1879:

April.....	225	February.....	191	July.....	169
May.....	217	June.....	186	October.....	166
March.....	216	August.....	173	November.....	162
January.....	198	December.....	171	September.....	146

TABLE VII.

Relative Purity of Water Supply in Philadelphia. Furnished by John L. Ogden Esq., Chief Engineer.

SOURCE OF SUPPLY.	Pumping Stations.	Reservoirs.	Wards supplied.	Order of excellence.*
Schuylkill River.	Fairmount. Spring Garden & Fairmount.	Fairmount. Corinthian.	5, 6, 7, 8, 9, and 10. 1, 2, 3, 4, 26, 30, 11, 12, 13, 14, 16, 19, and part of 20.	Fifth. Third.
	Spring Garden.	Direct pumpage into mains.	15, 28, 29, and part of 20.	Third.
Delaware and Schuylkill combined.	Belmont. Roxborough.	Belmont. Roxborough.	24 and 27. 21, 22, and part of 25.	Fourth. Second.
	Kensington and Spring Garden.	Lehigh.	17, 18, 31, and part of 25.	Sixth.
Delaware River.	Frankford.	Frankford.	23 and part of 25.	First.

* See a report upon a chemical examination of the water supplied to the city of Philadelphia, by Professors Mallet, Wormley, and Greene, 1885.

RECORDS OF TEMPERATURE, RAIN-FALL, ETC., FROM TWENTY TOWNS IN PENNSYLVANIA, viz.:

Philadelphia; West Chester, Chester County; Fallsington, Bucks County; Quakertown, Bucks County; Drifton, Luzerne County; Wilkesbarre, Luzerne County; North Mountain, Luzerne and Sullivan Counties; Tamaqua, Schuylkill County; Schuylkill Haven, Schuylkill County; Pittsburgh, Alleghany County; Erie, Erie County; Catawissa, Columbia County; Chambersburg, Franklin County; Dyberry, Wayne County; Leetsdale, Beaver County; Grampian Hills, Clearfield County; Carlisle, Cumberland County.

From Records of the Philadelphia Station, United States Signal Service.

	BAROMETER. Elev., 52·419.				THERMOMETER. Elev., 98·97.				Rain-fall.	Cloudiness, mean.	HUMIDITY.			
	7 A. M.	3 P. M.	11 P. M.	Range	A. M.	P. M.	P. M.	Mean.			A. M.	P. M.	P. M.	Mean.
	Deg.	Deg.	Deg.	Deg.	°	°	°	°			Ins.	Tenths.	Per c.	Per c.
1872..	30·019	29·956	29·990	823..	48·3	57·4	50·3	52	47·83	5·39	70·25	54·45	69·27	64·66
1873..	30·013	29·957	29·993	.....	48·2	56·5	49·9	51·5	54·62	5·8	72·3	57·1	69·6	66·3
1874..	30·066	30·020	30·043	.....	49·2	57·9	50·7	52·6	46·31	5·2	72·0	54·9	70·1	65·7
1875..	30·033	29·973	30·006	.....	46·7	55·2	48·3	50·1	40·19	4·79	72·9	57·5	70·7	67
1876..	30·013	29·954	29·989	.....	49·2	57·7	50·5	52·5	47·38	4·92	73·5	57·4	71	67·3
1877..	30·023	29·955	30·000	.....	50·4	59·4	52·0	53·9	37·26	5·21	75·2	58·9	73	69·2
1878..	29·962	29·909	29·943	.....	51·2	59·8	52·7	54·6	34·53	4·9	74·28	57·6	73	68·3
1879..	30·045	29·990	30·028	.....	49·8	58·8	51·6	53·4	36·75	4·7	76·1	59·6	74·6	70·1
1880..	.....	.....	.....	.....	50·5	60·5	52·5	54·5	33·64	4·8	71·1	54·5	73	68
1881..	.....	.....	.....	.....	50	60·2	52·4	54·2	30·21	5·2	79·9	58·3	75	71·3
1882..	.....	.....	.....	.....	51	59·5	53·4	54·6	45·58	5·2	74·9	57·3	72·2	68·1
1883..	.....	.....	.....	.....	49·7	59	52	53	39·17	4·7	82	70	82·3	78·1
1884..	.....	.....	.....	.....	49·5	59	51	53	39·34	5	81·8	66·6	79·8	76·1
1885..	.....	.....	.....	.....	47	57	49	51	33·35	4·6	76	57·4	74	69
Aver.	.....	.....	.....	.....	.....	.....	.....	52·2	40·44	5·03	.....	.....	.....	69·2

From Records of the Philadelphia Station, United States Signal Service.—(Continued.)

	WIND DIRECTIONS. Per cent.									DAYS.		
	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Calm.	Clear.	Fair.	Cloudy.
1872.....	12	12	7	4	5	20	15	23	2	93	158	115
1873.....	8	16	9	5	5	20	12	21	2	88	143	134
1874.....	12	10	12	4	6	20	15	17	4	136	127	102
1875.....	12	11	14	3	8	16	16	19	1	122	148	95
1876.....	14	7	15	4	6	15	16	20	2	65	115	186
1877.....	15	12	13	3	6	15	19	15	0·5	83	110	172
1878.....	10	14	8	4	8	21	15	19	1	99	116	127
1879.....	9	12	5	3	10	22	12	16	1	132	136	97
1880.....	10	13	6	3	9	17	14	17	0·5	121	142	103
1881.....	15	12	15	4	6	11	21	15	1	118	133	114
1882.....	8	16	6	5	7	18	12	22	2	100	161	104
1883.....	10	19	4	6	7	23	9	20	2	123	154	88
1884.....	13	17	3	5	14	16	7	20	0·3	109	159	98
1885.....	9	14	4	5	13	14	13	22	4·7	109	188	68
Average..	11·2	13·2	8·6	4·1	7·8	17·6	14	19·1	1·9	107	142·2	114·8

The annual mean temperature in Philadelphia from 1800 to 1885, inclusive, with the annual amount of rain and snow, in inches, from 1825 to 1885.

YEARS.	Mean annual temperature.	Rain, in inches.	YEARS.	Mean annual temperature.	Rain, in inches.
	Degrees.			Degrees.	
1800.....	51.50	.....	1843.....	51.50	46.25
1801.....	52.00	.....	1844.....	53.00	39.00
1802.....	53.50	.....	1845.....	54.00	40.25
1803.....	52.00	.....	1846.....	54.00	44.87
1804.....	51.00	.....	1847.....	53.86	45.09
1805.....	51.50	.....	1848.....	54.80	35.00
1806.....	51.50	.....	1849.....	53.10	42.09
1807.....	52.00	.....	1850.....	54.00	54.54
1808.....	52.00	.....	1851.....	54.04	35.50
1809.....	51.00	.....	1852.....	54.04	46.20
1810.....	51.00	.....	1853.....	55.44	42.96
1811.....	52.00	.....	1854.....	55.38	45.23
1812.....	51.00	.....	1855.....	54.53	44.65
1813.....	50.50	.....	1856.....	51.92	33.52
1814.....	51.00	.....	1857.....	53.48	48.45
1815.....	51.25	.....	1858.....	55.20	41.06
1816*.....	49.00	.....	1859.....	54.49	54.75
1817.....	52.50	.....	1860.....	54.12	45.40
1818.....	53.00	.....	1861.....	54.71	45.41
1819.....	51.00	.....	1862.....	53.58	45.66
1820.....	51.75	.....	1863.....	54.13	49.64
1821.....	51.50	.....	1864.....	54.60	46.73
1822.....	53.00	.....	1865.....	55.77	53.64
1823.....	53.50	.....	1866.....	54.90	43.57
1824.....	53.75	.....	1867.....	53.41	62.93
1825.....	54.00	29.30	1868.....	52.83	50.18
1826.....	53.00	40.00	1869.....	54.23	44.16
1827.....	50.00	39.50	1870.....	56.44	43.56
1828.....	54.00	38.50	1871.....	54.91	45.98
1829.....	53.00	42.00	1872†.....	54.85	49.02
1830.....	52.50	44.75	1873.....	51.4	54.62
1831.....	53.00	41.00	1874.....	52.6	46.31
1832.....	51.00	39.25	1875.....	50.3	40.24
1833.....	52.50	48.38	1876.....	52.6	47.39
1834.....	52.25	33.00	1877.....	54.2	37.36
1835.....	52.00	39.50	1878.....	54.7	34.53
1836.....	50.25	43.00	1879.....	53.6	36.75
1837.....	52.25	37.10	1880.....	54.6	33.58
1838.....	53.00	44.25	1881.....	54.2	30.21
1839.....	52.00	44.75	1882.....	54.6	45.58
1840.....	52.25	47.50	1883.....	53.5	39.17
1841.....	51.50	55.50	1884.....	53.5	39.34
1842.....	52.75	47.50	1885.....	51.0	33.35

* Ice in every month; the coldest year on record in the city; the year without a summer.

† From this year observations taken at United States Signal Office used in this department.

Temperature: Mean for 86 years, 52.92° Fahr.

Rain-fall: Mean for 61 years, 43.25 in.

Mean Monthly and Annual Rain-fall at West Chester, Pa.

YEAR.	1st month.	2d month.	3d month.	4th month.	5th month.	6th month.	7th month.	8th month.	9th month.	10th month.	11th month.	12th month.	Year.	Mean annual temperature.
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.			Deg.
1875.	3.84	4.22	5.12	2.72	2.09	4.96	3.84	9.67	3.12	2.11	6.10	4.35	52.14	47.78
1876.	2.30	4.56	7.49	2.11	4.26	2.32	7.21	1.32	12.33	2.50	4.90	2.76	54.06	50.19
1877.	4.15	2.55	5.86	3.10	0.83	5.08	6.65	1.42	5.07	8.06	8.11	2.05	44.10	51.63
1878.	5.22	4.00	3.71	3.89	4.32	4.16	4.35	2.90	3.06	3.22	3.83	5.84	40.41	52.05
1879.	2.88	2.62	2.73	5.19	1.38	4.13	2.60	6.10	2.20	0.60	1.63	6.13	38.19	45.17
1880.	2.92	3.01	4.71	3.69	1.35	1.91	6.90	3.18	1.49	2.28	2.90	6.65	40.99	51.59
1881.	5.18	5.99	6.36	1.10	2.59	5.60	1.77	0.94	1.53	3.00	3.08	4.39	34.60	51.91
1882.	6.38	4.95	4.61	2.36	6.94	1.50	2.80	4.38	7.23	1.15	1.42	1.98	45.70	50.46
1883.	4.52	5.48	3.62	3.52	2.71	5.72	2.54	5.20	3.64	4.45	2.30	4.63	40.27	49.53
1884.	7.32	7.29	6.09	2.94	3.64	7.52	5.27	2.12	0.42	2.56	4.36	7.05	56.58	50.72
1885.	4.65	6.39	1.34	2.20	4.07	1.26	0.93	9.51	1.49	6.25	4.71	4.18	46.98	49.19

WEST CHESTER, PA., *April 12, 1886.*

DEAR DOCTOR: The above is the mean monthly and annual rain-fall and mean annual temperature, taken from my "meteorological observations," as requested in thy letter of the 7th inst.

Height of rain-gauge above tide-water, 450 feet.

Thine truly,

J. C. GREEN.

Dr. WM. PEPPER, *Philadelphia.*

Carlisle.

	DAYS.			
	Fair.	Cloudy.	Rain.	Snow.
1843.....	205	160	91	19
1844.....	202	164	75	16
1845.....	214	151	68	20
1848.....	218	148	71	4
1849.....	244	122	68	20
1850.....	191	174	89	20
1852.....	179	187	93	26
Mean.....	207	158	92	19

Pittsburg, 1825-'54, 50.86°; rain-fall, 1837-'54, 34.96 inches.

Carlisle, 1840-'54, 51.10°; rain-fall, 1849-'54, 34.01 inches.

Carlisle Barracks (now the site of the Indian Industrial School) is situated in a beautiful valley ten miles wide, about midway between the north and south mountain spurs of the Alleghany range, five miles from the mountains. A small marshy tract of land (the only one in the vicinity) lies north of the barracks some three or four hundred yards. There is also a boggy tract along the Leitart Creek. This tract has been, at times, partially submerged.—From "Report on Mortality, U. S. A." Coolidge.

Fallsington, Bucks County, Pa.

MONTH.	Highest barometer during month.	Lowest barometer during month.	Mean barometer for month.	Highest temperature during month.	Lowest temperature during month.	Mean temperature for month.	Prevailing winds during month.	Total rainfall or melted snow during month.	No. of days on which 0.01 or more rain fell, sn'w m'lt'd	No. of days on which cloudiness averaged 8 or more on a scale of 10	No. of thunder-storms during month.	No. of days on which frost occurred.	Snow-fall.
1879.													
July.....	30.13	29.43	29.825	97	63	75.00	S. W.	5.59	9	5	7	0	.00
August.....	30.02	29.60	29.875	92	59	71.70	"	8.80	11	8	4	0	.00
September.....	30.28	29.63	29.995	87	43	62.75	N., S. W.	1.48	6	5	14	2	.00
October.....	30.59	29.47	29.996	86	29	59.50	S. W., N. W.	.48	5	4	0	5	.00
November.....	30.41	29.45	30.029	74	15	40.03	N. W.	1.78	9	6	0	14	1.75
December.....	30.51	29.62	30.045	63	12	37.50	S. W., N. W.	5.98	14	12	0	7	3.00
1880.													
January.....	30.54	29.49	30.089	64	6	39.80	N. W., N. E.	2.72	9	12	1	13	5.00
February.....	30.49	29.15	30.003	66	13	37.35	N. W., S. W.	2.34	10	9	0	7	4.00
March.....	30.35	29.32	29.959	73	21	38.16	N. W.	5.27	14	12	0	5	6.50
April.....	30.25	29.51	29.916	82	31	52.00	N. W., S. W.	3.98	12	7	4	6	.00
May.....	30.23	29.70	29.963	97	40	68.25	S. W.	.78	3	4	0	0	.00
June.....	30.17	29.55	29.896	94	62	72.66	S. W., N. W.	2.08	11	4	4	0	.00
1881.													
July.....	30.06	29.63	29.883	92	62	77.85	S. W.	12.51	13	10	7	0	.00
August.....	30.32	29.65	29.956	92	58	72.15	"	3.10	10	9	3	0	.00
September.....	30.25	29.60	29.936	90	48	65.20	"	2.64	7	5	1	0	.00
October.....	30.31	29.42	30.026	80	34	50.50	N. W.	2.25	8	7	0	11	.00
November.....	30.63	29.58	30.153	66	12	38.80	"	2.27	8	10	0	17	5.25
December.....	30.39	29.56	29.963	47	-8	26.88	"	4.45	11	10	0	13	20.75
1881.													
January.....	30.56	29.32	30.073	46	-14	25.45	"	4.94	9	11	0	7	9.00
February.....	30.71	29.38	30.116	58	Zero.	29.85	"	4.20	11	9	1	9	8.00
March.....	30.25	29.10	29.713	62	24	39.00	"	4.09	9	11	1	13	1.50
April.....	30.25	29.43	29.833	79	24	48.00	"	.71	6	9	2	4	0.25
May.....	30.37	29.59	29.983	92	47	64.32	S. W.	3.04	13	9	6	0	.00
June.....	30.09	29.62	29.843	89	53	67.03	N. W.	4.71	14	10	5	0	.00

Fallsington, Bucks County, Pa.—(Continued).

MONTH.	Highest barometer during month.	Lowest barometer during month.	Mean barometer for month.	Highest temperature during month.	Lowest temperature during month.	Mean temperature for month.	Prevailing winds during month	Total rainfall or melted snow during month.	No. of days on which 0.01 or more rain fell, sr.'w m't'd	No. of days on which cloudiness averaged 8 or more on a scale of 10	No. of thunder-storms during month.	No. of days on which frost occurred.	Snow-fall.
1881.													
July	30.16	29.60	29.873	92	65	75.25	N. W.	1.13	4	6	4	0	.00
August	30.24	29.61	29.953	97	62	74.50	S. W.	1.44	7	5	3	0	.00
September	30.25	29.82	30.023	103	55	74.00	"	.64	4	6	1	0	.00
October	30.47	29.47	30.070	88	31	59.50	"	2.00	11	12	0	7	.00
November	30.59	29.61	30.113	64	25	46.50	N. W.	2.85	10	11	0	11	.00
December	30.54	29.38	30.096	63	22	44.50	"	3.32	11	12	0	13	.00
1882.													
January	30.76	29.33	30.116	48	2	30.15	"	5.02	12	15	0	11	12.65
February	30.66	29.45	30.096	58	15	35.00	"	4.99	9	9	2	10	8.00
March	30.62	29.59	30.050	64	24	42.00	"	2.31	12	9	1	5	2.50
April	30.45	29.39	29.990	75	29	42.00	"	2.37	8	9	2	5	.00
May	30.38	29.49	29.980	83	40	56.25	S. W.	5.14	14	14	1	3	.00
June	30.18	29.53	29.863	93	57	70.50	"	2.30	10	3	5	0	.00
1883.													
July	30.25	29.60	29.973	95	60	75.50	S. W.	1.69	7	5	3	0	.00
August	30.25	29.61	29.994	91	57	72.50	"	5.03	12	9	1	0	.00
September	30.23	29.60	30.013	90	52	67.50	N. E.	12.35	10	9	4	0	.00
October	30.28	29.74	30.060	76	39	59.00	"	1.96	14	13	1	2	.00
November	30.43	29.69	30.123	73	19	40.75	N. W.	1.63	9	9	0	15	8.50
December	30.41	29.68	30.090	48	11	30.00	"	2.02	6	7	0	20	.00
1883.													
January	30.58	29.55	30.160	44	2	27.50	N. E.	4.07	19	18	1	8	14.00
February	30.68	29.74	30.243	60	6	32.50	N. W.	4.60	15	7	0	8	8.15
March	30.45	29.32	29.962	64	11	35.00	"	2.60	8	6	0	12	2.50
April	30.42	29.65	30.008	72	32	48.25	N. E., N. W.	3.88	14	8	3	5	.00
May	30.33	29.45	29.955	85	45	61.15	N. W.	3.34	12	8	4	1	.00
June	30.42	29.63	29.970	91	52	72.00	S. W.	5.04	14	7	5	0	.00

Fallsington, Bucks County, Pa.—(Continued).

MONTH.	Highest barometer during month.	Lowest barometer during month.	Mean barometer for month.	Highest temperature during month.	Lowest temperature during month.	Mean temperature for month.	Relative humidity—mean during month.	Prevailing winds during month.	Total rainfall or melted snow during month.	No. of days on which 0.01 or more rain fell, sn'w m'lt'd	No. of days on which cloudiness averaged 8 or more on a scale of 10	No. of thunder-storms during month.	No. of days on which frost occurred.	Snow-fall.
1883.														
July.....	30.20	29.75	29.966	93	57	74.25	.....	S. W.	2.05	9	4	2	0	.00
August....	30.24	29.67	30.020	91	52	68.00	.....	N. W.	5.36	6	5	3	0	.00
September..	30.41	29.52	30.056	84	42	63.25	.....	S. W.	3.64	10	9	3	4	.00
October....	30.58	29.46	29.948	81	35	53.50	.....	N. E.	4.02	14	10	1	6	.00
November..	30.57	29.73	30.134	74	18	44.00	.....	S. W.	1.56	7	9	0	15	.00
December..	30.63	29.53	30.096	56	3	33.25	.....	N. W.	3.31	14	13	1	19	15.25
1884.														
January....	30.79	29.17	30.110	47	4	26.00	.....	"	4.90	15	11	0	14	11.65
February...	30.70	29.29	30.080	64	8	37.00	.....	"	5.04	18	15	1	6	4.60
March.....	30.40	29.55	30.005	63	8	39.75	.....	"	4.79	17	18	1	6	7.75
April.....	30.15	29.18	29.864	73	33	49.54	.....	"	2.25	8	8	2	3	.00
May.....	30.25	29.95	29.948	87	46	61.25	.....	"	4.48	13	5	3	1	.00
June.....	30.46	29.76	30.072	93	53	70.50	.....	S. W.	5.30	8	3	2	0	.00
1885.														
July.....	29.98	29.65	29.860	91	62	71.75	.....	N. W.	4.24	15	7	2	0	.00
August....	30.27	29.75	30.044	93	56	71.86	.....	S. W.	4.58	10	5	3	0	.00
September..	30.44	29.76	30.099	92	48	69.50	.....	"	0.22	3	1	1	0	.00
October....	30.54	29.77	30.132	81	31	54.58	71.849	"	2.30	12	9	1	7	.00
November..	30.42	29.52	30.056	62	20	40.50	74.396	N. W.	3.12	7	7	0	17	.25
December..	30.61	29.55	30.140	62	Zero.	32.75	80.530	S. W. to N.	6.00	14	10	0	11	7.35
1885.														
January....	30.75	29.38	30.099	57	4	28.62	69.670	N. W.	4.03	9	6	0	11	3.45
February...	30.45	29.16	29.967	40	—1	21.13	80.000	"	4.91	14	5	1	8	17.15
March.....	30.45	29.62	30.043	59	7	29.14	68.530	"	1.19	9	5	1	12	7.25
April.....	30.56	29.55	30.042	84	29	48.75	67.596	S. W.	2.30	10	6	1	7	.00
May.....	30.24	29.65	29.975	83	42	57.25	74.420	N. E.	1.51	11	5	2	2	.00
June.....	30.26	29.53	30.005	92	55	68.75	71.500	S. W.	1.02	5	0	2	0	.00

Fallsington, Bucks County, Pa.—(Concluded).

MONTH.	Highest barometer during month.	Lowest barometer during month.	Mean barometer for month.	Highest temperature during month.	Lowest temperature during month.	Mean temperature for month.	Relative humidity—mean during month.	Prevailing winds during month.	Total rainfall or melted snow during month.	No. of days on which 0.01 or more rain fell, sn'w m't'd	No. of days on which cloudiness averaged 8 or more on a scale of 10	No. of thunder-storms during month.	No. of days on which frost occurred.	Snow-fall.
1885.														
July.....	30.16	29.72	29.968	97	59	74.00	77.287	S. W.	4.05	12	1	5	0	.00
August.....	30.25	29.72	29.997	90	51	69.25	83.997	"	7.56	13	5	9	0	.00
September..	30.35	29.48	30.254	82	42	61.75	79.700	"	1.07	7	3	2	0	.00
October.....	30.26	29.20	30.033	75	34	51.65	82.440	N. W.	4.23	13	6	2	11	.00
November..	30.34	29.64	29.932	70	26	43.25	80.577	"	3.58	12	8	0	17	0.20
December..	30.70	29.25	30.017	58	10	34.25	77.570	"	3.26	11	5	0	13	0.10
1886.														
January....	30.77	28.82	30.058	56	—3	25.75	81.255	"	4.12	13	9	0	5	10.25
February...	30.47	29.40	30.070	63	—5	27.75	80.678	"	5.67	9	6	0	10	9.10
March.....	30.48	29.38	29.902	65	12	37.00	76.967	"	3.53	13	7	2	10	.00

Rain-gauge, Signal Service, 10 inches from the ground.

Thermometers, Signal Service, authorized, wet bulb.

Thermometers, Signal Service, authorized, dry bulb, 47 feet above sea-level.

Thermometers, Signal Service, maximum and minimum, 47 feet above sea-level.

Barometer, Woodruff's; iron cistern; readings reduced; bulb 44 feet above sea-level.

Height of ground, 41 feet above sea-level.

MILNOR GILLINGHAM.

FALLSINGTON, BUCKS COUNTY, PA.

The following is a tabular statement of the records of the weather, kept at Quakertown, Bucks County, Pa., for five years ending December 31, 1885, by J. L. Heacock.

	Highest temperature.	Lowest temperature.	Average temperature.	Greatest temperature, mean.	Lowest temperature, mean.	Daily range of temperature, greatest.	Daily range of temperature, least.	Daily range of temperature, average.	Monthly range of temperature.	Amount of rain-fall and melted snow.
1881.										
January.....	41	-13	23.12	31.51	14.77	35	7	16.74	54	3.40
February.....	51	-5	27.64	35.60	18.96	26	6	17	56	4.01
March.....	56	18	35.16	41.64	28.70	25	3	12.93	38	4.46
April.....	83	18	45.38	53.80	35.26	36	2	19.53	65	.69
May.....	90	32	68.64	73.29	51.16	29	9	21.51	58	5.12
June.....	87	46	64.06	74.23	54.23	29	7	19.66	41	4.10
July.....	91	55	72.70	83	62.40	30	9	21	36	.73
August.....	97	54	73.16	84.80	60.90	32	9	24.32	43	.27
September.....	102	48	72.60	83.20	62	33	3	20.53	54	.89
October.....	88	28	57.51	67.93	47.09	33	3	20.48	60	1.57
November.....	66	22	43.33	50.80	35.30	27	4	15.50	44	2.15
December.....	62	18	39.13	46.39	30.93	34	3	15.45	44	4.71
Averages and rain-fall for year ... }	76.15	17.50	51.87	60.52	41.81	31	5	18.72	49.42	32.10
1882.										
January.....	47	-2	26.70	32.87	20.48	20	5	12.39	49	2.95
February.....	54	12	32.57	41.07	24.10	29	5	16.96	42	4.18
March.....	61	20	37.45	45.87	29.70	29	8	16.22	41	4.47
April.....	70	22	44.56	54.26	34.73	32	7	19.43	48	2.20
May.....	80	32	52.58	62.32	44.16	29	4	19.94	48	7.30
June.....	89	44	66.60	77.43	55.76	33	9	21	45	3.00
July.....	92	49	71.29	81.51	61.22	30	6	20	43	1.95
August.....	88	46	69.32	79.29	59.38	30	11	19.90	42	3.95
September.....	86	40	65.83	70.44	56.22	40	7	18.78	46	7.25
October.....	73	33	54.89	62.36	47.43	28	5	14.93	40	1.85
November.....	70	15	38.86	46.53	30.09	29	7	15.30	55	.65
December.....	46	5	29.06	36.19	20.19	26	1	13.90	41	1.20
Averages and rain-fall for year }	71.33	26.33	49.14	57.51	40.29	29.51	6	17.39	45	40.95

Remarks: This town is elevated on an average 516 feet above sea-level. Observations of temperature are taken from a self-registering thermometer, and the mean is for twenty-four hours.

Records of the weather at Quakertown, Bucks County, Pa.—(Continued).

	Highest tem- perature.	Lowest tem- perature.	Average tem- perature.	Greatest tem- perature, mean.	Lowest tem- perature, mean.	Daily range of temperature, greatest.	Daily range of temperature, least.	Daily range of temperature, average.	Monthly range of tempera- ture.	Amount of rain- fall and melt- ed snow.
1883.										
January.....	42	1	23.29	29.94	16.68	26	4	13.26	40	3.40
February.....	48	7	28.21	35.57	20.86	29	2	14.36	41	3.20
March.....	59	1	31.60	40.58	22.32	34	8	18.26	58	1.69
April.....	66	19	43.87	54.23	35.76	27	3	18.46	47	2.65
May.....	78	35	57.03	68.03	46.03	31	10	22.32	43	2.09
June.....	85	53	67.60	77.73	57.76	29	5	19.76	32	6.98
July.....	90	49	70.39	80.45	60.29	25	9	20.74	41	1.05
August.....	86	50	66.13	76.87	55.29	29	8	21.29	36	2.25
September.....	79	37	59.33	69.33	49.70	33	6	19.63	42	3.72
October.....	77	28	50.26	58.74	41.84	30	4	16.87	49	4.10
November.....	68	16	41.33	49.43	33.16	30	5	16.33	52	1.47
December.....	52	4	30.66	38.13	22.03	32	4	16.09	48	2.15
Averages and rain- fall for year.....	69.17	25	47.47	56.59	38.47	29.58	5.66	18.11	44.08	34.75
1884.										
January.....	42	-2	22.55	30.09	15.06	30	3	15.42	44	2.96
February.....	52	2	32.34	38.51	26.21	27	4	9	50	4.74
March.....	59	-2	34.19	41.97	25.80	30	4	15.63	61	4.99
April.....	68	28	46.06	55.20	35.23	31	9	18.56	40	2.70
May.....	81	37	57.59	66.80	48.19	35	5	20.19	44	3.53
June.....	88	41	66.53	78.26	55.76	36	8	21.16	47	6.54
July.....	86	52	67.55	76.22	59.20	28	7	17.09	34	7.92
August.....	88	45	68.32	77.48	59.13	26	7	18.36	43	3.76
September.....	89	39	65.86	76.66	54.90	31	13	22	50	.53
October.....	78	27	53.26	62.77	43.77	30	4	19	51	4.38
November.....	60	17	40.03	48.70	31.43	29	3	17.26	43	3.53
December.....	52	0	30.36	36.64	24.09	25	3	12.22	52	6.46
Averages and rain- fall for year.....	70.25	23.66	48.72	57.44	39.90	29.83	5.83	17.16	46.83	52.04
1885.										
January.....	57	0	27.39	36.06	18.83	40	1	16.42	57	4.52
February.....	45	-4	19.82	28.35	11.91	27	9	17.05	49	4.38
March.....	52	2	26.38	34.55	18.23	25	7	16.61	50	1.21
April.....	82	24	45.10	57.20	35	36	11	22.20	58	2.79
May.....	80	31	55.45	65.06	46.16	34	10	18.90	49	2.32
June.....	89	42	77.13	57.03	29.06	33	8	21.10	47	.81
July.....	96	48	72	.....	.....	..	..	..	..	1.26
August.....	88	44	67.45	75.77	59.03	24	3	16	44	8.24
September.....	87	26	56.50	.....	.....	..	..	.....	..	.52
October.....	72	26	49	.....	.....	..	..	.....	..	4.29
November.....	64	20	40.07	46.99	34.06	22	0	12.90	44	4.23
December.....	48	8	31.16	38.13	24.51	25	7	13	40	3.15
Averages and rain- fall for year.....	71.67	22.25	47.45	.....	.....	..	..	.....	..	37.82

Statements taken from the voluntary Signal-Service observations made by H. D. Miller, Superintendent of Drifton Hospital, Drifton, Luzerne County, Pa.

Latitude of station, 41° 1' 1" north.

Longitude of station, 1° 4' 48" east of W.

Height of station above the sea, 1,655 feet.

MONTH.	Highest temperature.	Lowest temperature.	Mean temperature.	Snow-fall.	Rain and melted snow fall.
1884.					
February.....	56	-8	27.3	8.25	4.30
March.....	65	-8	29	5.50	4.04
April.....	73	24	40.48	23	4.36
May.....	88	32	53.07	....	3.62
June.....	92	41	65.70	....	2.88
July.....	89	47	64.08	....	6.77
August.....	91	40	66.34	....	4.79
September.....	91	37	63.08	....	2.50
October.....	81	22	49.45	....	2.67
November.....	68	14	37.76	....	3.83
December.....	62	-8	30.46	12.5	4.76
1885.					
January.....	62	-9	24.07	11.5	5.25
February.....	45	-16	15.85	31	3.39
March.....	51	-6	21.54	5.5	.76
April.....	85	18	43.77	4.25	1.99
May.....	85	31	56.36	....	2.30
June.....	87	41	64.79	....	2.00
July.....	97	42	70.39	....	2.70
August.....	90	40	65.06	....	7.44
September.....	82	38	59.09	....	1.39
October.....	77	27	48.72	....	5.66
November.....	72	12	37.39	27.5	5.46
December.....	56	-4	28.12	2.75	2.82
1886.					
January.....	60	-12	20.69	21.75	6.42
February.....	59	-12	36	1.5	3.47
March.....	65	-3	31.83	8	5.15

The record for April has not yet been made up.

H. D. MILLER.

Rain-fall, Franklin, Venango County, Pa. Recorded by Joseph Bell.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1875..	2.56	1.56	4.56	2.81	3.25	4.62	3.32	5.62	4.62	4	4	5.25	46.17
1876..	4	4.18	4.81	3.31	1.68	3.50	4.38	2.50	9.56	2.25	3.18	3.50	46.85
1877..	4.18	1.56	6.26	1.20	4.07	6.52	6.72	1.10	3.06	4.06	5.53	2.32	42.98
1878..	3.67	2.03	2.08	2.74	2.76	2.91	5.66	.84	6.71	2.04	3.26	5.42	38.12
1879..	3.48	5.11	3.10	1.89	.86	3.27	3.75	1.55	2.27	1.95	5.41	5.02	36.67
1880..	3.64	2.92	2.61	2.21	2.78	4.94	1.83	3.81	2.32	2.40	2.62	2.50	34.58

Average rain-fall, 6 years, 40.93 in.

Wilkesbarre, Luzerne County, Pa.

Latitude, 41° 14' 40.4". Longitude, 1° 10' 4.6". Altitude, 543.1 feet.

Statement of the monthly and annual temperature, mean, maximum, and minimum, together with the rain-fall.

MONTH.	1881.			1882.			1883.			1884.			1885.			RAIN AND MELTED SNOW IN INCHES.					
	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	1881.	1882.	1883.	1884.	1885.	Aver.
	January.....	24.2	44	-8	27.8	47	-5	22.8	38	-6	21.6	50	-9	24.8	56.5	-7.5	3.25	4.98	3.41	5.18	4.22
February.....	27.6	53	-5	33	54	15	28.3	48	11	32.4	59	-1	17.8	45	-12	.....	5.37	2.38	3.48	3.27	3.40
March.....	38.9	57	20	39.4	63	21	31.0	62	7	33.8	60.9	-2.5	25.6	57.2	-3	.....	2.27	2.55	4.95	.90	2.95
April.....	47.2	83	22	46.6	70	25	46.0	72	26	45.9	76.1	26	46.3	89	21.2	.....	2.10	2.70	2.46	2.56	2.40
May.....	68.8	91	4.2	55.6	85	36	61.5	85	46	58.2	91	32	58.2	89	31	.....	6.75	5.35	3.97	2.66	4.68
June.....	66.3	87	51	70.7	91	55	68.4	88	38	70	91	40	67	91	40	4.00	5.76	8.52	2.68	2.71	4.73
July.....	77.8	89	62	72.9	90	57	69.3	92	43	67.2	90	49	72.4	97.2	42	4.58	4.65	7.08	4.62	3.01	4.79
August.....	76.1	92	56	70.6	90	53	65.4	91.5	41	68.7	94	38	66.6	93.4	41.1	1.89	3.69	0.88	2.90	7.92	3.46
September.....	75.4	96	53	64.3	86	40	57.8	83.8	30.7	65.6	96	34	59.9	86	38.5	3.35	2.70	3.19	1.40	1.20	2.37
October.....	56.8	89	30	56.6	78	31	49.3	79.7	22	51.6	81.8	23	49.6	83.2	29.5	1.70	1.41	3.12	3.16	4.65	2.81
November.....	43.3	64	22	39.5	75	12	41.6	69.8	11.6	38.4	64.1	16.5	39.7	72	12	2.70	1.69	1.45	3.30	5.15	2.86
December.....	37.8	58	21	28.8	48	8	30.4	54.5	4.8	30.7	49	-7	32.3	56.4	5	4.83	1.06	2.00	4.53	2.68	3.02
Mean of years.	53.4	..	..	50.5	..	..	47.6	..	..	48.7	..	..	46.7	..	..	23.05	40.71	44.20	40.86	41.89	41.69

The monthly means are made up from the daily means. These are made from three daily observations, at 7 A. M., 2 P. M., and 9 P. M., doubling the 9 P. M. observation, and dividing by 4.

I have no record of rain-fall before June, 1881, and know of none in this city. I have used the record of my friend Judge E. L. Dana in supplementing my own, both in temperature and rain.

In making out the averages of rain-fall for January, February, March, and April, I have added in the fall of these months respectively this year. The May average is only for four years.

Rev. F. B. Hodge,

118 S. Franklin Street.

Temperature at North Mountain, Sullivan and Luzerne Counties. Altitude, 2,600 feet. Recorded by Dr. Lewis H. Taylor, of Wilkesbarre, Pa.

JULY, 1876.				AUGUST, 1876.			
DATE.	Max.	Min.	Mean.	DATE.	Max.	Min.	Mean.
1.....	80	56.5	68.2	1.....	73	52.5	67.7
2.....	78.6	60.5	69.5	2.....	72.5	56	64.3
3.....	78	63	70.5	3.....	69.5	62.7	56
4.....	76	62.5	69.2	4.....	70	59.5	64.7
5.....	75	60	67.5	5.....	81	64	72.5
6.....	75	60	67.5	6.....	84	63.5	73.8
7.....	79.7	54	66.9	7.....	84	63.5	73.8
8.....	87	65.5	76.2	8.....	80	49	64.5
9.....	87	69.5	78.2	9.....	79	53.5	66.5
10.....	85	66	75.5	10.....	79	56.5	67.8
11.....	86	63	74.5	11.....	79.5	58	68.7
12.....	84	65	74.5	12.....	80	60.5	70.2
13.....	84	65	74.5	13.....	86	60.5	73.3
14.....	80.2	64	72.1	14.....	76.5	59.5	68
15.....	80	63.8	71.9	15.....	81	64	72.5
16.....	85	56	70.5	16.....	77	58	67.8
17.....	78.8	55	66.9	17.....	75	61	68
18.....	81.8	62	71.9	18.....	76	53	64.5
19.....	82.5	64	73.2	19.....	65	61.5	63.2
20.....	85.2	65.8	74.5	20.....	68	59	63.5
21.....	71	56.5	67.7	21.....	63	41	52
22.....	72.4	49.5	60.9	22.....	69.5	41.2	55.3
23.....	68.9	60.5	64.7	23.....	75	55.5	65.2
24.....	63.2	45.6	54.4	24.....	76	53	64.5
25.....	63.8	45.8	54.8	25.....	81	55	68
26.....	64.8	46.5	55.6	26.....	70	49	59.5
27.....	71.8	44	57.9	27.....	68	47	57.5
28.....	68.8	58.5	63.7	28.....	70	47	58.5
29.....	66.5	56.8	61.7	29, omitted.....	.....	.....	.....
30.....	62.8	54.5	58.7	30, ".....	.....	.....	.....
31.....	60.7	52	56.3	31, ".....	.....	.....	.....
Average.....	.....	.....	72.8	Average.....	.....	.....	64.5

Record showing temperature and rain-fall at Tamaqua and Mahanoy Plane, Schuylkill County, Pa.

MONTH.	Highest temperature.	Lowest temperature.	Mean temperature.	Total rain or melted snow.	No. of days on which 0.01" fell.	Depth of snow in inches on ground at end of month.	Total snow-fall in month.
TAMAQUA, 1884.							
May.....	90	46	67.02	4.35	9	..	..
June.....	100	56	78	3.74	4	..	..
July.....	94	60	74.5	6.96	10	..	..
August.....	96	58	76.2	7.13	18	..	..
September.....	98	53	72	1.36	5	..	..
October.....	85	32	55.6	2.24	11	..	..
November.....	60	20	40	2.90	6	1.25	..
December.....	56	-4	31	7.40	9	..	14.65
1885.							
January.....	56	0	25.2	4.09	6	5	7
February.....	42	-12	19.1	1.40	2	..	2.25
MAHANAY PLANE, 1885.							
February.....	37	3	20.0	2.16	5	..	23
March.....	55	2	27.9	3.9	2	4	4.50
April.....	84	26	49.8	2.28	8	..	4.00
May.....	87	40	61.2	3.42	10	..	..
June.....	92	52	70	1.04	3	..	..
July.....	97	58	77.56	1.75	7	..	..
August.....	89	53	70.2	9.99	12	..	..
September.....	84	45	64.2	.76	5	..	..
October.....	74	35	53.0	5.54	10	..	..
November.....	67	13	41.6	6.78	12	6	24
December.....	58	8	33.9	4.17	5	..	4
1886.							
January.....	52	-4	24.8	8.46	10	..	25.75
February.....	51	6	28.6	5.59	5	..	..
March.....	64	7	39.7	7.59	6	..	..

Mean annual temperature for 1885..... 50.58 degrees.

Annual rain-fall for 1885..... 52.24 inches.

Rain-fall in Schuylkill Haven, Schuylkill County, Pa., 1880-1885.

This statement shows the inches and hundredth parts of an inch, and is taken from an accurate water-gauge.

1880.....	37.93 inches.
1881.....	42.83 "
1882.....	35.18 "
1883.....	38.51 "
1884.....	43.88 "
1885.....	34.80 "
Mean.....	38.85 "

Furnished by WILLIAM H. DECHANT, *Division Engineer,*
P. & R. R. Co. (Mahanoy Plane Div.).

Especial reference should here be made to the assistance derived from the following sources in the preparation of this paper :

John S. Billings, M. D., LL. D., Surgeon-General's Office.

Dr. Persifor Frazer, Philadelphia.

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Mr. Charles A. Ashburner, Second Geological Survey, Pennsylvania.

Henry I. Bowditch, M. D., Boston.

Mr. John L. Ogden, Chief Engineer Water Department, Philadelphia.

Dr. Guy Hinsdale, Philadelphia.

Dr. Hobart A. Hare, Philadelphia.

Mr. George E. Chambers, Philadelphia.

Mr. J. C. Green, West Chester.

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Dr. Lewis H. Taylor, Wilkesbarre.

Mr. William H. Dechant, Mahanoy Plane.

Mr. Joseph Bell, Franklin, Venango County.

Dr. W. H. Mercur, Pittsburgh.

Dr. William D. McGowan, Ligonier.

Prof. I. Thornton Osmond, State College.

Dr. F. Donaldson, Baltimore, Md.

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