

U.S. Census Office. 9th Census, 1870.



STATISTICAL ATLAS

OF THE

UNITED STATES

BASED ON THE RESULTS OF THE

NINTH CENSUS 1870

WITH CONTRIBUTIONS FROM MANY EMINENT MEN OF SCIENCE
AND SEVERAL DEPARTMENTS OF THE GOVERNMENT

COMPILED UNDER AUTHORITY OF CONGRESS

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JULIUS BIEN, LITH.

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STATISTICAL ATLAS

UNITED STATES

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PREFACE AND INTRODUCTION TO THE STATISTICAL ATLAS.

BY THE COMPILER.

THE present work is a growth from the series of maps introduced into the quarto volumes of the Ninth Census. During the year 1871, the writer, as Superintendent of Census, had caused to be laid down in color upon outline-maps of the United States, the proportions disclosed by the enumeration as existing in the several sections of the country, between the aggregate population and its principal constituent elements. No originality of design was claimed in this mode of representation. These maps having been borrowed from the Census Office by Prof. D. C. Gilman, now President of the University of California, were by him exhibited at a Session of the American Geographical Society, eliciting expressions favorable to the application of this method to these and other subjects in connection with the Statistical Tables then about to be published.

In January, 1872, a Memorial was addressed to the Census Office by several Professors in the Sheffield Scientific School, recommending the graphic illustration of the census volumes. The subject having been brought to the attention of the Department, a communication was addressed, June 5, 1872, by the Secretary of the Interior, to the Speaker of the House of Representatives [Ex. Doc. No. 9, 42d Cong., 3d Sess.], inviting the attention of Congress "to the importance of graphically illustrating the three quarto volumes "of the ninth census of the United States, by a series of maps exhibiting to the eye the "varying intensity of settlement over the area of the country, the distribution among the "several States and sections of the foreign population, and of the principal elements "thereof, the location of the great manufacturing and mining industries, the range of cultivation for each of the staple productions of agriculture, the prevalence of particular "forms of disease, and other facts of material and social importance which have been "obtained through said census," and recommending an appropriation therefor.

At the same session Congress made an appropriation for the purpose here expressed. Under that appropriation 24 plates of graphic illustrations were incorporated in the volumes which appeared during that and the following year. The several subjects taken for illustration were as follows:

A Hypsometric Sketch of the United States, prepared by Prof. A. Guyot of Princeton College; with addition of intermediate level curves, by Prof. Chas. A. Schott, of Washington. (Pl. X, A, of the present publication.)

A Temperature Chart and a Rain Chart of the United States, being a reproduction of charts published by the Smithsonian Institution. (Plates V and VII.)

A Geological Map of the United States, compiled by Profs. C. H. Hitchcock and W. P. Blake. (Plates XIII and XIV.)

The remaining maps were prepared in the Census Office.

The following were the subjects taken for treatment. [The Arabic letters denote the page of the quarto volume of the Census, where the map first appeared. The Roman figures denote the Plates of the present publication, which correspond more or less fully to the maps as they first appeared.]

Volume on Population and Social Statistics. (25,000 copies.)
The density of the Total Population, 1, (XVIII-XIX.)
The Colored Population, 75, (XXI.)
The Foreign Population, 297, (XXV.)
The Germans, the Irish, 327, (XXVII, maps 1 and 3.)
The Swedes and Norwegians, the English and Welsh, the Chinese, the British Americans, 343, (XXVIII, in part.)

Illiteracy, 393, (XXIX.)
Wealth, 393, (XXXIII.)
Area and Political Divisions of the U. S., 571, (XV.)

Volume on Vital Statistics. (10,000 copies.)
Deaths from Consumption, 1, (XLI.)
Deaths from Malarial Diseases, 145, (XLII.)
Deaths from Typhoid, Typhus, and Enteric Fevers, 305, (XLVI.)
Deaths from Dysentery, Diarrhoea, and Enteritis, 425, (XLV.)
Hypsometric Sketch, 513, (X, A.)
Temperature Chart, 579, (VII.)
Rain Chart, 649, (V.)

Volume on Industry and Wealth. (15,000 copies.)
Wheat, 81, (XXXVI, in part.)
Corn, 121, (XXXVI, A, in part.)
Cotton, 161, (XXXVI, in part.)
Hay, 217, (XXXVI, in part.)
Tobacco, 289, (XXXVI, in part.)
Dairy Products, 369, (XXXVI, A, in part.)
Geological Map (in pocket at end of Vol.), (XIII-XIV.)

The rudeness of the maps prepared in the Census Office, as thus first published, hardly requires apology. The writer had only begun to appreciate the capabilities of this method, which now opens before him, whatever way he turns, so that the hardest task is that of selection and rejection, while the art of construction and arrangement is one in which indefinite improvement appears to be possible. The public acceptance of this early effort at the graphic illustration of the statistics of the United States, was cordial in the extreme. In his Annual Report for 1872, the Secretary of the Interior recommended—

"That a Statistical Atlas of the United States, based upon the results of the Ninth Census, to contain a large number of maps, with appropriate text and tables, be "authorized, in an edition not exceeding five thousand, to be prepared under the direction "of the Superintendent of the Census, for distribution to public libraries, learned societies, "colleges and academies, with a view to promote that higher kind of political education "which has hitherto been so greatly neglected in this country, but toward which the "attention of the general public, as well as of instructors and students, is now being turned, "with the most lively interest. The exact knowledge of our country should be the basis "of this education, and it is in the power of Congress, by authorizing such a publication

"as is here recommended, to practically inaugurate the study of political and social statistics "in the colleges and higher schools of the land." (Report, pp. 15-6.)

In accordance with this recommendation, Congress, by Act of March 3, 1873, made the appropriation under which the present work is issued. The compilation was undertaken by the writer with a corps of able assistants, immediately upon the passage of the act cited, and the full results are now presented to Congress and the country. Freedom from errors in matter, and faults in style, is not claimed for the work; indeed, now that it lies finished, the Compiler can detect many blemishes, and could lightly promise to make it much better, were it to be done over again; but he trusts that, such as it is, it may be accepted as justifying the recommendation of the Secretary of the Interior and the action of Congress.

ACKNOWLEDGMENTS.

In performing the duty with which he was thus charged by Congress, the Compiler has had the good fortune to secure the co-operation of two of the Scientific Services of the Government, and of several eminent gentlemen, to whose contributions especially, has he looked, to give character to this publication. The names of the official and private contributors to the Atlas will be found recorded in connection with their several Maps and Memoirs, and also in the Index immediately preceding this page. In addition to such mention, the Compiler begs to acknowledge his obligations for suggestions bearing on the general scope of the work, or for specific information and advice on mooted points, or for valuable Maps and Documents supplied upon request, to the following gentlemen:

Prof. Joseph Henry, Secretary, and Prof. S. F. Baird, Assistant Secretary, Smithsonian Institution, Washington.

Maj. Gen. A. A. Humphreys, Chief of Engineers, U. S. A.

Brig. Gen. A. J. Myer, Chief Signal Officer, U. S. A., and Prof. Cleveland Abbe and Lieut. Henry Jackson, U. S. A., of the Signal Office.

Prof. J. E. Hilgard, U. S. Coast Survey.

Brevet Col. J. J. Woodward, Surg. Genl's Office, U. S. A.

E. B. Elliott, Esq., Chief Clerk, Bureau of Statistics.

Prof. W. L. Nicholson, Topographer, Post Office Dept.

Prof. W. H. Brewer, New Haven.

Col. G. D. Harrington, Chief Clerk of the Census Office, has rendered much assistance by consulting the records of that office for information not contained in the published Census volumes.

The Assistants employed upon the work, besides those engaged solely in computations required for the paper on "The Progress of the Nation" and therein mentioned, have been Messrs. S. A. Galpin, formerly of the U. S. Census and Indian Offices, J. J. Skinner, C. E., and H. R. Elliot. Mr. Galpin has had charge of the correspondence arising in the progress of the work, has prosecuted special researches in connection with subjects, historical and statistical, under treatment, and has assisted in the delineation of groups upon the maps, especially those relating to population. Mr. Skinner has drawn, under the direction of the Compiler, all the geometrical figures, except those (Pl. XLVII-LIV) which were contributed by Mr. Wines, and has performed a considerable part of the computations required for these as well as for other graphic illustrations in Parts II and III. Mr. Elliot has been largely engaged in arithmetical computations, but has also assisted in plotting groups for the geographical illustrations. To these gentlemen is the Compiler indebted, not only for zeal and fidelity in the performance of their several parts, but for many intelligent suggestions respecting the details of the work, as its scope was gradually developed and its successive difficulties were encountered.

Mr. Julius Bien, of New York, has done all the lithographic work upon the Atlas. How he has done it, form and color in the result will tell without any words of the Compiler, who cannot refrain, however, from adding his acknowledgment of the patience with which Mr. Bien has submitted to frequent modifications and corrections of "copy," and of his zealous interest in the work which has made the Compiler's task sometimes less difficult.

The Compiler desires, on behalf of the Government and of himself, to acknowledge much courtesy and material assistance from the Governing Board of the Sheffield Scientific School, who granted the use of a room for the construction of maps, and afforded, from time to time, many facilities for this work.

AN ACCOUNT AND TECHNICAL DESCRIPTION OF THE MAPS AND CHARTS.

The three Parts of the present publication contain together sixty plates, of the full single-page size. The highest plate-number is, however, the fifty-fourth, six plates bearing duplicate numbers. The division of this total between the several Parts is shown by the Index, preceding.

Of the sixty plates, sixteen are devoted to Geometrical Illustrations. In these, the special configuration of States and Sections is disregarded, and the statistical facts which form the subjects of the several charts are exhibited by lines and plane figures. Twelve of the sixteen are to be found in Part III, "Vital Statistics," the remainder in Part II, "Population—Social and Industrial Statistics." Some of these charts contain many distinct figures, the aggregate number being in excess of 1200.

The remaining forty-four plates are occupied by Geographical illustrations, the special configuration of States and Sections being here observed, and the statistical facts treated being exhibited by colors and shades of color imposed upon the surface thus presented.

In six cases, maps occupy each two pages. Five of these are found in Part I, "Physical Features," the sixth being the map which shows the Density of Population at 1870, in connection with Indian Reservations, Plates XVIII and XIX, Part II. In the case of seven plates, viz., XVI, XVI, A, XXVII, XXVIII, XXXVI, XXXVI, A, XXXVI, B, more than one distinct map is offered on a single page. In the case of the remaining twenty-five plates, the entire page is devoted to a single map. The whole number of maps, whether covering the United States or some smaller field, is, if we count that a distinct map which completes the representation of a separate subject (see the first page of Crop-Maps, Pl. XXXVI), sixty-nine. Of these, ten, occupying fifteen pages, are contained in Part I; fifty-three, occupying twenty-three pages, in Part II; and six, occupying six pages, in Part III.

The Map which has been used as the base for all the illustrations (excepting the River and Coal Maps) which occupy two pages, or one page for the Territory east of the 100th meridian (for example, those on Pl. XVII-XXIX), is that prepared in the Office of the Chief of Engineers of the U. S. Army.

We will first speak of those illustrations embraced in the present publication which we have termed Geometrical, to distinguish them from the Geographical illustrations, of which less will require to be said in explanation, whether of method or of result.

Mr. Wines has, in the first four of his charts of the afflicted classes (Pl. XLVII-L), made use of a method which the Compiler believes to be a novelty in the graphic illustration of Statistics. With Mr. Wines' sanction, the method has been applied in the construction of the Charts, Pl. XXXVIII, XXXIX, XLIII, XLIV (Parts 1 and 2). The limitations of Mr. Wines' method are obvious, yet, in spite of those limitations, its advantages are unquestionable.

The more familiar method of illustration is that made use of in Part 3, Pl. XLIV, where a series of perpendicular lines are cut at distances above the horizontal base line, corresponding to the proportions existing between the various statistical subjects to be represented. Thus, charts are constructed showing to the eye fluctuations in the volume of currency, in connection with movements occurring simultaneously in the prices of commodities; or, the changes of temperature and of humidity throughout the year are brought into contrast with the varying death-rate of the corresponding seasons.

The chief advantage of this method is that it enables the eye to make very minute measurements, at single points, of the dimensions of the different subjects under treatment. Thus, with a perpendicular of the length taken for the figure in Part 3, Pl. XLIV, a preponderance of one-half of one per cent. is easily shown. The limitation of this method is found in the fact that but a few subjects can thus be shown together, without the eye becoming confused and losing its clue, its *thread*, as it passes across the figure from side to side. The use of alternately light and heavy lines, of continuous, of broken, and of dotted lines, and the printing of lines in different colors, will do much to postpone this result; yet, after all is done that can be done to extend the capabilities of this method, it fails in representing any large number of statistical subjects together.

According to Mr. Wines' method, whenever a statistical subject consists of two parts approximately equal, as male and female, a perpendicular is erected, and from this bilateral ordinates are drawn, at equal distances from each other, the ordinates on one side being devoted to, say, the male, and the other to the female element, and the several ordinates, on the one side and on the other, being determined as to length by the statistical proportions to be represented. The end of each ordinate (away from the perpendicular), instead of being left "out in air," is connected with the ends of the ordinates next above and below, and thus a completed and closed figure is formed. A separate figure is devoted to each statistical subject, and comparison is made between the several figures *as to the general effect only*, since nice comparison by the eye, of part with part, is, of course, impossible. There are few persons who can distinguish differences of 2, 3, or perhaps even 5 per cent., in the lengths of lines which cannot be laid against each other. But where preponderances are decided, and it is sufficient for the purposes of the statistician to convey a general impression, this form of illustration has, the Compiler ventures to say, an advantage over any other yet proposed. The figures are neat and compact, each strikes the eye, as a whole, at once, instead of requiring the eye to pass now up and now down from side to side of a page, much of the impression of what has gone before being lost as each new portion of the figure is brought into view. And the number of subjects which can thus be drawn into ready comparison as to their general dimensions or proportions, is very large. Thus, on Pl. XLVII, Mr. Wines has presented 73 figures, each of which can be studied separately, or in turn compared by the eye, as to its main proportions, with any other.

Although the notes to the charts explain the construction of these figures, the explanations are yet necessarily so condensed that a few additional remarks may be of assistance. Let us speak particularly of the one just referred to, Pl. XLVII. The subject is, the Distribution of the Blind of the United States at 1870 and 1860, between the two sexes and among the several periods of life. It is known that many persons who are blind are not so set down in the census returns: while not a few of such persons may be omitted entirely from enumeration, yet it is believed that when so large a number as twenty thousand is taken, the proportions obtained therefrom will conform substantially to the law of the whole body.

The upper left-hand figure of all represents the distribution of this total of 20,313, the Blind of the United States. Ordinates are drawn on each side the perpendicular, for ten ten-year periods of life. The ordinates on the left represent the males, those on the right, the females. Each ordinate is drawn of a length corresponding to the number of persons of that sex and age, who are blind, the total having first been reduced to thousandths for convenience of expression, and the figures for the appropriate number of thousandths being set down, for convenience of verification or comparison, opposite the end of each ordinate. Now let us briefly discuss the figure. We find the lines which stand for the males and the females, severally, under 10 years of age, to be not far from equal, the liability of the sexes to blindness from birth being substantially equal, and the perils of the nursery and the playground being nearly the same for both, though still somewhat greater in the case of the boy than of the girl. Up to 20 years the same proportion holds, but after this period, the liability to acquired blindness becomes greater on the part of the male. Perhaps the man goes into the machine-shop, the furnace, the mine, where his eyes are incessantly exposed to destructive accidents; perhaps he works all day in the direct glare of the sun; perhaps he rides much on the cars, as passenger or as railway employee; perhaps he engages in riots on the street or fights in the saloon, and, through one or another of these means, loses his sight.

All the while, the woman is, in a degree, protected by her place, her occupation and her disposition, from accidents involving loss of sight. But after middle life, say at 45 or 50 years of age, the liability of the man begins to diminish relatively, that of the woman to increase. He is less actively employed, less adventurous, less reckless, less quarrelsome. The woman is perhaps no more quarrelsome, reckless, adventurous or actively engaged, but her patient sewing and darning through long years, trying at the best, and often with insufficient or unfavorable light, now begin to tell. Moreover, her greater tenacity of life after 50 operates to increase relatively the number of her sex living at the higher ages, and, by implication, the number of blind women at such ages. So that, we find the female side of the figure swelling out again after 50 years of age until at 70 the number of the two sexes becomes about equal, while after this, the females remain distinctly in excess. Thus we have, as a consequence, a figure which we may call "hollow-backed," as the type of the *blind population*, the males in excess on the whole, and their side being shaded to represent that preponderance.

The other figures on the upper half of this plate represent the blind of each State, by turns, at the same census, 1870. And here we note, together with many irregularities, an

almost unfailling intimation of *the type*. The hollow-back appears in almost every case, though generally without the easy curve of the typical figure. Why these irregularities? Two reasons exist. The first is that the law of Average operates more effectively, the wider scope is given it.* The second is that migration within the Union is constantly tending to destroy the proportions naturally existing between the several classes of the population. For example, Maine and New Hampshire are States from which there is constant emigration. The blind, however, as a rule, do not emigrate. The birth-rate of Maine and New Hampshire is also low (see Pl. XXXIX and XL). As the result of these two causes these States have not only a greater number of blind proportionally to population than new States, like Wisconsin and Minnesota, but also an unusual proportion of their blind in the higher ages of life.

In Pl. XXXVIII this method has been applied to the distribution of the whole living population by age and sex. Here we see how each 1000 of the inhabitants of the United States, and afterward of each State by turns, is distributed between the two sexes and among the eight periods of life taken. In a later series, on the Plate next in order (XXXIX), the Native and the Foreign populations are separately treated in the same manner.

The striking difference between the type-figures (the figures for the United States, in the upper left-hand corner of their respective groups) for the Native and the Foreign population is referred to and important use made of it a little further along in the text; but this difference is scarcely more striking than that which exists between figures of the same series: compare the lines which represent the number of children under 10 years of age in the Native population of New Hampshire and Maine with the corresponding lines for Minnesota and Wisconsin; note, too, how the preponderance shifts from the female to the male side as you go westward (cf. Pl. XXXVII). In the figures for the Foreign population, again, compare California with Massachusetts, Arkansas with Rhode Island. Observe that here the only figures in which the right side is shaded to denote an excess of Foreign females are those for the cotton-spinning and paper-making States of Massachusetts, Rhode Island, and New York, for the District of Columbia, where the population is highly exceptional, and for the polygamous Territory of Utah; and this last remark leads us to refer back to the figure for the Native population of Utah, in the preceding series. Observe that more than half the population is under 10 years of age. The study of these two pages will bring out to the careful observer a hundred points of interest. Observe, for instance, the "nick" on the male side at 30-40, in so many of the Southern States, telling of the unrepaired losses by the war. Especially compare the figures for Alabama, Georgia, Mississippi, and Virginia, with that for the United States.

On Pl. XLIII, the same method of illustration is applied to the distribution *by age and sex* (1) of the body of deaths for all diseases occurring in the United States, and in each State, during the Census year, and (2) of the deaths occurring within the United States from each of certain specified diseases and groups of diseases. Here, again, the upper left-hand figure of each group affords the type, while the conformity to, or divergence from, the type, in the figures which succeed, becomes significant of causes or conditions characteristic of the individual State, or of the special disease or group of diseases.

On Plate XLIV, parts 1 and 2, we have the same method applied to the distribution of the Deaths occurring during the Census year, by sex and *Month of Death*, (1) for the United States and for the several States, in the aggregate of deaths from all diseases, and (2) for the United States, in the aggregate of deaths for each specified disease or group of diseases.

One caution needs to be offered here. As explained in the paper of Mr. Elliott, presenting a Life-Table for the United States (Part III, Vital Statistics), considerable omissions take place in the returns of deaths in a Census of the United States taken under existing laws. This tendency to omission is clearly greatest in respect to those deaths which occur furthest away from the date of enumeration (June 1), which are, of course, the deaths of the June of the preceding year. Hence there would be anticipated, what the Census actually discloses, a deficiency in the returns for this month, a deficiency which it is not practicable to supply, or even to measure with certainty, yet which must be seen to exist. In the study of the figures on Pl. XLIV, therefore, the accidental deficiency in the deaths for June must always be held in mind. On this account, as well as for the better guidance of the eye in tracing the monthly ordinates across the page, the line for June has been made heavier than the others.

Part 3 of Pl. XLIV, forms the subject of a separate paper by the Compiler (Part III, Vital Statistics).

On Plates LI-LIV, Mr. Wines has shown the distribution of the afflicted classes according to sex, race, and nationality. Let us take the Chart of the Blind (LI), for description. Here the numbers of the Blind in the United States and in the several States are shown by proportional circles. The upper left-hand circle represents the total number in the United States, and the sectors of that circle show the parts into which that aggregate is divided by distinctions of sex and nationality.

If we may compare the radii of the circle to the hands of a clock (supposing these to be, instead of two, four, all of equal length), one hand, in these figures, always stands at six o'clock, and the others are moved around at various angles to it and to each other, to represent the distribution indicated above. Thus, to carry out our image: one hand standing at 6, another stands at just 11:30, the sector formed by the two hands containing 165 degrees of the circle, being the share of the Blind of the United States who are Native Males. A third hand stands at 12:20 o'clock, the sector formed by this radius and the one just mentioned containing 36 degrees of the circle, which represents the share ($\frac{1}{5}$) of the total Blind who are Foreign Males. The fourth hand stands at 1:20 o'clock, the sector formed by this radius and the one last mentioned, containing 22 degrees of the circle, showing the share of the total Blind who are Foreign Females. Of course there remains a sector, to complete the circle, comprised between this last radius and the one that stands fast at 6, which sector contains 137 degrees of the circle, representing the share of the total Blind who are Native Females.

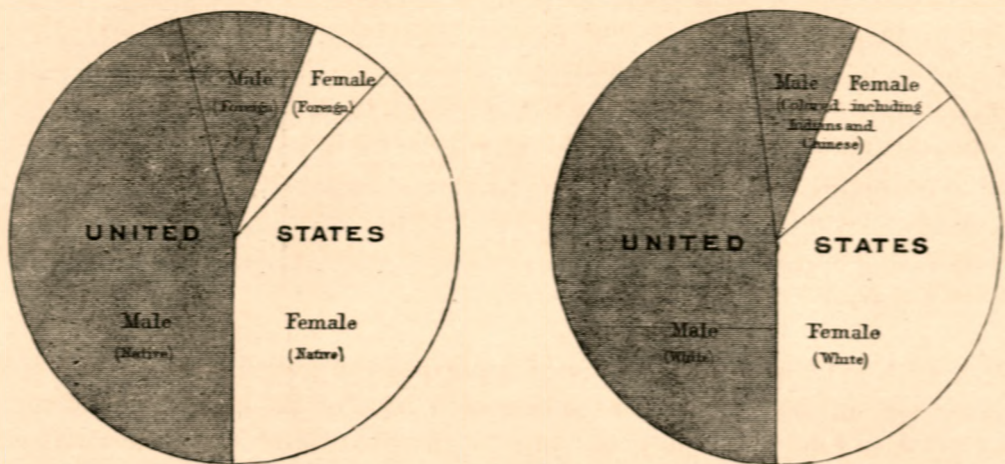
These sectors manifestly can be put together to form larger classes, either without the distinction of sex, or without that of nationality. Thus, to take the sectors in the order named, Nos. 1 and 2 represent the Male Blind, Nos. 3 and 4, the Female Blind. Nos. 2 and 3 represent the Foreign Blind; Nos. 1 and 4, the Native Blind.

The first horizontal series of smaller circles are constructed upon precisely the same principle, with the difference only, that the circles here stand for the blind in each State, by turns.

The large figure on the upper right-hand corner is constructed upon a similar principle with that in the left-hand corner, except that the sectors here represent the White Males and White Females, the Colored Males and Colored Females, while the second horizontal series of smaller circles show these classes of facts by States.

* The same principle applies as between the figures for large States and for small States, where the second cause, *migration*, does not come in to disturb natural proportions. Note the extreme irregularity of the figure for Delaware. A population of 125,000 does not afford scope for the law of average to produce symmetry. When the mode of representation is applied to Territories, like Dacotah, Wyoming, and Idaho, with populations of 9,000-15,000, the figures resulting are of course shockingly distorted, a single mining or railway accident serving, in so small a field, to exaggerate or even to reverse the relations existing in the typical figure.

For convenience of reference, the two principal figures described are reproduced here.



The third horizontal series of circles on Pl. LI are intended to show, for each State, the increase of Blindness during the decade 1860-'70, the inner circles being proportional to the number of blind at 1860, the outer circles being proportional to the number at 1870, and the rim between (showing the increase) being shaded for better effect.

The technical description here given of the Chart of Blindness, will apply to the three following. The Males are shown to be in excess among the Blind, the Deaf Mutes, and the Idiots; the Females among the Insane. The Foreigners are shown to be in excess of their proportion among the Blind and the Insane; the Natives among the Deaf Mutes and Idiots. The Colored are shown to be in excess of their proportion among the Blind and the Idiots; the Whites among the Insane and the Deaf Mutes.

Of the four remaining plates which are occupied by geometrical illustrations, the first in order, Pl. XX, is intended to exhibit the Constituent Elements of Population of the several States, at 1870. The scheme on which the diagrams are constructed, is there succinctly stated. It may, perhaps, facilitate their use, to show in detail how the figure for a single State is made up. Let us take that for the State of Missouri.

Here we have a square, proportioned to the population of the State, on the scale of 350,000 inhabitants to the square inch. This is divided by perpendicular lines into three rectangles of the full height of the square. That on the left-hand represents the number of persons living in Missouri who were born outside the United States. The central rectangle of the three represents the number of Colored persons living in Missouri; but this is divided by a horizontal line into two parts, the lower of which represents the Colored persons now living in Missouri, who were born in that State; the upper, the Colored inhabitants of Missouri, who were born in other States of the Union. There remains to complete the square, a rectangle very much larger than the other two combined, which represents the White inhabitants of Missouri who were born in the United States. This rectangle, also, is divided by a horizontal line into two parts of not very unequal size, of which the lower represents the White Missourians who were Missouri-born; the upper, those who were natives of other States.

While, therefore, the square is first divided by perpendicular lines into three rectangles of the full height of the square, two of these are divided by horizontal lines, so that the figure is finally constituted of five rectangles, representing the following elements of population:

Foreign	}	Born in the State.
Native Colored . . .		Born in other States.
Native White . . .	}	Born in the State.
		Born in other States.

Close by the square thus composed, and on its right, stands a rectangle of equal height, which, on the same scale (350,000 inhabitants to the square inch), represents the number of persons Missouri-born, who are found, by the Census, in other States of the Union. This rectangle, again, is divided by a horizontal line into two, the upper representing the Colored Emigrants, the lower, the White.

Such being the principle upon which these figures are constructed, some of the most important facts relating to the population of each State may be seen at a glance. Observe the width of the Foreign rectangle in some States and of the Colored rectangle in others. Observe how largely the Native White population of Kansas and Arkansas, of Iowa and Texas, and other States Northwest and Southwest, is made up of persons born outside the States in which they now live. On the other hand, note how small has been the Native White emigration from other States into the Carolinas, Maine and Virginia, and even in comparison with the States first named, into New York and Pennsylvania. Observe how differently the Colored populations of the States are made up in this respect; compare Louisiana, Texas, Arkansas, and Mississippi, with Virginia, the Carolinas, and Kentucky.

And turning to the rectangles which stand for the emigration from the several States, observe how strongly they are contrasted. Compare the figures for New York, Ohio, Vermont, New Hampshire, and South Carolina, with those for Kansas, California and Michigan. And still keeping our attention on these isolated rectangles, note how largely the emigration from Virginia has been composed of Colored persons; how largely that of Tennessee, of Whites.

In the Charts (Pl. XXXI and XXXII), devoted to Church Accommodation and the Occupations of the People, a different principle of representation was adopted. The States are here taken as equal bodies; that is, equal squares are taken to represent their population of 10 years of age and over. Inside each square, and symmetrically placed with respect to it, is another square which represents the proportion of the Chart-subject to such population. Thus, in the figure for any State, on Pl. XXXI, the sides of the inner square are to the sides of the square exterior to it, as the square root of the aggregate number of sittings in all the Churches of the State is to the square root of the population of 10 years of age and upwards. The interval between the two squares, which is shaded in black, is, therefore, in exact proportion to represent the share of the population over 10 for which sittings are not provided. It will be noted that in the figures for the States of Ohio and Vermont, the shaded margin disappears entirely, the aggregate Church Accommodation equalling the population over 10 years of age.

Next, the interior square is divided by perpendicular lines into rectangles representing the share of the total church accommodation which is provided by the churches of the several denominations. Four denominations, the largest, are separately shown in the figure for each State, and the remaining denominations are thrown together into a group, "all others," to form the right-hand rectangle (in every case but that of Nevada, where the four denominations separately shown exhaust the list). Ten denominations thus appear in the State figures. Three figures are added, one for the District of Columbia, one for the Northwest Territories, and one for the Southwest Territories. On the last appears a denomination not shown elsewhere, the Mormon, making the number of denominations appearing separately on the Chart, eleven. Of these, one appears 39 times; one, 34 times; one, 30 times; one, 22 times; one, 13 times; two, 7 times; one, 4 times; three, once.

A square for the United States is added, which is made, for convenience only, four times the size of the State figures. Here is shown the ratio between the aggregate sittings of the Churches of the country and the population over 10 years of age; while the interior square is divided to exhibit the eight largest denominations, three which are of importance enough to be represented in some one or more of the States not coming out in the United States figure.

Upon the same plan and on the same scale, the figures on Pl. XXXII are constructed to show the ratio between the population over 10 in each State and the number of persons who are accounted for, either as pursuing gainful occupations (criminal and shameful occupations being excluded from the census tables), or as attending School. The Interior Squares are here divided into ten rectangles, as follows:

Engaged in Agriculture,	Male	Female
Engaged in Manufactures and Mining,	Male	Female
Engaged in Trade and Transportation,	Male	Female
Engaged in Personal and Professional Services,	Male	Female
Attending School,	Male	Female

Upon the principle of these Charts, the rectangles vary in size to represent the varying proportions in which the populations of the several States appear as engaged in the various occupations. In many cases, however, the females engaged in gainful occupations are so few as scarcely to be shown upon squares of this size. This is especially true of females engaged in agriculture in the Northern and Northwestern States; while at the South, where the negroes are in force, females appear largely in the department of agriculture.

The last remaining illustration of the geometrical series, the Fiscal Chart, Pl. XXXV, A, scarcely needs description. The Compiler will only explain why it was that the revenue and the expenditures of the several years were taken as equal, and only varied to show the varying proportions in which the total revenue was made up of receipts from the several recognized sources, and in which the total expenditure was directed to the several recognized objects: in other words, why the Chart does not combine both the *absolute* and the *relative* methods (see the title following, "Suggestions for the Study of Statistical Maps and Charts"). The reason was found in the enormous differences in the receipts of different years within our fiscal history, and still more, the differences in the disbursements of those years.

Thus, the receipts for 1866 were nearly 170 times those for 1792. If, therefore, the receipts for 1866 had been represented by the full width of the page, those for 1792 could have been allowed but one-ninth of an inch. On the other hand, the expenditures of 1865 were more than 400 times those of the period May, 1789, to December, 1791, so that, had the full width of the double page been given to the expenditures for 1865, those of the earlier periods would have been crowded into less than the fourteenth of an inch. Hence the Compiler felt constrained to adopt the relative method solely, showing in the figures themselves, only the proportions in which the Revenue and Expenditures were made up, each year, of the several parts recognized in the Treasury Reports, but adding the actual figures of receipt and disbursement, opposite the line for each year.

The Geographical illustrations, in general, require no verbal description and explanation, beyond what is given on their face. It is not the Compiler's intention to preach from them, as a text; nor does he assume that attention needs to be directed to their more obvious or their more recondite suggestions. Certain of these maps will be specially mentioned in this present paper. Others* form the subjects of separate discussion by their Compilers. For the rest, the account given on the first page of the paper on the Progress of the Nation (Part II), of the method adopted in the formation of map-groups, according to a scale taken, will answer in substance.

There are, however, a few of these maps which, as we have said, require that their principles of construction be more fully stated and illustrated than it was found possible to do upon the plates themselves. These are, the Signal Office Maps (Pl. VI, VIII, IX, X), the Crop Maps (Pl. XXXVI, XXXVI, A), and the Pacific Coast Maps (Pl. XXXVI, B).

The Signal Office Maps.—The following is the descriptive text furnished by the Chief Signal Officer of the Army.

I.—CHART SHOWING THE FREQUENCY OF STORM CENTRES. (Pl. VI.)

This Chart is designed to show the frequency with which the centres of areas of low barometer (assumed to average fifty miles in diameter) have passed over any given district. It does not include local thunder or hail storms.

The Chart is constructed upon the following principles: supposing it to be divided into squares of one degree each, the determination of the frequency is arrived at by counting the number of areas of low barometer, as shown by the Signal Service Reports, to have passed over any designated square, or to have approached within twenty-five miles of it. The Chart shows the *annual* average as obtained from the records of the two years ending February, 1873. This chart is of interest in connection with all statistics bearing on the security of navigation, and on the habitability of a country, and the diseases that originate in the sudden changes of weather that attend storms.

2.—CHART SHOWING MEAN TEMPERATURES AT 4:35 P. M. OF THE HOTTEST WEEK OF 1872, AND AT 7:35 A. M. OF THE COLDEST WEEK OF THE WINTER OF 1872 AND 1873. (Pl. VIII.)

The distribution of heat is the controlling influence of all climates, and the data of temperatures are already well given in the chart of annual isotherms, published in the second volume of the publication of the Census Office,† but the knowledge of extremes of heat and cold at any point, in any one year, is of the greatest importance.

An extremely hot week, or even a hot day, has a very marked effect on human life; an extremely cold day or week is equally destructive.

This Chart is designed to show these extremes at any point, and is compiled from data furnished in the Signal Service Reports of the average of the maximum daily temperature for the hottest week of the year 1872, and the average minimum daily temperature for the coldest week of the winter of 1872-'73. Thus, at Breckenridge, Minn., the average maximum daily temperature for the week ending July 13th, was 83° 7', while the average minimum temperature of the week ending December 21st, was—22° 4'.

The hot temperatures are shown by red lines, and the cold, by blue ones.

* The Woodland Map, Pl. III and IV, is particularly discussed in Prof. Brewer's paper. The Coal Map, Pl. XI and XII, is described in Prof. Hitchcock's paper, and the Geological Map, Pl. XIII and XIV, in the joint contribution of Profs. Hitchcock and Blake. The Area Map, Pl. XV, is explained in Mr. Stocking's Memoir and the tables accompanying. The Eight Maps, Pl. XVI-XIX, are described and discussed in the paper on "The Progress of the Nation."

† Pl. VII, of the present publication.

3.—CHART SHOWING ANNUAL MEAN OF BAROMETER AND TOTAL MOVEMENT OF THE ATMOSPHERE, WITH RESULTANT. (Pl. IX, X.)

The Isobarometric lines, shown on the Chart, are for the year ending May 30, 1873, and are compiled by an approximate formula, but are yet sufficiently exact, when the uncertainty of the altitudes and reduction to sea-level is taken into consideration. The total movement of the atmosphere is for the year ending May 31, 1873, and is designed to show the total movement in each recorded direction, as shown by the Signal Service Reports, and the yearly resultant of the same. It is charted as follows: Take the total movement of northerly winds, as measured by the Robinson Aneuroimeter, and lay it off by the scale to the south of the initial point, do the same with the movement from the northwest and lay it off from the initial point to the southeast, and the same with the movements from the west, southwest, south, southeast, east, and northeast; connect the points and it gives the figures as shown on the Chart. The resultant is obtained by starting from the initial point and laying off to the south the total movement of north wind; from the end of this line to the southeast the same for the northwest wind; from the end of this to the east, the movement of the west wind; and finally, having plotted the eight courses, connect the initial point with the point at the end of the last course, and this line gives the resultant of the total movement for the year. This chart might be compared with the statistics relating to disease and the rainfall on the coasts.

The Crop Maps.—Pl. XXXVI contains maps which exhibit the range, and, within the range, the degree, of cultivation of eight crops. The process of forming the scale for these maps is briefly stated at the foot of the page. Pl. XXXVI, A, contains a map of the Corn Crop constructed upon the same principle. The other maps upon this page fully explain themselves.

These nine crop-maps, then, are constructed by the following rule. The number of bushels, bales, tons, or pounds (according to the unit of quantity appropriate to the special crop) produced in each county, is divided, first, by the number of inhabitants, and second, by the number of acres of improved land in the county; the two quotients thus obtained are multiplied together, and the square root of the product is taken as the measure of the productive power, in respect to that crop, of the county. This method of constructing a scale for crop-maps must be admitted to be somewhat arbitrary. The Compiler submits it to the judgment of statisticians; and in doing so, has only to say for it that he knows of no other scheme against which more objections have not occurred to him than against the one here adopted. His reflections and tentative computations have satisfied him that no simple ratio can be taken which will not in many cases grossly exaggerate, and, in other cases, as unjustly disparage, the importance of the crop to the county, and of the county to the crop of the country.

The *per-capita* test is notoriously unjust, as the *per-capita* product may, on the one hand, be brought down by the prevalence of manufacturing industry or the presence of commercial towns, and, on the other, may be enhanced by the mere fact of a partial settlement of a region, population being so scant as to be saved from the necessity of resorting to inferior soils. Nor does a section sparsely settled and producing an inconsiderable aggregate, though showing a high average yield, deserve to be ranked quite on terms of equality with a section all settled up, and, though with no higher yield for each inhabitant, pouring out each year a vast volume for export.

And yet, on the exact contrary of this, a sparsely settled county of Minnesota which produces 120 bushels of wheat for each man, woman, and child within its limits, with an undoubted capability of maintaining a rate approaching this with twice and three times as many inhabitants, ought not to be set down as of precisely the same grade of productive capability, in respect of this crop, as an Eastern county producing, in fact, exactly as many bushels to the square mile, but with a far greater laboring population. Hence, the test of *absolute production* seems not wholly satisfactory.

Even less satisfactory still, is the more usual test applied, that of *acreage*. Without reference to the breadth of land sown, the report of average yield per acre often affords a most fallacious representation of the productive power, in respect to a given crop, or of the actual contribution to that crop, of any region. The cultivation of any crop as a fancy-crop, or upon the more favorable soils only, may give results very much out of proportion to what would be, were that crop to be generally cultivated as an essential part of the industry of the people and extended over a considerable area.

The considerations thus briefly sketched, determined the mind of the Compiler to the adoption of the mode of constructing a scale for the crop-maps, which has been stated. It is believed that the two elements taken are those which have most importance in the connection, and that the plan of compounding them tends to reduce any extravagant excess of one element over the other, due to exceptional conditions.

The Pacific Coast Maps.—The *raison d'être* of Pl. XXXVI, B, will doubtless appear upon the most casual examination of the Atlas. To have extended the maps treating the various subjects exhibited on Pl. XXI to XXXVI, over the vast uninhabited tracts west of the 100th meridian, in order to take in the narrow areas of settlement on the Pacific Coast, would have required, either that the maps should be reduced one-half in size, or that one-half of them should be omitted. It was deemed far more expedient to bring together on a single Plate, both for economy of space and for readiness of comparison, such map-subjects as most concerned the Pacific Coast. This has been carefully done by Mr. Galpin, on Pl. XXXVI, B.

Ten small maps are here given. The first, counting from the upper left-hand corner, shows the areas of Pacific Settlement, as by the Census of 1850; the representation corresponding, therefore, to that given of the Atlantic and Mississippi Settlements, on Pl. XVII. The map on the right of the first mentioned, shows the Settlements of 1860; corresponding, therefore, to that on Pl. XVII, A. The areas of Pacific Settlement at 1870 having been shown on Pl. XVIII, it was not deemed necessary to repeat the representation here. The areas correspond substantially, however, to the colored portions of the maps of Foreign Parentage, German Birth and Preponderating Sex. It will be observed, that on each of those maps just named, the colored areas coincide exactly in extent, and that, in each, the outside limits of color are shaded off in faint black lines which indicate that the population outside is less than two to the square mile, which means, generally, no population at all.

Besides the two maps for 1850 and 1860, the eight maps of this Plate represent the constituents or the conditions of the population of the Pacific Coast at 1870. The map-subjects are in order, counting from left to right, as follows:—1. Foreign Parentage, corresponding to Pl. XXIV, for the country east of the 100th meridian. 2. Proportion of Foreign to aggregate population (Pl. XXVI). 3 and 4. Proportion of the Irish and the German elements, severally, to the aggregate population (Pl. XXVII). 5. Proportion of Chinese to aggregate population. 6. Preponderating Sex (Pl. XXXVII). 7. Illiteracy of the total population (Pl. XXIX). 8. The Wheat Crop (Pl. XXXVI, Map 1).

SUGGESTIONS FOR THE STUDY OF STATISTICAL MAPS AND CHARTS.

The Compiler trusts that it will not seem presumptuous in him to say, that much study will be required, even on the part of those most accustomed to observe and discriminate, before the full significance of these Maps and Charts, even the simplest of them, will be exhausted.

The first faculty to be acquired, for the use of maps like the most of those presented, is that of distinguishing readily BETWEEN THE SHADES OF COLOR which mark the comparative intensity of the prevalence of the map-subject. With the eye uneducated in this special direction, there is a liability to accept the distinction between the colored and the uncolored portions of the map, as the great distinction to be observed, the student failing to realize that the positive difference between the regions where the element under representation is found in a degree so slight as not to call for coloring on the map, and regions in the lowest shade of color, is often, and indeed generally, much less than the difference between two groups next each other in the scale.

The Compiler has noted, in exhibiting those maps to many cultivated persons, that the tendency was almost universal, on the first glance, to dwell on the outline of all the groups as a body, without much reference to the distinction between the successive groups. And after this disposition has been mastered, one has still to acquire the power, not by a single effort, but by a process of education, of discriminating easily and accurately the several groups with a due appreciation of their comparative significance, in order to give the just effect to the stronger tones of the picture. The preservation of the lower grades will prove a hindrance and not a help to the comprehension of the subject, unless this caution is observed; but, with due consideration of this, the lower grades of color become not less interesting and significant in their relation to the uncolored parts, than the higher grades, in their place.

Let us turn for illustration of these remarks to Plate XXV. We have here first to realize the dense foreign settlements in the lower New England States, along the Hudson and around the shores of New York Bay, in the anthracite regions of Pennsylvania and at the junction of the Alleghany and Monongahela Rivers, across the central region of New Jersey, at the head of the Chesapeake Bay, along the shores of the Great Lakes from Rochester to Milwaukee, at the junction of the Missouri with the Kansas, of the Mississippi with the Rock River, and of the Missouri and the Mississippi with each other, and finally, at various points up the Ohio River. Anything that defeats this impression impairs the usefulness of the map, and if the lower grades of color are to be allowed to do this, it were better they should not appear. But it is possible, as has been said, to give these regions as distinct *relief* from the surrounding regions in color, as the latter receive without any effort of the mind, by reason of their strong contrast with the unstained page. When once this distinction between the higher and lower grades is effected, the extensive regions covered by a comparatively sparse foreign population, pursuing agricultural occupations, become suggestive of many economical and social considerations when viewed in contrast with tracts which are substantially destitute of foreign settlements.

Another distinction which needs to be held clearly in mind, for the study of most of the maps dealing with the statistics of population, is that herein drawn between the ABSOLUTE and the RELATIVE modes of representation. These are terms made use of for the highest convenience of expression, though not without liability to philological criticism, to indicate—the first, the exhibition of an element of the population, by itself, leaving out of account the general population and showing merely the number of that special element to the square mile, within the field depicted; the second, the exhibition of that element, no longer by itself, but in its proportion to the general population. It will be seen to follow, from these definitions, that very different regions may be colored, and the same regions be colored with very different degrees of intensity, in representing an element of the population by the one and the other method.

Let us refer, for illustration, to Plates XXVII and XXVIII. Here are five specific foreign elements, each shown absolutely and also relatively. Let us select the first of these, the Irish (Maps 1 and 2), and confine our attention to the State of Iowa. It will be observed that, on Map No. 2 (*relative*), almost the entire State is colored. This is because the Irish everywhere constitute, at the least, one to four per cent. of the population,—not an inconsiderable contribution to be made by one foreign element. On Map No. 1 (*absolute*), however, less than one-half of the State is colored. This is because, though the Irish form a noticeable element of the population, such as that is, everywhere throughout the State, yet, in the northwestern and south-central sections, the population is so sparse (cf. Pl. XVIII and XIX) that the number of Irish to the square mile falls below the lowest figures taken for representation by the absolute method, 36 of the counties of the State having less than 100 Irish each; and some, less than twenty. In the same way, many counties of Kansas are uncolored on Map 1, because the absolute number of Irish found in them is small; while these counties are colored in Map 2, because, sparse as their population is, it includes this element in a very appreciable degree.*

This distinction between the absolute and relative methods of representing the constituent elements of population, must be borne constantly in mind in studying the series, Pl. XXI–XXVIII.

On the other hand, in the maps representing illiteracy, Pl. XXIX and XXX, the relative method alone is followed, illiteracy being nowhere shown as, what you might call, an accumulation or deposit, but exhibited simply as a feature, more or less prominent, of the actual population, be the same greater or smaller.

Again, in the maps devoted to wealth, public indebtedness, and taxation, Pl. XXXIII–XXXV, these facts are only shown as *per capita* of the population, without reference to the density thereof.

Thus, on the Wealth Chart, a Western county 30 miles square, having 9000 inhabitants, with a total valuation of \$4,500,000, would bear the same shading and make four times the show upon the map, as an Eastern county 15 miles square with a population of 18,000 and a total valuation of \$9,000,000. That is, the map, as it purports to do, only gives the amount of wealth to each man, woman, and child, in each section by turns, without reference to the number of inhabitants; consequently, it does not assume to show directly where the wealth of the country is. In the cases taken, the equal *per-capita* wealth of the two counties would need to be wrought with the numbers which represent the respective densities of settlement in the two counties, before we should have the positive amount of wealth for a given space upon the map.

It is to facilitate the reference so constantly required, to the density of population, that the series of "population-lines" have been introduced upon Pl. XXI–XXVI, XXIX–XXX, XXXIII–XXXV, XXXVII, XL–XLII, and XLV–VI. The lines thus imposed upon the maps which show the distribution of the Foreign and Colored elements, the prevalence of Illiteracy, the predominating Sex, the Birth-Rate, the prevailing Diseases, etc., are a reduction from the outlines of groups on the eastern half (Pl. XIX) of the map showing the density of population at 1870. The five groups there shown are consolidated into three for use in maps whose principal purpose is to show other elements than population. The consolidation effected is as follows:

GROUPS.	ON DENSITY MAP, PL. XIX.	FOR OTHER MAPS.	GROUPS.
I	2 to 6 inhabitants to the square mile.	} 2 to 18 inhabitants.	I
II	6 " 18 " " " "		
III	18 " 45 " " " "	} 18 to 45 inhabitants.	II
IV	45 " 90 " " " "		
V	90 " and more " " " "			} 45 and more inhabitants.	III

* Opinions might easily differ respecting the comparative interest and usefulness of the two methods. In the quarto volumes of the Census of 1870, the elements of population were treated according to the absolute method only. The London Saturday Review, of January 26, 1873, intimates its opinion that "the proportion to population generally" should be shown, and not "the number on a square mile." The Compiler holds, however, that where a choice must be made between the two methods (as was imperative in the census volumes, on account of the limited number of maps), the absolute method is to be preferred. The first question to be answered by the graphic illustration of any statistical subject is, *where is that element found?* This question is answered directly by the absolute method, and only indirectly, and by comparison, through the relative method. Thus, in 1870 there were five millions and a half of foreigners in the U. S. Where were they? The third map of the "Population" volume showed where they were. And in like manner, the Geographical distribution of the specific Foreign elements and of the Colored element, was shown by the absolute method. Those who wished to ascertain the proportions which the several elements bore to each other and to the total population, could do so, only generally, it is true, and somewhat laboriously, by comparing the several maps with each other.

These population-lines are printed in blue over the maps showing the special elements, while the figures showing the number of inhabitants to the square mile, 2-18, 18-45, 45 + are stamped at convenient places within the groups so defined.

The advantage of ready comparison with the general facts of population will be obvious without illustration. Suppose we are examining the map of State, county, and municipal taxation, and our attention is for the moment attracted to the State of Iowa. We see there a number of counties in the western part of the State, in dense color, indicating the highest degree of taxation. The first impression is perhaps unfavorable. But the blue lines superimposed show that this section is as yet sparsely settled. Those people have come in from the older States, with sentiments and traditions requiring schools, bridges, and good roads. They believe these to be the best investment they can make of a considerable portion of their present earnings. They know the soil is capable of supporting ten or twenty times the population now upon it; they know that immigration is setting by tens of thousands a year into their State, and that those sections will be preferred which have to show, ready made, these attractive institutions. Consequently, with what we must call a wise prevision, they tax themselves heavily, through their town-meetings, or their County Boards, knowing well that they will receive back tenfold the money they now put into roads, schools, and bridges, through the enhanced value of their lands, in a near future.

Again, in the examination of the map showing the proportion of deaths from Malarial Diseases, the question cannot fail to arise, whether the diseases prevail most in regions very sparsely settled, where but little land has been broken up, where swamps remain undrained, and vast vegetable deposits lie decaying all around, or whether this prevalence is determined by causes independent of this single condition. For such a comparison, while reference will sometimes be required to the more minutely delineated groups of Pl. XIX, the population-lines traced on the special disease-map, will often answer the purpose equally well.

But the highest use of these Maps and Charts is when they are COMPARED WITH EACH OTHER, so far as their subjects are cognate in any degree, for the discovery of relations and proportions which can not be made to appear on any one map. The greater the number of maps which can thus be brought into comparison, the larger the result. Let us take an illustration of this use of the maps. In figure 3 of Pl. XLIV, is shown the distribution of the body of deaths resulting from certain important diseases and groups of diseases, among the several constituent elements of the population.

By this it appears that while the Blacks are but $\frac{12.6}{1000}$ of the population, $\frac{25.5}{1000}$ of the deaths from Intermittent and Remittent Fevers occur among this element; but while the Foreigners are not less than $\frac{14.4}{1000}$ of the population, only $\frac{2.8}{1000}$ of the deaths from this class of fevers occur among them. On the other hand, of the deaths from Consumption only $\frac{11.1}{1000}$ occur among the Blacks, and not less than $\frac{7.2}{1000}$ among the Foreigners. At first this seems to indicate very marked differences between these two elements of the population, as to liability to one and the other of these diseases. So it must be considered, if we look only at this plate (XLIV). But let us take Pl. XLI and XLII, which show the proportion of the total body of deaths, occurring in each section by turns, which result from Consumption and from Malarial Diseases respectively. Here we note that the range of these diseases is, to a certain extent, and even in a high degree, complementary. Where Consumption is most fatal, Malarial Diseases are, as a rule, least fatal, and *vice versa*.

Now, if the two classes of diseases from which, as we have seen, the Blacks and Foreigners suffer so differently, are thus complementary in their range, the question arises whether these two elements may not themselves be found to be complementary, in some degree, in their location. An examination of Pl. XXI and XXV shows this to be true, and in a striking degree. Speaking generally, where the Blacks are, Foreigners are not.

Here, then, after bringing together five plates, we reach the explanation of at least the greater part of the difference discovered in the two elements of the population in respect to mortality from the causes indicated. The Blacks die so largely of Intermittent and Remittent Fevers, because almost the entire Colored population is found within the fields where these are the prevailing forms of disease. The Foreigners do not die of these fevers for the best of reasons, because they keep away from the regions where these prevail. In respect to Consumption, the geographical relations of the two elements are reversed. Whether there still remains a difference in liability to one or the other form of disease, due to differences of stock, breeding, or occupation, is a question too large to be discussed here. We adduce this solely as an instance in illustration of the method to be employed in studying the maps and charts herewith presented.*

Still keeping our attention fixed on figure 3, Pl. XLIV, we note that the lines representing the several Foreign elements all rise rapidly on the right of the figure, and almost run out at the top before they reach the last perpendicular line. What can be the reason of this? Are there any diseases from which the Foreign population have such marked exemption? Examining the titles on this figure, we find that the diseases on the right are children's diseases. Why do the Foreign nationalities represented among us make such slight contribution to the body of deaths from these diseases?

If we turn back to Pl. XXXIX we shall not fail of an explanation. In the series of figures numbered 3, it will be seen that in every State but Maine and New Hampshire, the line which represents the portion of the Native population under ten years of age, is longer, and generally much longer, than any other line in the figure. Such should be the case in respect to every community, if population is to be kept good. But when we look at the series of figures numbered 4, on the same Plate, devoted to the Foreign population, we find the line representing the first decade of life to be shorter, generally, than any other up to the period 60-70, and sometimes, as in Louisiana, South Carolina, and the District of Columbia, than even the line for the period 70-80; while the lines representing the period 20-30, and that 30-40, exceed that for the first decade sometimes in the ratio of 10 to 1, sometimes in a much larger ratio.

* This and other of the questions suggested by the proportions disclosed in fig. 3, Pl. XLIV, are discussed in the paper on The Relations of Race and Nationality to Mortality (Part III, Vital Statistics).

Here we have a substantial reason for the vanishing of the "Foreign" lines towards the right of fig. 3, Pl. XLIV. Fewer Foreign children die of the diseases there represented, because there are but few Foreign children, comparatively, to die of them. Whether, over and above the proper effect of this cause, there is found in the proportions herein disclosed, any greater or any less constitutional liability to these diseases on the part of Foreign children, taking equal numbers, is a question not to be dismissed thus in a few words, but calling for a very careful analysis and comparison of the several charts.

Again, turning to Pl. XLIII, we note the surprising length of the lines which, in the figures for the New England States, particularly Maine, New Hampshire, and Vermont, represent the deaths occurring above the age of 80 years. Why is this? Is it a proof of greater longevity in a population of natural growth, or is it due to some disturbance in the relative numbers of persons in the several periods of life?

By turning to Plate XXXVIII, we have our answer in the figures which show, for the same States, the number of living inhabitants of corresponding ages. More people die above 80 years in these States because there are more people above that age to die. But why is the number above 80 greater, relatively, here than elsewhere? Again, other Plates, together with what is of common fame, must furnish the answer. Pl. XL shows the Birth-Rate prevailing at the present time in this section to be, as an average, the lowest known in the United States, while Pl. XX shows (by the width of the rectangles placed by the side of the squares which represent these States) that the emigration to other States out of the Native population has been very great. Thus while the earliest period of life is recruited very inadequately by birth, the attractions of new States are constantly drawing off the young and active, leaving the old in excess of the natural proportion.

Still again, just as a comparison of Pl. XXI and XXV shows the Colored and the Foreign elements to be in a high degree complementary in their location, comparison of the several small maps contained in Pl. XXVII and XXVIII, will show (if due regard be had, as has been explained, to the relative significance of the successive shades of color), that some of the special Foreign elements are also in a degree complementary in their location. Thus, a north and south line drawn through Buffalo will clearly leave about two-thirds of the Germans to the west and an equal proportion of the Irish to the east. A north and south line drawn through Lake Michigan will leave four-fifths of the British Americans to the east, but nine-tenths of the Swedes and Norwegians to the west.

Again, while Pl. XXIII and XXV both refer to the same period, 1870, a comparison of them brings a past generation vividly up to view.

Examine the uncolored space northwest of Harrisburg on Pl. XXV. On no considerable portion of this tract are there Foreigners enough to average 1 to the square mile. Yet Pl. XXIII shows that here are a sufficient number of persons of Foreign parentage to bring the whole tract up into the group "2-5 to the square mile."—Twenty, thirty, forty years ago, there was a considerable Foreign immigration into this region. Since then, the Foreign population has not been kept up and increased by fresh arrivals, while many of the first comers have been lost by death; but there still remain, to witness of the original immigration, a large number of American-born persons who are Foreign by one remove. Take, in the same way, the Group IV, southeast from St. Louis, on Pl. XXIII, and compare it with the Group II over the same tract on Pl. XXV. Forty and fifty years ago this region swarmed with Foreigners, French, Scotch, and English employes of fur and trading companies. Even the floods of recent immigration have not served to bring the number of Foreigners here above 4-8 to the square mile, but there are still found not less than 20-33 persons of Foreign parentage to the square mile, to testify of the old settlers and rovers, of trapping and trading days. But even more instructive will be found the comparison of Pl. XXIV and XXVI which show the proportion borne to the aggregate population, by persons of Foreign parentage and of Foreign birth, respectively. Compare the valleys of the Shenandoah, the Arkansas, and the Mississippi, as represented on the two maps, to bring out the still existing effects of a Foreign immigration in the past. The whole field of the Southern States is, indeed, a most interesting study in this view.

The above are intended merely as suggestions for the use of these maps and charts, and as illustrations of the relations which will often be found to subsist between them. In many cases, the connection of maps is obvious on the first mention of their titles; in others, the connection must be sought through a careful consideration of the reason of the case, and often by a series of tentative comparisons.

No reference has been made to the use of the Physical Maps in Part I, in explaining the facts of vital, social, and industrial concern which are represented graphically in Parts II and III. To exhaust this subject would require a volume; only to open it, an extended article. The relations to animal life and health, to vegetable growth and reproduction, and even to industrial development, which are sustained by temperature and humidity, both in their mean and in their extreme range and variability, by the pressure of the atmosphere and the movement of the air, by the character of the soil, its drainage and the extent of its tree-covering; these relations do not so much as need to be alluded to here, in justification of the inclusion, in a Statistical Atlas, of Maps illustrative of the physical features and meteorological conditions of the country. The Compiler trusts, not only that this juxtaposition of the two orders of facts will afford the true explanation of a vast number of phenomena seeming most strange and even contradictory of recognized causes in the political and moral constitution, but that an illustration, so large and varied, of the effects of physical influences upon the progress of population and the condition of society, may even serve to suggest to the physical geographer some possible modifications of his own generalizations.

THE PHYSICAL FEATURES OF THE UNITED STATES.

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IN describing the physical features of a country, we have first to consider the skeleton or frame-work of mountains to which its plains, valleys, and river system are subordinate, and on the direction and elevation of whose parts its climate is in a very large degree dependent.

The skeleton of the United States is represented by two great systems of mountain ranges, or combinations of ranges—one forming the eastern, the other the western, side of the frame-work by which the central portion of our continent is embraced. These two systems are the Appalachian ranges and the Cordilleras.* These systems are of very different magnitude and extent.

The Cordilleras are a part of the great system or chain of mountains which borders the Pacific coast of both divisions of the American continent, and forms its dominating and most imposing feature. In South America, however, the chain—there called the Andes—is comparatively narrow, but, on the other hand, exceedingly elevated: it is also remarkable in the way in which it hugs the coast, forming a lofty wall, as it were, on the Pacific edge of the continent, and being thus the cause that there are neither harbors nor navigable rivers on that side; and, besides, giving rise to extraordinary peculiarities of climate at its western base. The chain is also remarkable for the grandeur of its volcanic manifestations; its highest points being sublime volcanoes—which, however, are gradually losing their power, and approaching the dormant, or even the extinct, condition.

The Andes sink at the Isthmus, and almost disappear, so that a railroad of little less than 48 miles in length, and having an elevation of only 2624 feet at its summit, there unites the two oceans. From the Isthmus north, the ranges gain rapidly in elevation, and through Central America and Mexico become more and more complex in character, while the volcanic cones which are sentinelled along their crests again increase in altitude, and in the activity of their manifestations. Two of these cones—Popocatepetl and Orizaba†—are the culminating points of North America, being the only summits which surpass 17,000 feet in altitude.

From Mexico the system of the Cordilleras enters our territory, still widening and gaining in complexity. Just above the southern border of Arizona, along the parallel of 32°, occurs the greatest depression of the Cordilleras existing anywhere north of southern Mexico; here the continent may be traversed without rising to an elevation of over 4000 feet. The country along this line is a table-land, with many short and broken ranges of no great altitude built upon it, but deeply excavated by numerous cañons, as the narrow valleys of the streams are, in the Cordilleras, universally called, and of which that of the Colorado river may be taken as the type. On this plateau, in latitude 35°, there is a transverse east and west line of volcanoes, similar to that which traverses Mexico; these grand volcanic cones, of which San Francisco Mountain is the loftiest and best known, rise to nearly double the altitude of the plateau on which they are built up.

The greatest width of the Cordilleras is along the line passing from the vicinity of San Francisco, by Great Salt Lake, to Fort Laramie, or between latitudes 38° and 42°; here the mass of mountains attains a breadth of fully a thousand miles, and if the Black Hills, an outlier of the Rocky Mountains, in latitude 44°, are included—as they may properly be—the total breadth of the complex of ranges will be, in its maximum, over 1100 miles. The whole area embraced within the mountainous belt which we call the Cordilleras is but very little, if any, short of a million of square miles; hence it may, with propriety, be called the greatest physical feature of our territory.

To roughly indicate the shape of the mass of the Cordilleras, we may consider it as having a lozenge-shaped figure, bounded by two parallel north and south and two northwest and southeast sides. The length of each side is approximately 600 miles. The western edge of the figure corresponds in trend to the line of the Pacific coast, which, as a glance at the map will show, is northwest and southeast as far as Cape Mendocino, and from there to Vancouver Island north and south nearly. The north and south trending portion of the Pacific edge of the Cordilleras is known as the Cascade range; the northwest and southeast range, as the Sierra Nevada. Here, bordering on the Cascade and Sierra Nevada ranges, but still nearer the ocean, are the Coast ranges, parallel with the loftier masses on the east, and inosculating with them, at various points, in such a manner that a distinct separation between coast and interior ranges seems hardly possible, either on geographical or geological grounds.

The Rocky Mountains proper, with their continuations southward in New Mexico, form the north and south trending portions of the eastern rim of the Cordilleras, and in latitude 43°, nearly, the change from a northern to a northwestern direction of the ranges takes place, the Big Horn, Wind River, Bitter Root, and other subordinate ranges of which the chain is here made up, having the same northwesterly trend as the Sierra Nevada.

The lozenge-shaped figure thus indicated, framed in, as it were, by the Cascade range and Sierra Nevada on the west, and the Rocky Mountains on the east, encloses a high plateau, which, through its centre, east and west, has an elevation of from 4,000 to 5,000 feet above the sea-level, and which falls off in height toward the north and south from that central line. This plateau has built upon it a great number of ranges of mountains, the waters finding their way down whose slopes are discharged into the Pacific, chiefly by the Columbia and the Colorado, or else they lose themselves in the desert, and do not run to the sea at all, but evaporate and disappear. But before noticing the remarkable peculiarities of the drainage of this vast plateau, the ranges which traverse it, with their complicated network, must first be briefly described.

There is no one of these ranges which can fairly be considered the dominant one; but the Wahsatch comes nearest to occupying that position. This chain forms the eastern edge of the "Great Basin," or the region without drainage to the ocean, and it extends, with a nearly north and south course, through six degrees of latitude, rising very precipitously from the plateau, as seen from the western side, to an elevation of from 4,000 to 6,000 feet above it. Right through the centre of the Wahsatch passes the Union Pacific Railroad, by means of one of those deep gorges which cut the range almost to its base, and without the aid of which it would have been almost impossible to traverse the continent, anywhere near this latitude, except by an immense detour either to the north or the south.

Between the Wahsatch and the Rocky Mountains is the most elevated portion of the great continental plateau, which embraces the series of the "Parks," beginning with the San Luis Park, and ending with the so-called Laramie Plains, which, with the South, Middle, and North Parks, form a plateau, traversed by spurs of the Rocky Mountains, and having an elevation of from 8,000 to 10,000 feet above the sea-level, the highest portion being in latitude 39°, along the northern edge of the South Park, from which there is a gentle decline in both directions. The great fresh-water Tertiary plains of southwestern Wyoming belong to the same lofty plateau, and it is over these that the railroad passes, keeping always at an elevation about equal to, or in places even greater than, that of the summit of the Sierra Nevada on the line of the Central Pacific Railroad.

The only well-defined range between the Wahsatch and the Rocky Mountains is the Yuintah; and this is the only high and well-marked chain in the Cordilleras which has an east and west trend. South of the Yuintah is a region of tremendous cañons, ragged and almost inaccessible where the streams—branches of the Colorado—have worn down their beds in the soft, horizontally-stratified rocks, in the most surprising manner, so that the region is one which almost entirely forbids all passage through it.

Between the Wahsatch and the Sierra Nevada are a great number of nearly parallel ranges, which have a direction a little east of north and west of south, and are generally long, narrow, and precipitous. These ranges rise from a base of 5,000 feet high, or nearly that, and run obliquely across from the Sierra Nevada to the Humboldt River, which marks the limit of their extension toward the north. Beyond this, we strike the southern edge of the stupendous volcanic plateau which covers so large a portion of eastern Oregon and Washington Territory, as well as of southwestern Idaho, northern Nevada, and northeastern California. Rising to a considerable height above this volcanic plateau is the range of the Blue Mountains, which lies to the west of Snake River, in eastern Oregon, and which is perhaps less known than any other chain of mountains within our limits. To the west of Snake River are groups of broken ranges, which have hardly yet received names, and which have been but little explored, although they have been for years the scene of more or less successful gold-mining.

Here it may be remarked, that the central portion of the Cordilleras, or that embraced in the belt of States and Territories lying between, and including, Colorado and California, has become very much better known than the regions to the north and south. With the publication of the work of the various State and United States surveys which have been going on adjacent to the line of the Overland railroad, we shall soon be placed in possession of quite detailed maps of the region in question, while the extreme northern and southern portions of the Cordilleras, within our limits, have, as yet, received but a scanty share of attention.

The height above the sea-level of the various ranges of mountains indicated above

* The name "Cordilleras" has been proposed by the writer, and is gradually coming into use, as a comprehensive term for the vast complex of ranges west of the 104th meridian, which are so connected together as to demand a name which shall include them all.

† It does not yet appear to be definitely settled which of these two volcanic masses is the higher. The most recent measurements give the palm to Orizaba, but we have no means of ascertaining how trustworthy they are.

now demands a brief notice. The most elevated portion of the ranges is on the highest region of the plateau, or in the belt which stretches from California to Colorado. The highest part of the Sierra Nevada is near the parallel of $36^{\circ}30'$, and here the peaks rise to over 14,000 feet, while the passes have an elevation of not far from 12,000. The culminating point of the Sierra, Mount Whitney, falls a little short of 15,000 feet, the latest measurement giving 14,887 feet as its height. From here towards the north the range declines gradually in altitude, and, where the railroad crosses, the pass is only 7,000 feet above the sea. At Lassen's Peak there is a great break in the range, which may, indeed, there be said to have an end. Beyond this, the Sierra and the Cascade range assume rather the form of a plateau, on which, however, several grand volcanic cones have been built, beginning with Shasta and continuing with Pitt, Hood, Adams, St. Helens, Rainier, and Baker. Of these, Shasta and Rainier are the highest, and of almost exactly the same elevation, if the results of the latest measurement of the latter by the United States Coast Survey are to be depended on, differing as they do by more than 2,000 feet from the former one by the Wilkes United States exploring expedition.

The highest points in the Rocky Mountains are none of them, so far as known, quite equal in altitude to the highest in the Sierra Nevada; but while there are only a few peaks in the last-named chain which exceed 14,000 feet, there are in the Rocky Mountains a very large number which range between 14,000 and 14,300, their differences of altitude, in fact, falling within the limits of barometric error of measurement, so that a long time must elapse before they can be arranged according to their relative rank. It is, indeed, one of the most curious facts, in connection with the different mountain groups of the Cordilleras, that the dominating peaks are so nearly of the same height.*

The culminating points of the Wahsatch, Uintah, and East Humboldt ranges will, it is believed, not exceed 13,000 feet in elevation; but no definite statements have yet been published in regard to these mountains by the chief of the "Fortieth Parallel Survey," under whose directions they have been examined and measured.

The drainage of the region enclosed between the Rocky Mountains and the Sierra Nevada is very remarkable. Owing to the great elevation of the central portion of the plateau, the streams rising on the western slope of the ranges which crown the eastern edge of the mass of the Cordilleras have to find their way to the sea by means of long detours to the north and south. The sources of these streams are in the Wind River range, where the Colorado, the Columbia, and the Missouri head.

In the higher portion of the vast triangular area embraced between the two great rivers that drain the western slope of the Rocky Mountains lies the Great Basin, which includes almost all the State of Nevada, as well as the western portions of Utah. Here the amount of the rain-fall is very small, and the evaporation rapid, so that the streams grow "small by degrees and beautifully less" as they leave the mountains, finally disappearing altogether in the valleys at their base. There are many of these "sinks," as they are called, each the place where the drainage of some particular range or group of ranges disappears. By far the most important of these, however, is the sink of the Carson and Humboldt, the former stream coming down the eastern flank of the Sierra Nevada, the latter preserving its existence for more than 300 miles, and running across the whole of northern Nevada, transverse to the general direction of the ranges in that State, and thus affording the only practicable railroad route from east to west. It also marks, as before suggested, an important change in the geology, since its course is along the southern edge of the great volcanic plateau of the West.

Want of navigability is a characteristic of all the streams which drain the Cordilleras to the west. Instead of the vast stretches opened to steam navigation by the Mississippi and all its tributaries, allowing access to points two and three thousand miles away from the mouth of that mighty river, we have the Colorado, which is hardly of any account at all for the purposes of navigation; the Columbia, with two portages by railroad before the Cascade range is crossed; the Sacramento, navigable for moderate-sized boats for about sixty miles only; and, with these exceptions, no stream of any importance as opening access to the interior, along our whole Pacific coast—while, it may be added, the same drawback to commercial prosperity marks the entire coast of South America.

The number of water-falls within the Cordilleras is no doubt large, although few, if any, have yet attained celebrity. The most important are those of the Snake River, called the Shoshone Falls, and these are worthy to be ranked as but little inferior to Niagara in grandeur, all the features of the adjacent country being, in each case, taken into account. Situated in the midst of the volcanic region, with stupendous over-hanging cliffs of basaltic lava, the Shoshone Falls may be classed with the Niagara, the Zambezi, and the Kaieteur, the cataracts which are typical, when volume and elevation are both taken into account. The Yosemite Falls, on the other hand, are perhaps equal, or even superior, to anything yet discovered, when vertical height and grandeur of surrounding scenery are considered, without reference to the volume of the water falling.

Leaving now the Cordilleras, we have next to consider the eastern border of our territory—the northeast and southwest trending mass of ranges, known as the Appalachians; and in this portion of our little *résumé* of the physical features of the United States, we shall have to rely less on our own observations, and more on the labors of others, and especially on those of Professor Guyot and of Professor J. P. Lesley, of the Pennsylvania Geological Survey, who have both labored with zeal and ability in

making the topography of our eastern border intelligible, when State and United States help has been but sparingly bestowed.

A glance at the map shows that the central portion of North America, from the Gulf of Mexico to the Arctic Ocean, is a region of great rivers and lakes, and not of mountains. A sinking of the land of less than 1,000 feet would open a water-way through from north to south; 2,000 feet of such a sinking—or an equivalent rise of the ocean—would divide our territory into two distinct and remote portions. On the east we should have a comparatively narrow belt of land extending in a northeast and southwest direction from Pennsylvania to Georgia, with groups of outlying islands on the north, especially in about latitude 44° , where the tops of the Green, White, and Adirondack mountains would rise in the form of lofty and precipitous islands above the waste of waters. On the west, the mass of land remaining uncovered would be of grand, almost continental dimensions, for its breadth would be fully equal to 1,500 miles, narrowing as we follow it northward, while in length, north and south, it would extend entirely across our territory. The breadth of the ocean separating these masses of land would be not far from a thousand miles. And after first sketching the topographical peculiarities of the Appalachian range, we will then briefly consider this lower region, which includes the great valley of the Mississippi and its tributaries.

The Appalachian chain extends from the promontory of Gaspé, in a general south-westerly direction, for a distance of about 1,300 miles, into Alabama, where it dies out, and becomes lost under the horizontal strata of more recent geological formations which cover nearly the whole surface of that State. The base from which this chain rises, on the eastern side, is the Atlantic sea-board, which, in the early history of the United States, seemed to be the whole country, and which is still commercially the most important, and the seat of its largest cities. This plain is slightly inclined towards the Atlantic, and its elevation above the sea is inconsiderable. In New England it hardly exceeds 300 to 400 feet; but towards the south, after passing the Bay of New York, where it is nearly at the sea-level, it gains in altitude and also in width, finally attaining a height of a thousand feet and a breadth of some two hundred miles. The western base of the Appalachian range is the great plateau region, which descends gradually towards the Great Lakes and the tributaries of the Ohio, having a general elevation of a thousand feet or more, but deeply cut into by the streams which traverse it, and which run in valleys depressed from 300 to 500 feet below the general level of the country.

The Appalachian chain presents, in many of its features, a most marked contrast to the Cordilleras just described. In many respects the relations of the two systems of elevations are like those borne by the Alps and the Jura. The Cordilleras, however, are vastly grander in dimensions and more complicated and less a unit than the Alps; while, on the other hand, the Appalachians and the Jura have several striking points of resemblance. Of these the most characteristic is, the presence in both chains of numerous nearly parallel lines of elevation—wrinkles of the surface or folds of the strata, as they may be called—which preserve their regularity of form, parallelism, and equality of height over long distances, so that they seem almost like artificial walls, in this respect differing most wonderfully in character from the ranges of the Cordilleras, which seem to delight in irregularity of outline and in lack of persistency of form. It is especially in the middle portion of the Appalachian chain that these peculiar characters are well developed. Towards the north, and again at the opposite extremity, in the southern region, the parallelism of the subordinate members is almost lost, the structure of the range becoming more irregular and complicated. According to Professor Guyot, there is one feature which distinguishes the Appalachian system from that of the Jura: this is, the well-marked division of the former into two longitudinal zones of elevation, one turned towards the shores of the Atlantic, in which the form of parallel chains just spoken of predominates, and the other towards the interior, and made up of elevated and continuous plateaus descending from the summit of their eastern escarpment, in the centre of the system, in gentle stages towards the basins of the lakes and the valley of the Ohio. Thus, in reality, there are two somewhat distinct regions traversed in crossing the chain through its central portion, from east to west; one a zone of parallel ranges and longitudinal valleys, the other a region of plateaus with occasional irregular and quite subordinate chains wrinkling their surface. Thus, therefore, there is lacking in the Appalachians that almost entire uniformity of structure which prevails in the Jura.

Professor Guyot calls attention to a conspicuous feature of the most folded portion of the Appalachians, characterizing the chain through its entire length. This is, the existence of a great central valley running through the system from northeast to southwest, which can be traced without difficulty, although not perfectly uniform in its development. It is the Lake Champlain and Hudson River Valley in New York, the Kittatinny Valley of Pennsylvania, the Great Valley of Virginia, and, finally, still further south, the Valley of East Tennessee. The chain, or system of chains, bordering this central depression on the southeast is also a persistent feature of the Appalachian system, for it extends with but few interruptions from Vermont to Alabama, being known by a variety of names, as it passes from one State into another. It is the Green Mountain range of Vermont, the Highlands of New York, the South Mountains of Pennsylvania, the Blue Ridge of Virginia, and, finally, the Iron, Smoky, and Unaka Mountains of North Carolina and Tennessee.

Possessing these features in common, as a whole, the chain of the Appalachians presents three subdivisions, each exhibiting its own well-marked peculiarity of structure. These are the northern, extending from Gaspé to the Hudson; the middle, from New

* It may be mentioned here, that the statement continually repeated in the text-books of geography in regard to the great elevation of Mt. Brown, Mt. Hooker, and Mt. St. Elias, all north of our borders, have no basis of fact on which to rest. Mt. Brown and Mt. Hooker have never been measured at all, and the height of Mt. St. Elias has never been definitely ascertained, the different measurements differing nearly 3,000 feet from each other.

York to the Kanawha or New River in Virginia; the southern, from New River to the southwestern extremity of the system. Each of these subdivisions has its peculiar curvature and general direction. The northern trends to the north from the Hudson River to near the Canada line, then bends to the eastward, sweeping a great curve, so as to present, on the whole, its concavity to the southeast; the middle subdivision also curves quite regularly, the ridges trending from east and west around to southwest, so that the concavity faces the Atlantic shore, while the most southern portion of the range, from New River southward, bends to the west again, so as to form a gentle curve concave towards the north-west.

The most northern division of the three is quite distinct from the next one south, both geographically and geologically. It includes all the mountain groups and ranges north and east of the Mohawk and Hudson valleys, which make a complete break through the system, both vertically and longitudinally, forming the great natural highway between the East and the West, or the Great Lakes and the Atlantic sea-board. This was the first route across the country which was traversed by canal and railroad. So complete is the physical break here, that a rise of the ocean of 400 feet only would separate all the extensive region included between the St. Lawrence, the Atlantic Ocean, and the Hudson and Mohawk valleys, into a great island entirely detached from the rest of the continent. A rise of 140 feet only would detach all that country which lies east of the Hudson and Lake Champlain.

The subdivisions of this eastern group of the Appalachians are necessarily rather artificial, for the mass of elevations is very irregular in its development. The most continuous range is that of the Green Mountains; but this is flanked on each side by higher groups: on the east, the White Mountains; on the west, the Adirondacks. Of the first-named group, Mount Washington is the culminating point, and it is 6,288 feet high; of the last-mentioned, Tahawus, with an altitude of 5,379 feet, is the dominating peak. Greylock, in Massachusetts (3,505 feet), and Mount Mansfield in Vermont (4,430 feet), are the highest points in those States.

The line of summits extending through Massachusetts and New Hampshire, beginning with Wachusett on the south, and extending up to the White Mountains, through Monadnock, Sunapee, Kearsarge, and other peaks, is broken and irregular. Both the White Mountains and the Adirondacks are rather isolated masses, while the Green Mountains proper are in more intimate connection with the Canadian range which terminates in Gaspé.

The central division of the Appalachian chain extends from the Hudson River to the Kanawha, which makes an almost complete cut across the chain, heading in the Blue Ridge and marking an important change in the character of the topography. This central division of the Appalachians is about 450 miles in length. It is very narrow towards its northern end, but widens out in Pennsylvania, decreasing again in Virginia. It is composed of a considerable number of subordinate chains, much curved toward the west, and remarkable for their regularity, their parallelism, their abrupt declivities, and their moderate elevation, both relative and absolute; they rarely rise to 2,500 feet above the sea-level.

West of this division of the Appalachian chain is the great plateau, which occupies all that part of New York which lies south of the Mohawk, and also the northwestern part of Pennsylvania, and reaches an elevation near Lake Erie of 2,000 feet. From this table-land the drainage descends by the Great Lakes to the St. Lawrence, to the Gulf of Mexico by the Ohio, and to the Atlantic by the Susquehanna, which breaks across the whole chain, finding its way in the most unexpected manner through gaps in the different ranges.

The topography of the Appalachians in Pennsylvania has been carefully worked out by the State Geological Survey, and it is so remarkable in its character that some additional details may with propriety be given in regard to that portion of the chain.

According to Professor H. D. Rogers, the mountain-zone of Pennsylvania may be divided into five well-marked parallel belts, which are as follows, when enumerated in order from the east toward the west: 1st. The South Mountains, already mentioned as being the continuation of the Highlands of New York, and the equivalent of the Blue Ridge of Virginia; 2d. The Great Appalachian Valley; 3d. The Central Appalachian Ridges, or the Appalachian chain proper; 4th. The Sub-Alleghany Valley; 5th. The Alleghany Mountain, or the southeast escarpment of the Alleghany Plateau.

The South Mountains have already been alluded to as part of the system of ranges bordering the great central depression of the Appalachians on the east. In Pennsylvania this belt consists of two quite detached ranges of hills, one of which is the prolongation of the New York Highlands, the other the northeastern termination of the Blue Ridge: both these groups of hills have a moderate elevation in Pennsylvania, hardly exceeding 600 or 700 feet.

The Appalachian Valley, or Kittatinny Valley, as it is usually called, stretches across the State from the Delaware to Maryland, forming a part of the great central valley previously mentioned. In Pennsylvania this has an elevation of from 200 to 600 feet, and it forms a broad, moderately undulating plain, having a width of from ten to eighteen miles. This valley is, beyond a doubt, one of the most favored parts of our country; climate, soil, mineral resources, and scenery all combine to lend it charms.

The third division, or the Appalachian chain proper, may be thus described, using nearly the language of Professor H. D. Rogers:—It is a complex chain of long, narrow, very level mountain ridges, separated by long, narrow, parallel valleys. These ridges sometimes end abruptly in swelling knobs, and sometimes taper off in long, slender points.

Their slopes are singularly uniform, being in many cases unvaried by ravine or gully for many miles; in other instances they are trenched at equal intervals with great regularity. Their crests are, for the most part, sharp, and they preserve an extraordinarily equable elevation, being only here and there interrupted by notches or gaps, which sometimes descend to the water-level, so as to give passage to the rivers. The whole range is the combined result of an elevation of the strata in long, slender, parallel ridges, wave-like in form, and of excessive erosion of them by water; and the present configuration of the surface is one which demonstrates that a remarkable, and as yet little understood, series of geological events has been concerned in its formation. The ridges, which are but remnants of the eroded strata, are variously arranged in groups with long, narrow crests, some of which preserve remarkable straightness for great distances, while others bend with a prolonged and regular sweep. In many instances, two narrow, contiguous, parallel mountain crests unite at their extremities, and enclose a deep, narrow, oval valley, which with its sharp mountain sides bears not unfrequently a marked resemblance to a long, slender, sharp-pointed canoe. There are two classes of these boat-shaped valleys, one possessing a synclinal structure, or having geologically higher strata in the middle of the trough, the lower, harder rocks forming the steep, narrow, enclosing mountains; the other having the anticlinal form, being valleys scooped longitudinally out of the summits of the arches by an excessively energetic erosive force of water cutting through the harder upper strata, down into the softer, lower ones. Both classes, though thus begirt by steep, sharp, and very strong ridges, are usually entered by more than one notch or gap, affording pass-ways to the streams. These gorges constitute a most important feature in the hydrography of the country, as they permit a ready transit, at the general level of the country, through and among crowded and steep mountain-ridges, which, when these are absent, are found to be difficult of passage even for common roads. It is through these gaps that the rivers of Pennsylvania find their way to the sea, almost the entire drainage of that State being across the whole breadth of the chain. Interspersed among the narrow ridges and valleys are wide tracts of table-land, of the same general elevation as the ridges themselves. Some of these are formed by the merging together of two or more ridges, which flatten out before uniting; others are broad synclinal plateaus, or high flattened mountain basins, subdivided at their ends into a series of spurs projecting like fingers.

The other two divisions of the Pennsylvania mountain-zone, namely the Sub-Alleghany Valley and the Alleghany Mountains, are of subordinate importance and need not here be dwelt on farther. The latter is indeed only the escarpment of the great plateau which, properly, forms the western base of the Appalachian system.

Greater diversity of structure and increased altitude mark the southern division of the Appalachians, or that part of the chain which extends from New River towards the southwest. Here, however, we have no such careful studies of the topography as have been made in Pennsylvania, and for our knowledge of the relations of the different groups of ranges we have to depend chiefly on the investigations of Professor Guyot. As before remarked, the main chain which borders the Great Valley on the east, and which separates it from the Atlantic sea-board, bears off more to the southwest, leaving a considerably wider space between it and the ocean, and in this southern extension it assumes the name of the Blue Ridge. This eastern chain now becomes the divide between the waters flowing into the Atlantic and those which run to the Mississippi, the New or Kanawha River having its source on the extreme eastern border of the mountains, crossing all the ridges in a northwesterly direction, or just the opposite of what we have previously noticed as occurring in the case of the Susquehanna. There are marked peculiarities of structure which accompany this complete reversal of the lines of direction of the drainage of the chain. That remarkable looped structure of the ranges which we have observed as occurring in Pennsylvania gradually disappears as we go southward, and instead of it we have straight outcrops cut off by oblique faults, and a general broadening and increased elevation of the mountain masses. In the high regions comprised between the Blue Ridge and the great chain of the Iron, Smoky, and Unaka Mountains, separating North Carolina from Tennessee, we have the culminating portion of the whole chain of the Appalachians. Here, for an extent of more than 150 miles, the mean elevation of the valley from which the mountains rise is more than 2,000 feet, scores of summits reaching 6,000 feet, while the loftiest peaks rise to a height of 6,700 feet. To the west of this high region is the valley of the Tennessee, the continuation of the Great Central Valley previously noticed as a marked feature of the whole chain. This valley rises as we go south, and attains its greatest elevation in the basin of the New River, where it reaches a height of 2,600 feet. Along the Tennessee it widens out to nearly sixty miles, and has here a mean height of not more than about 1,000 feet, which is only one half of that of valleys in the high mountain region to the east, in North Carolina.

Beyond this, still farther to the west, is the plateau of Tennessee, known as the Cumberland Mountains, which are indeed but the escarped edges of a table-land some thirty or forty miles wide, which stretches along between the Cumberland and Tennessee rivers.

Between the Appalachians and the Rocky Mountains there are, within our borders, no connected masses of mountain ranges; isolated hill ranges rise, like islands, at various points, as in Missouri and Arkansas; and there are a few short ranges on the south shore of Lake Superior.

North of the Great Lakes and the St. Lawrence, however, there is the dividing range which separates the waters flowing into the last-named stream from those which run into Hudson's Bay. This is an imperfectly known region, wonderfully cut up by rivers and dotted with lakes. The highest points of the Laurentian range, as these mountains are

called, is supposed to be where the Saguenay cuts the chain, and 4,000 feet is given as the approximate elevation, while peaks in the parallel ridges nearer the St. Lawrence exceed half that height. Among the summits seen with such picturesque effect from Quebec, Mt. St. Anne is the highest, and is given by Bayfield at 2,687 feet.

This range falls off in elevation as we follow it west, and in the country between the Ottawa and Lake Huron the highest summits do not appear to exceed 1,500 to 1,700 feet. The range is made up of rounded hills, densely wooded, almost exclusively with coniferous trees on its higher portions. Its valleys are very wide and full of great ponds and lakes, so that one may traverse almost the whole region with the aid of the birch canoe. As Sir William Logan remarked, in 1863, over a thousand lakes have already been laid down on the maps of the Canadian portion of the Laurentian Mountains, although the region has been as yet only imperfectly explored.

We have thus rapidly sketched the most striking features of the great ranges of mountains which form the frame-work of our territory, and have now to say something of the interior regions thus enclosed. And the most noticeable facts in regard to this vast area are its slight elevation above the sea-level and the general plain-like character of its surface. These conditions are well illustrated by the statement that at Cairo, the junction of the Ohio and the Mississippi, we are 1,100 miles from the mouth of the last-named river, and yet only 322 feet above the sea-level. At Pittsburg, the head of the Ohio proper, 975 miles further up, we have attained an elevation of only 699 feet. Going in the opposite direction, or following up the tributaries of the Mississippi and Missouri, which come in from the west, we have a similar condition of things. One may travel up the Platte or Kansas for hundreds of miles, rising so gradually and imperceptibly that the country seems all the time a level plain. From Council Bluffs to the source of Lodge Pole Creek—along the line of the Union Pacific Railroad—the ascent averages only five feet to the mile. From St. Paul, which is 828 feet above the sea only, we travel for 670 miles westerly before the mouth of the Yellowstone is reached, and here we have attained an altitude of only 2,010 feet, with an average rise of only two feet to the mile.

The Great Lakes, those vast expansions of the upper waters of the St. Lawrence, are among the grandest of the geographical features of the North American continent. They are remarkable for their immense area and uniformity of elevation above the sea-level, and the consequent facilities which they afford for commercial intercourse among the States which are near them. Their combined area is equal to a little more than 90,000 square miles, Lake Superior having over 30,000, and Michigan and Huron each over 20,000 square miles of surface. Erie, Huron, and Michigan are nearly on the same level, the extreme difference between the first and last named being only about nineteen feet, while Superior is only twenty-two feet higher than Michigan, or forty-one above Erie. The divide between the Great Lakes and the waters flowing into the Mississippi and its tributaries is also everywhere low, and at the lower end of Lake Michigan it is so trifling that only a small amount of excavation has been required to cause the waters which formerly flowed into that lake to run towards the Gulf of Mexico. Lake Ontario is, indeed, 331 feet lower than Lake Erie, about half the descent from one to the other being made in one single plunge of the vast body of water, forming a cataract which has, in all probability, not more than one rival in the world.

The level and fertile region of the Mississippi Valley is prolonged towards the far

southwest, around the Gulf of Mexico, and far into the interior of Texas, where it finally passes into the elevated, barren plateau of the Llano Estacado.

From such facts as those above mentioned it may with propriety be inferred, that there is a great uniformity of character over the vast area enclosed between the Appalachians and the Rocky Mountains; so far as its availability for settlement and cultivation are concerned, the most important differences seem to result from the unequal distribution of rain upon it. Between the Appalachians and the Mississippi, and for some distance west of this river, the annual precipitation is ample for the purposes of agriculture, and, in consequence, this region is pre-eminently the agricultural portion of our territory; its gently undulating surface is abundantly wooded, and hardly anywhere too rough for cultivation, while a very large portion of it is covered by a soil of unequalled fertility.

But as we leave the Mississippi and the Missouri behind us, traveling westward, we gradually enter a region of diminished rain-fall; the trees decrease in number, and finally become exclusively limited to the banks of the streams, while the general surface of the country is covered by a heavy growth of nutritious grasses; and this continues until the base of the mountains is reached, when moisture from the melting snows on the higher summits is sufficient to nourish and support a forest vegetation. This pastoral, rather than agricultural region of our territory extends from about the 98th meridian west until we have risen so high on the slope of the Cordilleras that the elevated and mountainous character of the country forbids all cultivation.

We have, viewing our territory in the most general way possible, four great divisions of its surface:—1st. The eastern sea-board, and the Appalachian ranges which press so closely upon it; this is the commercial and manufacturing region. 2d. The Great Central Valley, pre-eminently the agricultural region. 3d. The pastoral, or the region of the plains. 4th. The mining region, or the Cordilleras.

The nearness to Europe, the abundance of its water-power, the variety and value of its forests, its inexhaustible resources in coal and iron, the excellence of its harbors—these are the conditions which determine the east as the leading commercial and manufacturing region. Wonderful richness of soil, natural facilities for internal commerce, afforded by an unrivaled system of rivers and the ease with which railroads may be constructed, vast deposits of coal and iron ore—these are the gifts of nature to our Central Valley, and such as will enable it, while surpassing the east in agriculture, to vie with it in commerce. The mineral and metallic wealth of the Cordilleras has within the past twenty-five years brought that previously unknown region within the pale of civilization, and it is already opened to commercial intercourse with the East and the Orient. Portions, indeed, of the extreme western border of our territory are to be classed among the most fertile districts of the country; but this fact would probably have remained long unknown had not the discovery of gold in that region drawn thither a numerous and energetic population. And, as if to render more and more feasible the at first doubtfully mooted project of an overland railway, the existence of rich deposits of silver, in various parts of the Great Basin, became a well-ascertained fact, after the most productive gold-fields had begun to fall off in their yield; and it was thus clearly demonstrated that the natural difficulties of a central route across the Continent must be overcome, however great they might be, in order that the East and the farthest West should come into close connection with each other.

THE WOODLANDS AND FOREST SYSTEMS OF THE UNITED STATES.

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THE map showing *the distribution of woodlands* relates to areas merely. It exhibits the relative proportions of surface occupied by woodlands and by lands not occupied by trees, so far as the scale chosen will allow. It takes no account of the species which make up the tree-covering of the soil, nor of the density of the forests—that is, of the relative numbers of trees per acre—nor of their size or economic value, or their fitness for sawing or other use or manufacture. The census of 1870 returned the number of acres of “Woodland” and the number of acres “improved” and “unimproved other than woodland” in each farm. The ratio of woodland to other land in farms, was calculated for each county, and made the first basis for the map. For some regions that were covered with farms, these data were reasonably satisfactory, but for other large areas were very imperfect and had to be modified by estimates. These data ceased with the first tier of States west of the Mississippi River, and for the region west of the 96th meridian the map was compiled entirely from estimates. In this work, light has been sought from all available sources, various reports and documents, from the General, State, and Territorial Governments, reports of surveys of every kind, public and private, journals and narratives of travel, reports of various expeditions, explorations and voyages, various journals, reports and works of botanists, the publications of learned societies, scientific periodicals, journals devoted to special industries dependent on wood and lumber, and other published information not necessary here to be enumerated. More than all this, was information given by those having personal knowledge of particular regions. These embrace private citizens resident in the different localities, travelers, persons connected with various national expeditions and surveys, with State geological surveys, and with land surveys of various kinds, railroad engineers, naturalists, botanists, persons connected with trades and industries that gave them peculiar facilities for information, many officers of the United States Army, U. S. engineers, and members of the Coast Survey, local engineers, etc., etc., in all a large number of persons who have kindly and cordially given what assistance they could, and whose names I would wish to here insert and thank publicly were it not that the list is entirely too long to be allowed here. The detached and scattered data from all these sources have been carefully worked over, and the general results are given on the map.

It is evident that for large areas the value of the map depends upon the accuracy of the estimates of intelligent observers. No published map of any considerable area in our country is known to us, on which the woodlands are laid down from actual surveys. The extensive and valuable information in the U. S. Land Office is largely accessible, but it is scattered through the thousands of books of original notes of the surveys. There has been no attempt to incorporate it in the maps of that office, and it is curious to see how much more care has been shown in locating the *mineral* districts than the woodlands, on the maps of that office.

Regarding the value of estimates, it is sufficient to say, that usually the information relating to particular regions, has been derived from several independent sources. Over considerable areas in the southern Rocky Mountain region, I had independent estimates of from three to seven scientific observers connected with various explorations and surveys; and here the estimates agreed with unexpected closeness. Sometimes they all agreed, while they rarely differed more than by one degree of density as given on the map, and such disagreements apparently arose from the different standards in the minds of the different observers. It is probable that as a whole, the amount of woodland as exhibited on the maps is underrated east of the Mississippi River and overrated west of it.

It is not possible to portray on one map all the characters of woodlands. The scale of this map is too small to show more than very general distribution. Nor is it possible to convey the same idea to all persons by shades of density, especially not to persons whose observations have been restricted to limited areas widely separated. Nor is it possible to convey by this means a correct idea of the character of the forests themselves. We cannot thus satisfactorily compare the grand forests of Puget Sound and Mendocino with the oak openings of Texas and the mesquit groves of Arizona; the hills clothed with a dense growth of small hard-wood trees in New England, with the open forests of the pine barrens farther south; the fringe of willows and cottonwoods skirting a river of the plains, with the tangled growth of the coast ranges of the Pacific; or the scattered cedars on the ridges of Dakota, with the intricate forests of Florida. The map, therefore, is a compromise, on which I have tried to show as far as is possible what is known of our woodlands. As it is the first, it is to be hoped that the work will ultimately be more satisfactorily done from fuller data and in a series of maps (perhaps by some future U. S. Commissioner of Forests), each to illustrate some separate character.

Considered botanically, the flora of the United States is very rich in woody plants. The actual number of species is not known, but 800 is perhaps not too high an estimate.

There is no dividing line in nature between trees and shrubs; the arbitrary rule adopted by most botanists is to call *trees* only such species as grow to thirty or more feet high; less than that are *shrubs*. Sometimes, however, the habit of the plant will place among the trees a plant which from size alone would be called a shrub.

An examination of various authorities shows that upwards of 300 indigenous species of trees are known to botanists, growing within the limits of the United States, which attain the height of thirty feet. About 250 of these are somewhere in the United States tolerably abundant, or at least, not rare.

If for our purpose we exclude all the smaller trees that never attain a height of fifty feet, also those tropical species, however large, which occur with us only in extreme southern Florida, also a few Mexican trees found only along our extreme southern border, also such rare species as may occur only in Alaska, also all those very rare species nowhere common, and consider only the larger trees which are somewhere in our territory tolerably abundant, we have still about 120 species, of which about twenty species attain a height of 100 feet, twelve a height of 200 feet, while perhaps five or six may attain a height of 300 feet and over. Of the 120 species indicated, about fifty belong to the *Coniferae*. How many of these species are of special importance in commerce, or in the home industries (of other use than for fuel) it is impossible to say, but it is a very large proportion of the whole number.

Many of the smaller species, however, and of the larger shrubs, give special character to large areas of woodlands and cannot be ignored in any discussion of American trees, whether considered botanically or economically.

A glance at the map shows large regions either treeless or very sparsely wooded. It is possible to cross the continent, from the Pacific to the Gulf of Mexico, without passing through a forest five miles in extent, or large enough to be indicated on the map. Then, again, the woodlands of the east are separated from those of the west by a broad treeless plain from six to fifteen degrees wide. The forests and woodlands on the two sides of this gap, are entirely unlike in their aspect and in their botanic characters. On the eastern side broad-leaved, hard-wood species predominate, both in abundance of individuals and in number of species, the forests of large areas consisting entirely of such kinds. On the west, the forests are entirely of *coniferae*; other species occur, some of great value, but they nowhere (or at most in only rare cases in the extreme west) form a conspicuous or even noticeable element in the forests. Not a single species forms a noticeable element in the forests of both sides; the nearest approach to it is the aspen (*Populus tremuloides*) which is a common tree in the north from the Atlantic to the Pacific. Two species of cottonwood are also abundant in some localities, and form an important element in the fringe of wood bordering streams, but are never otherwise a conspicuous element in the forests of the west. These three species of poplar are the only broad-leaved trees that figure as trees both sides of the central treeless plains; but others stray across as mere shrubs on one side. Among the *Coniferae* one cedar is found on both sides as an abundant wood in places, but it is a low crabbed growth west, a large shrub oftener than a tree. Neither beech, nor elm, nor hickory, nor mulberry, nor basswood, nor tulip-tree, nor magnolia, nor sassafras forms an element in the forests of the Rocky Mountains and westward.

For convenience in discussing the kinds of wood, we may divide our domain into ten geographical divisions, viz:—1st. New England; 2d. The Middle States; 3d. The South Eastern region; 4th. The Northwestern region; 5th. The Southwestern; 6th. The Plains; 7th. The Rocky Mountain region; 8th. Arizona, New Mexico and the Great Basin; 9th. The Pacific region; and 10th. Alaska.

Only *native species* are considered in the following discussion of the kinds of wood. So much confusion exists in the popular and commercial names of many of our trees that the botanical name is given where necessary for precision. One example is sufficient to illustrate this confusion of names. The most widely spread and valuable of western timber trees, *Abies Douglasii*, which grows from British Columbia to New Mexico, is known in its different localities under the various names of Douglas Fir, Red Fir, Black Fir, Douglas Spruce, Red Spruce, Black Spruce, Hemlock, Oregon Pine, Western Pitch, Bear River Pine, Swamp Pine, and perhaps others; moreover, nearly all of these names are also applied to other species. Similar confusion exists in the popular names of not a few species.

New England was originally entirely wooded, and has about eighty or eighty-five species of trees of which about sixty may reach fifty feet in height. Maine is a great source of pine and spruce lumber, but, as a whole, hard wood species predominate, particularly south of the 44th parallel. Many of these hard woods are noted for their durability and texture, and form the raw material for a great variety of manufactures, particularly of carriages and various tools and implements where tough wood is an essential part. The extent and variety of manufactures in wood is relatively greater in this region than else-

where, and ship-building is an important industry. The large timber used in house and ship building is unquestionably rapidly diminishing, but the area of woodlands is not decreasing in the same ratio. In many places the large trees suitable for sawing are cut, without clearing the land of the smaller growth, leaving it still *woodland*; and as such it is shown on the map. As a whole, the *area* of woodlands in this region is but slowly, if indeed at all, diminishing, and in large districts it increases from year to year. This is particularly the case in portions of the western part, where hilly regions, formerly largely in tillage and pasturage, are now growing up with trees, mostly of hard-wood kinds. Some of the timber thus grown is considered peculiarly valuable in manufactures, where strength and durability are needed. This extension of woodland-areas is by natural process. Few if any forests have been planted, except on the sandy regions along the southern part and on the islands, where pines have been planted to some extent. The extensive planting of trees for shade and ornament, however, increases largely the actual amount of wood in this region. To appreciate how much, it is only necessary to see many of the New England villages and cities from some height in summer, where the abundance of trees gives the appearance of a forest to the scene. Some of the cities have more actual wood growing in their streets and parks than is sufficient to be termed a heavy "forest" or "timber" in the sparsely wooded regions of the west. In New England the elm and perhaps the sugar maple attain their finest development and greatest abundance.

The middle States have about 100 to 105 species of trees, 65 to 67 of which sometimes reach 50 feet in height. The region was originally entirely wooded. Over much of it the forests were very heavy, and there are still immense quantities of timber available. The forests of this region are usually made up of quite a number of species, in some places the broad-leaved species predominating, in others the *Coniferae*; but both kinds commonly grow together, the coniferæ usually less abundant in the southern and western portions. The deciduous oaks, chestnut, beech, two species of ash, and perhaps the white pine, attain in this district their greatest size. The original and some of the remaining forests are noted for their grandeur. On the ridges of the Appalachians which cross Pennsylvania and New York, while the hard woods may not attain their greatest size, some of them, particularly white oak, white ash, and some of the hickories, are believed to attain their greatest perfection as regards strength and durability, or, at least, they are only equaled by the timber of the same species extended on the line of these ridges beyond this district in both directions. This is a matter of great importance in ship and boat building, and in the manufacture of railroad cars and of agricultural implements, all of which industries are here prominent. In portions of New York and Pennsylvania there are still large forests of excellent timber almost untouched by the axe; but as a whole the woodlands and forests are rapidly diminishing, both in area and in aggregate value, and there is as yet no corresponding compensation. Probably the price of timber must advance considerably before adequate means will be taken to produce a future supply by growth. How much this may be aided by wise legislation is still a problem.

The southeastern region, extending from Virginia to Florida, is the richest in species, is of peculiar interest to the botanist, and of first-class importance in commerce. (We cannot say that any one wooded region is *more* important than others, inasmuch as *wood* is a prime necessity in any civilized community.) This region, originally entirely wooded, has upwards of 130 species of trees (a much larger number, indeed, if we include the larger shrubs and the tropical species of extreme southern Florida), seventy-five of which attain a height of fifty or more feet, and perhaps a dozen species attain a height of 100 feet. A belt of pine timber extends nearly the whole length of this district, of varying width, occupying a part of the region between the mountains and the sea. This is the great source of hard pine timber (known in commerce as hard pine, yellow pine, heavy pine, pitch pine, southern pine, and Georgia pine). State statistics show that the annual export from Georgia alone now amounts from 200 to 300 millions of feet per annum. The trade is yearly growing, and the adjacent States are contributing largely to the supply. But this is not the only commercial lumber of this district. The live oak of Florida has a reputation throughout the world as ship timber. The hard woods of the mountain ridges have been less utilized than the growth of the regions already spoken of; but this is not owing to any inferiority of the wood itself. It is believed that the white oak attains its greatest development of strength in certain parts of Virginia and West Virginia, hardly equaling in size, however, its greatest development in the States immediately north. While pine is abundant along the belt mentioned and is at present of greater commercial importance; the broad-leaved species are the most abundant element in the forests. Here we find the magnolias and many flowering trees and shrubs in their greatest development and beauty. The area of woodlands as a whole has not probably much diminished of late years; but the trees suitable for hewing and sawing are decreasing under the heavy drafts made by commerce. In very many cases the land is despoiled of only its best timber-trees; the others are left so that it is yet a "woodland," and in due time a new crop of timber will result. The data for the preparation of the map of this region are more imperfect than for either of the regions before enumerated.

The northwestern region extends from Ohio to Iowa and Minnesota inclusive. In its original state, it had every variety of forest feature represented, from the heavy forests of broad-leaved species of the Ohio bottoms, and the dense coniferæ forests of Michigan through every gradation of lighter forests, "openings" and "belts" along the streams, to the grassy prairie and the treeless plains which everywhere terminate this district on the west. It is represented by about 105 to 110 species, about 68 or 70 of which may reach a height of 50 feet. In southern Ohio and Indiana, the

forests are of broad-leaved species; oaks and various hard woods grow to magnificent size and of good texture, while black walnut, basswood, white wood (or tulip tree) attain here their greatest development. The pine region may be said to begin in northwestern Ohio and extend across Michigan and Wisconsin to northern Minnesota. The northern parts of the three States last-mentioned now furnish a larger quantity of sawed lumber than any other part of the country. The census of 1870 gave the total production of sawed lumber in the United States as 12½ millions M. feet and of this Michigan furnished over 2¼ millions and Wisconsin over one million, the two States producing upwards of one-fourth of the whole yield of the country. The Chicago Lumberman's Exchange gives as the receipts of "lumber" at that city over a million M. feet for each of the three years since that census. This is sawed lumber, exclusive of laths, shingles, and all forms of hewed timber. A prominent journal devoted to the lumber trade gives the production of *logs* for a single river during the last winter (1873-4) as 433 million feet and deplors the dull trade as shown by such a short crop. To illustrate the capacity for sawing lumber, it may be stated that a single mill in Michigan, recently (on June 3d, 1874), as a test of capacity, sawed 179,718 feet of lumber in three working hours, the actual running time being two hours and forty minutes. (This is given on the authority of a local journal.) Many mills boast a capacity of 50,000 to 150,000 feet per day. But these examples of production tell a story of destruction also; and great as is the supply of pine in this region, it is so rapidly diminishing under the demands of the growing cities of the west, that serious apprehensions are awakened of a scarcity within a comparatively few years.

The data for northeastern Minnesota are very meagre, and that portion of the map has been prepared according to such scanty information as could be collected. For southern Minnesota I am indebted to the State surveyor-general for a detailed map of the areas of woodland and prairie.

Between the pine forests and the treeless plains, the prevailing trees are of broad-leaved species, sometimes forming forests of considerable density and size. Sometimes the limits of prairie and woodlands are well-defined; at others there is a regular gradation through "glades" and "openings" from the actual forest to the prairie. It must be remembered that the uncolored portions of the map are by no means always treeless. A region with less than forty acres woodland per square mile, if sparsely settled, may have sufficient timber and wood for the ordinary wants of such a population. Again, there are other regions without actual trees but with low shrubs sufficient for fuel and many other uses. The prairies of this region are the typical prairies of the country. Respecting their origin and the conditions which have rendered them treeless, there have been many theories, which it is not necessary here to discuss. Periods of excessive drouth, fires, the physical texture of the soil, are the leading theories, some advocating one, and some another. Where the prairies are uncultivated, or have at most but a sparse population, the patches of wood (where they occur) are doubtless diminishing in number and area through man's agency. Where, however, a prairie region is largely occupied by settlers and a considerable part is under cultivation, the amount of wood is doubtless rapidly increasing. This is brought about in part by checking the fires which would otherwise kill the trees while young, in part by fostering in various ways any spontaneous growth of wood that may occur, and in part by actual planting. In some places the aspect of the country has been entirely changed in this character by the settlement of the country; and in the more fertile regions, there seems no good reason why a future supply of wood and timber may not be produced on lands originally treeless, whenever the price is sufficiently enhanced to make a successful growth profitable.

The southwestern region extends from Kentucky and Missouri to Alabama and the western edge of the timber in Texas. Originally the eastern and southeastern portions were heavily wooded; prairies, however, occurring far eastward in the district, increasing in number and area westward, until the dry and treeless plains are reached which skirt the whole western border. It has about 112 to 118 species, 60 to 65 of which attain a height of 50 feet. The belt of pine of the southeastern States extends into this region near the Gulf in Alabama, thence running west and leaving the coast, extending into Indian Territory and Texas. This belt is not continuous, however, west of Mobile bay, and there are other detached areas of considerable extent with valuable "pine lands." In this district are swamps having an immense growth of cypress. Although so much of *Coniferae* may be found, broad-leaved species constitute by far the most abundant element of the forests embracing both hard and soft woods, and some species, which are shrubs or small trees elsewhere, attain in this district large dimensions. Sassafras, which is but an insignificant tree in New England, in Missouri becomes a tree sometimes three or more feet in diameter, equaling camphor-wood for the manufacture of chests for household use. Black walnut also is abundant in places and grows to a great size, and various species of timber trees are abundant over large parts of this district. This region has not furnished so much wood or timber to commerce as either of the districts before considered. This is not due to any deficiency in quantity or quality of its woods, but entirely to other causes. In this district as in the northwestern, the woods diminish westward, and finally fade out in the "oak openings" and "cross-timbers" of Texas and the fringes of wood that follow the streams far beyond the other trees into the plains west.

Over most of this district, particularly the better wooded portions, the area of woodlands is not seriously diminishing, but, as elsewhere, in places most available for commerce the better timber trees are disappearing. In the western borders, where the supply is at best sparse, it grows yearly less by the destruction or use of the scanty supply, and no efforts are made to replace it.

West of the districts described, the treeless belt already spoken of, separates entirely the wooded portions of the two sides of the continent, a belt extending from Mexico to the Arctic Ocean. It is fully 350 miles wide in its narrowest part, between Lat. 36° and 37°, widening to our northern boundary where it is 800 miles wide, or wider if we include a few outlying patches of timber on some of the northern ridges and mountains. Different parts of this belt, "The Plains" in common language, vary greatly in their aspect. Sometimes they are absolutely treeless as far as the vision extends; in others, a fringe of timber from a few rods to several miles wide skirts the streams, while the spaces between are treeless; and again in others, particularly northward, some of the intervening hills are dotted with scattered cedars, usually shrubby and crabbed, but in places attaining the size and dignity of trees. The Black Hills have heavy forests of pine and spruce, and appear like a forest-island 300 miles long rising out of this sea of plain, far from the forests of either side. A few other similar, though smaller, detached forests occur in this treeless waste. The causes which have left this great area so bare are without doubt mostly climatic. Although in places the character of the soil is unfavorable, the great cause is doubtless the scanty or capricious rainfall of the region. What can be done towards clothing this with trees by artificial means, is an entirely unsolved problem.

The Rocky Mountain region lies near the chain so called and north of Lat. 36°. From the Columbia River northward to Alaska, forests clothe the whole mountain belt, except where too high, or on limited parks and prairies. On our northern boundary, the treeless plains suddenly cease at the eastern base of the chain (about Lon. 113° 40' W.), and heavy forests are almost continuous thence westward to the Pacific. South of the Columbia River (about Lat. 38° N.) the forests of this chain are everywhere separated from those near the Pacific by dry and treeless plains and valleys of greater or less width. The forests of the northern part of the chain are continuous from Alaska southward to about Lat. 42° 40' N., where a nearly treeless belt about a hundred miles wide cuts entirely through them from the bare plains east to the more barren basin in the interior. South of this belt, forests begin again and extend southward from southern Wyoming across Colorado and into northern New Mexico, more than 400 miles, with a width of 200 to 250 miles. This forest is of varying degrees of density and interspersed in it are many treeless, or nearly treeless valleys called *Parks*. This forest is surrounded on every side by treeless areas, the limits usually sharply defined except along the southern and southwestern edge, where they shade off more gradually in density. The northwestern part of this forest is continuous with the forests of the north slope of the Uintahs, and these again with the forests of the Wasatch of Utah. Southwesterly in New Mexico and Arizona, are detached forests of similar character, clothing in each case mountain chains. These forests are everywhere of *Coniferae*. The whole tree-vegetation consists of twenty-eight or thirty species, about one-third of which are broad-leaved kinds and two-thirds conifers, the latter constituting the forests. Of the former, box-elder (*Negundo aceroides*) occurs most abundantly along the eastern base of the mountains; two kinds of cottonwood, along the streams and mostly out on the plains or in the parks; alders along the streams but higher in the mountains; the aspen as a small tree (locally known as *Asp*), in the mountains and on the margins of the parks. No oaks occur as trees, but a scrubby form (*Quercus alba*, var. *Gunnisonii*), rarely more than ten to twenty feet high, sometimes occurs on the foothills in the south. These and a few other species known to the botanist but not abundant as wood, and usually here as stragglers from some other region, make up the ten or eleven broad-leaved species. The great Colorado forest spoken of consists essentially of five species of Conifers, viz., *Pinus ponderosa* (called here yellow pine), *P. contorta* (called tamarac, and red pine), *Abies Engelmannii* (really a spruce, but called "white pine," as it has a soft, white wood), *A. Menziesii* (called here balsam), and *A. Douglasii* (called by a variety of names). These five species are by far the most abundant, large areas often being covered almost exclusively by but one or two of them. Other species not here named, are frequently met with, "not rare," as the botanist would say, but of vastly less economic interest than the species enumerated. On the outlying spurs and ridges which extend into the woodless region on every side, scrubby cedars are found, and in the drier valleys the nut pine or piñon (*P. edulis*) is abundant, particularly southward,—a low, scrubby tree usually less than twenty and rarely more than thirty-five feet high. These, with a few others, make up the eighteen or twenty species of *Coniferae*. The data for this part of the map are quite full and believed to be reasonably accurate. The timber of this region is diminishing vastly faster than a legitimate use demands. Where one tree is cut for use, ten perhaps are killed by fires which destroy great forests nearly every year, kindled by the carelessness of the whites, or perhaps as often by the Indians, who sometimes fire the forests to drive out game, sometimes to annoy an enemy, and sometimes, no one knows why. Whatever may be the cause, blackened trunks disfigure many hundreds of square miles.

For that portion of the Rocky Mountain region lying between the 43d and 49th parallels, the data for the maps are, as a whole, rather meagre. For Idaho and the Yellowstone region, they are more complete and reliable, but for the region north and east of the Wind River Mountains, they are scant and unsatisfactory. The map is colored according to the best information available. I have reason to suspect that the average of timber indicated is too high. The species of the northern Rocky Mountain region are perhaps the same as those south, but varying in relative abundance. The two magnificent firs, *Abies grandis* (called "white spruce," but in Oregon "yellow fir") and *A. amabilis*, become more abundant. In the northern part, particularly in the Kooskooskie region, heavy "pine forests" are reported.

West of the Rocky Mountains is another treeless or sparsely wooded region which extends from the Columbia River to Mexico. Its northern portion narrows northward, but forms an important part of the valley of the Columbia and its tributaries; it embraces the whole of the great basin except insignificant edges of the rim; it throws out an eastern branch entirely through the Rocky Mountains, and southward it is continuous with the treeless or sparsely wooded region which extends across the continent along our southern frontier. In this area occur the driest and the most inhospitable deserts of our country. It is of too varied character to admit here of details. Some portions are grassy prairies, some are plains of lava, others are deserts of drifting sand, others are half-naked rock cut by cañons, others are "alkali plains" and "salt valleys," others are great areas covered with "sage brush" and "grease wood," others pass into chapparal—in fact, there is every gradation from naked barrenness to great forests. Some of the mountain chains found in this area are as bare of trees as are the valleys themselves, others have large shrubs of scrubby pines or cedars, while others are clothed with forests. The extreme northern part consists largely of lava-plains. South of this, the Blue Mountains of eastern Oregon have heavy forests of pine, fir and spruce of the same species found in the northern Rocky Mountains. Still south of this are the "sage plains" and "deserts." In Nevada the valleys are treeless (with very rare exceptions); the ridges sometimes bare, sometimes dotted with shrubs and scrubby pines, the actual amount of wood being small, yet of inestimable value to a country so rich in minerals, and so poor in wood. Over parts, there is crabbed, shrubby growth, becoming in places chapparal, but oftener of scattered shrubs attaining in favorable places the size of small trees. One of these, called "mountain mahogany" (*Cercocarpus ledifolius*), is often over thirty feet high with a base two feet in diameter, the wood very hard, close-grained, dark-colored, and taking a beautiful finish when wrought. The shrubby vegetation of the region, including as it does the "sage" bushes, "grease woods," "creosote bush," etc., is of great interest to the botanist, but can hardly claim further notice here.

South of Latitude 35° are a few species of small trees of much greater value. Of these, first in importance is the mesquit (*Prosopis glandulosis*), which thrives in hot dry places in the valleys and on the mesas, but is rare on the steeper slopes. The tree has a spreading habit, rarely more than thirty feet high and twelve inches in diameter. The very hard and durable wood is used for a great variety of purposes. Posts in use for fifty years are still sound, and its value for railroad ties must ultimately be great. The fruit, consisting of eight to twelve "beans" in a long, sweet, pulpy pod, like that of the Carob (or St. John's Bread) of the Old World, is a valuable food for animals and even for man; while in western Texas a considerable trade has sprung up in Mesquit Gum, which is similar to Gum Arabic. This species extends from California to Texas, and in the future will doubtless be extensively planted and cultivated. The tornillo or screw-pod mesquit (*Prosopis pubescens*) is smaller and of more restricted range, but of similar use. Another small tree, called arbol de hierro or iron-wood (*Olneya tesota*), is of much local value and may become a commercial wood. Other broad-leaved trees occur, cottonwoods and sycamores are common along the streams. In parts of this region are several *Cacti* and one *Yucca* attaining a tree size, more picturesque in the landscape than useful to man.

The higher mountains of Arizona are well timbered with Conifers. The prevailing species are red spruce (*Abies Douglasii*) and yellow pine (*P. brachyptera*). The most notable of these forests (the limits of which have lately been demonstrated by the explorations of Lieut. Wheeler), extends nearly 400 miles. Other isolated forests, occupying mountains, are indicated on the map. On many of the lower ridges, the piñon (*Pinus edulis*) abounds, furnishing food to the Indians and fuel to the whites. It is a crabbed shrub rather than a tree, usually less than twenty or twenty-five feet high. Other trees occur of more limited range or abundance, the actual number known to botanists in the whole of this vast region amounting to about thirty-five species.

The Sierra Nevada and Cascade Mountains lie nearly parallel with the coast of the Pacific, with their eastern base 100 to 200 miles distant from it. This chain is nearly continuous from the northern frontier southward to Lat. 35°, a distance of about 1000 miles, everywhere a broad and high chain, its summits far above the line of tree-vegetation, often in the perpetual snow, culminating in the loftiest peaks in the United States. Its broad western slope is everywhere heavily timbered. Along the coast for the same distance are the "Coast Ranges," a system of mountain chains, more or less connected together but broken by gaps and separated by valleys and usually rather steep on the ocean side. They form a belt twenty-five to fifty miles wide and are mostly between 2000 and 4000 feet high, but with numerous points rising to twice that height. The Coast Ranges are generally wooded. Between these two mountain systems a series of valleys extend their whole length from Puget Sound to southern California, cut across by a few ridges, so that it is not a single continuous depression, but rather a row of valleys.

North of the Columbia, this valley is heavily wooded; the forests are open, but the trees are large, and little prairies are interspersed. Passing southward, the valley of the Willamette is largely prairie, but there is an abundance of wood for all uses. Between the upper Willamette and the upper Sacramento, several ridges cross from the Coast Ranges to the Cascades, and forests and prairies alternate. The former are heavily timbered. The great central valley of California is by far the largest of this series and is treeless, or but sparsely wooded, for an area 420 miles long by thirty to sixty miles wide. The northern half of this has more wood than the southern, where large areas are absolutely treeless, except a very narrow fringe along the few streams.

This region of mountain and valley, as a whole and in all its relations, economic, scenic,

and botanic, has perhaps the most interesting tree-vegetation known. The whole number of species known to botanists amounts to eighty-eight or ninety, but a vastly smaller number are found in any one botanical or commercial district. Many of the more noted species are very restricted in their range, and not more than three or four important timber trees extend the whole length of the region. It is therefore necessary to treat its parts more in detail than in the case of the other districts. In this district are perhaps the grandest forests on the globe. In Washington Territory they are made up of but few species, of which *Abies Douglasii* (called here Red Fir) is the most important. Commonly 150 or more feet high and four or more feet in diameter, but sometimes fifteen feet (in extreme cases even over twenty feet) in diameter and over 300 feet high, straight growth, the wood firm, elastic, holding spikes with great tenacity, it produces the most noted timber of the territory. Oregon cedar (*Thuja gigantea*), yellow or "Punkin" pine (*P. ponderosa*), Yellow Fir (*Abies grandis*), Black Spruce (*A. Menziesii*), are the next most abundant species, all attaining a great size. The popular names are much confused, the generic terms of cedar, pine, spruce and fir are all very loosely and capriciously applied. The finest of the forests are about Puget Sound and on the western flanks of the Cascades. On the Coast Ranges the forests are denser and with tangled undergrowth; but the trees not of such large average size. Regarding the wonderful quantity of wood produced, one authority (for many years surveyor-general of the territory) states that the whole region west of the summit of the Cascades to the Pacific and north of the Columbia, will yield "an average of 32,000 feet per acre of merchantable lumber." He states that about one thirty-second part of this area is prairie. The following extracts from the Annual Reports of the Commissioner of the General Land Office of the United States relate to this territory,— "the land will produce from 25,000 to 300,000 feet per acre," and "there are vast tracts that would cover the entire surface with cord-wood ten feet in height; there are localities that would afford double that quantity." Again the reports speak of the forests of pine, fir and cedar "which grows thickly," "from one to fifteen feet in diameter and 200 to 300 feet high," and again of the forests of "red and yellow pine of gigantic growth, often attaining a height of 300 feet and from nine to twelve feet in diameter." Similar testimony could be greatly extended. In the extreme northeastern part and east of the Cascades, are forests of pine; these forests are in character more like those of the Rocky Mountains with which they are continuous.

Passing south of the Columbia River the same species occur; but the forests are not so heavy, although individual trees may be as large. Prairies become more numerous and larger, and oaks and other broad-leaved trees become more common in the valleys. In places, Larch (*Larix occidentalis*) is abundant, and the Yew (*Taxus brevifolia*) attains in Oregon and northern California a height of fifty or seventy-five feet, a greater size than is attained by any Yew elsewhere in America. As a whole, Oregon is very heavily timbered.

Passing southward to California the tree-vegetation changes still more, and becomes the richest in species of any region west of the great plains, embracing a total of over eighty species. Some fifty species of Coniferæ have been enumerated by botanists, embracing several species and even genera not found elsewhere. All the Conifers of Washington and Oregon are found here, but not in the same relative abundance or size. The yellow pine (*P. ponderosa*) attains its greatest development and is often over 200 or 250 feet in height and four to eight (sometimes twelve) feet in diameter. The Sugar Pine (*P. Lambertiana*) is perhaps the most valuable pine of the State; is abundant, of excellent quality and great size. There are four firs (*Abies* of the section *Picea*), three large spruces; and about twelve species of pine are more or less abundant (more than twice that number of supposed species have been described by botanists). The "Big-Trees" (*Sequoia gigantea*) occur on the western slope of the Sierra Nevada, and are too well known to need notice here beyond the remark that the ease with which they are propagated and their valuable timber and rapid growth will doubtless give them great value for cultivation in the future. Of more present value is the Redwood (*Sequoia sempervirens*), which only grows very near the sea between Lat. 36 and 43 degrees, and on portions of this coast forms forests rivalling, if indeed not exceeding, any found elsewhere on the earth. The trees are often ten and sometimes more than twenty feet in diameter, very straight, 200 to 300 feet high, and the wood, which is light, is straight-grained, very durable, and adapted to many uses. It is extensively cut and the lumber shipped to South America, the Pacific Islands, China, and even to New Zealand. It is rapidly diminishing in quantity, and the only slight compensation is that when cut a new growth sprouts from the stump, which is not true of any other timber-tree belonging to the *Conifera*. California Cedar (*Librocedrus decurrens*) occurs in the mountains of large size. Several species of Cypress (*Cupressus*), the California Nutmeg (*Torreya*), and cedars of smaller size abound. Among the broad-leaved trees there are many of great beauty, but there is a great lack of hard woods. The Laurel (*Tetranthera californica*) has been sparingly used in ship-building; an ash, one maple (neither abundant), and some of the oaks do service where smaller hard woods are needed, but the supply is deficient. But among these trees are some of marvellous beauty, particularly among the oaks. Two cottonwoods, two sycamores, the Madroña (*Arbutus Menziesii*), and other trees are not rare.

The data for Alaska are insufficient to construct a map of distribution and density of timber with reasonable accuracy; so the attempt is not made. Some portions of that extensive territory are heavily wooded, other portions are treeless and there is every gradation, but the relative areas of each, and their boundaries are unknown. Official reports speak of the forests as "being really magnificent, covering the lower hills and uplands with dense masses of pine, spruce, fir, hemlock, cedar and other valuable timber, principally

evergreens." Again: that "the forests extend almost to the water's edge along the southern shores, but north and east of the Alaskan Peninsula they exist only in the interior except at the heads of bays and sounds," while "the inland forests are abundant, extending to within a short distance of the Arctic Ocean." In establishing the United States military post of Fort Tongas, "in clearing the timber for this post a magnificent growth of yellow cedar trees, eight feet in diameter and 150 feet in height" was found. "Nearly the whole of the Yukon district is well supplied with timber;" and much more appears to the same effect. Of the species on the Yukon Mr. Dall states that the white spruce (*Abies alba*) is the "largest and most valuable tree" found in the Yukon district. The next in importance is the Birch (*Betula glandulosa*). Various other species are mentioned.

Many questions suggest themselves in connection with the matters already discussed. That the original distribution of wood in the country was mostly determined by climate, there is no question. In all that part East, which was originally forest-clad, there is an abundant rainfall, and the rains (or snows) are so distributed throughout the year that rarely a month passes without any. Again, in all that treeless region west of the 97th meridian, the rainfall is much less, and long drouths prevail. While a certain amount of annual rain is a necessity, a glance at the rain chart will show that the density of the forests do not depend upon the amount of rain. It appears, however, that the treeless regions, even to the fertile prairies, are usually in regions more subject to drouths than the Atlantic slope. But the limited parks enclosed in forests in the Rocky Mountains, the abrupt line of division between the timber and the plain region at or near the base of many mountain chains, the isolated patches of timber in the western prairies, or isolated prairies within the woods, all show that other conditions conspire to produce the result seen. The character of the winds, the variations and range of temperature and moisture of the air, the physical texture of the soil, its chemical composition, the geological character of the rocks beneath, may each be demonstrated to influence or even control the distribution of the tree-vegetation in some particular place. Doubtless other and less obvious causes conspire to produce the varied results seen. Of late much has been said and written about the influence of woodlands or rainfall and climate. Within our country accurate observations and data are too meagre for any conclusions of value. It has not yet been demonstrated that the destruction of woodlands in the East, or the planting of trees on the prairies of the West have materially changed the rainfall. Limited observations in the eastern States seem to indicate that of two places near each other, the one well wooded and the other not, that which has the most trees will receive a little more rain, the excess being entirely made up in the light showers of the summer.

Regarding the economic value of our wood interests in the industries and productions of the country, no estimate of values can be made which truly covers the case. The census of 1870 gave to lumber the second place in our manufacturing industries, iron manufacture standing the first. The statistics of "sawed lumber" were 1,295 millions laths, 3,265 millions shingles, 12,756 millions feet of lumber, \$1,433 millions of capital was invested, 150,000 persons employed, and the lumber produced was valued at \$210 millions. Then of the secondary manufactures, in which lumber is the raw material, we have 22,000 persons employed as cabinet-makers, whose products are valued at \$17½ millions, 15,000 carpenters and builders producing \$17½ millions, sawing and planing establishments employing over 52,000 persons, and producing \$58½ millions, and so on through coopers, tanners, carriage-makers, ship-builders, &c., &c., all using products of the forests as their raw material. Yet all this gives but an imperfect idea of the part that wood and timber plays in the wants and industries of a people. The great majority of all the buildings of the country are made of it, and it is an essential ingredient of nearly all those which are nominally of brick or stone. It, too, is the principal ingredient in the vast majority of ships, boats, cars, carriages, etc., for transportation, so too of our furniture, and of most of the tools and implements in use. It is the sole household fuel of at least two-thirds the inhabitants of the country, and the partial fuel of perhaps nine-tenths of the remaining third. For making steam, reducing metals and the various processes in the arts, it is used in immense quantities. Entering as it thus does into the multiform uses of civilization, and every period of life from the cradle to the coffin a constituent of so many of our manufactures and nearly all our structures, from a match or tooth-pick to the railroad and steamship, it forms an element in our needs and our industries which cannot be reached by statistics nor expressed by figures.

In our exports, it is an important feature. "Furs, sassafras, and cedar" we are told, formed the cargoes of ships from our coast even before the first settlement at Jamestown, Manhattan or Plymouth; and a continuous stream of lumber from our shores still pours across the Atlantic on one side and the Pacific on the other.

That our larger timber, suitable for sawing, is diminishing, there is no question, nor is there any question that this will go on until the price so much rises that new timber will be planted as the old is cut. That a part of this diminution is due to prodigal use and needless waste there is also no question. Legal efforts have been put forth to prevent this waste (with varying success) from time to time since early colonial days. We find, for instance, that "Att a meeting held this 29th day off Aprill 1699, in Breucklyn (Brooklyn) Benjamin Vande Water, Joris Haussen, Jan Gerritse Dorlant" were chosen officers to consider the "greate inconvenience and lose" that the inhabitants of the town suffered because that unauthorized tradesmen "doe fall and cutt the best trees and sully the best woods," &c. Steps were then taken to stop the needless waste, and penalties affixed for illegally cutting or wasting the timber on the public lands. And similar laws have been enacted from time to time ever since, by local governments first, and the General Govern-

ment later; but the waste has not ceased, nor have any adequate means been devised to stop it. At present, the most serious waste is caused by forest fires.

The question of future supply suggests itself in any discussion of our woodlands and forests. Intimately bearing on this, is the experience of other countries, now civilized, once forest clad, and the relations of our tree flora with theirs. We have already stated that our flora was rich in native species of trees. How much richer than central and western Europe a few figures will show. We have already roughly stated the number of our native trees as above 300 species. Gray's "Manual of the Botany of the Northern United States" (east of the Mississippi and north of the Carolinas) enumerates 132 indigenous trees. Torrey's "Flora of the State of New York" gives 80 species of trees for that State alone. Cooper in his "Catalogue of the Native Trees of the United States" gives for the eastern forest regions (of North America north of Mexico) 234 species; for the western, including the Mexican boundary, 138 species. In this discussion we have considered only the more abundant kinds, and the three authorities are merely cited to illustrate by their figures this single point, the wealth of our flora in tree species. In comparison with this, Germany, embracing the whole of central Europe from the frontiers of France to those of Russia and from the Adriatic to the Baltic sea, has but about sixty native species. In France the number is given by some authors as thirty, by others as thirty-four species. In Great Britain, there are twenty-nine species above thirty feet high, and the local botanists describe but fifteen of these as "large" or "moderately large" trees. But in all of these countries, tree culture began early, and the resources in wood and timber have been enormously increased by the introduction of foreign species, sometimes by private enterprise, sometimes with government aid. Lindley gives in detail the history of the introduction of foreign trees and shrubs into Great Britain. He states that in the 16th century 89 new species were brought in, in the 17th 131 species, in the 18th 445, in the 19th, up to 1830, 699 species; "the total number of foreign trees and shrubs introduced up to the year 1830 appears to be about 1,300," but "among them are not more than 300 trees

which attain a timber-like size." The most valuable one of these he considers the Larch, but many other valuable timber trees have been planted; and he adds "our principal fruit trees are from Asia, but by far the finest ornamental trees and shrubs are from North America." In France a similar process has been going on. Professor Thouin stated in the *Mémoires d'Agriculture* for 1786 that "France then possessed about eighty-four different species of trees, of which twenty-four were of first rank in point of size or exceeding 100 feet." And the work has gone on since. A similar process has been going on in most countries of Europe, and the production of wood and timber has thus been increased. If these countries, having naturally a tree flora so much poorer than ours, have been so successful in the cultivation of woods and forests, may we not infer that we may be equally or more so, in a country where the natural conditions seem more favorable, as indicated by the number of our species and the luxuriance of the native growth?

But *what* species are to be most advantageously used for cultivation here cannot be predicted by any scientific observations yet made. Prolonged and extensive experiment only can tell which will be the most successful kinds. The success attending the introduction of foreign fruit trees is significant; so also that of a few forest trees introduced for ornament—some in the eastern States being already over a century old. The luxuriance of the European Elm, the Lombardy Poplar, various willows, the Ailanthus and other species in limited cultivation in the older States, and of the *Eucalyptus* west, indicates that ultimate success is certain. The last-mentioned tree has perhaps been the most extensively planted of late of any one foreign species, one or two millions having been planted within the last ten years. One tree recently cut (1874) in Sonoma, Cal., of nine years growth, we are told by a local authority had attained a height of ninety-six feet, and a diameter of eighteen inches at four feet from the ground. The fact that so many ornamental species flourish in cultivation, also points to ultimate success in the cultivation of the useful ones; yet, our hopes of future supply must be mainly from native kinds, either the spontaneous growth of nature or as a product of cultivation.

GEOLOGICAL MAP OF THE UNITED STATES AND TERRITORIES.

BY CHAS. H. HITCHCOCK AND WM. P. BLAKE.

A GEOLOGICAL Map giving a broad general view of the extent of the various geological formations of the country has long been an acknowledged desideratum. The materials have been accumulating from year to year, one government expedition after another has returned bringing new facts, and State after State has instituted geological surveys. But all these results have been published independently, and at different times, without concert or system. The attempts to combine and generalize these disconnected data have been few, and, in general, unsatisfactory, though, no doubt, each effort has been of great service to the science, and economically.

The preparation of such a map is one of the most difficult and thankless labors a geologist can undertake. It is not a work of mere compilation. To a general knowledge of the whole region must be added critical skill and discrimination, for the data are so disconnected, diverse, and often conflicting that they must be compared, harmonized, and resolved into a common expression. There are also blanks, for which the facts are scanty or wanting, and these must be filled in order to complete the general picture.

Under such adverse conditions, with diverse, and in some regions, only partial materials, notably in the great and but partly explored areas of the West, the result must necessarily be imperfect. It will fail to satisfy many who have made special studies of limited areas in detail, and will afford an inviting field for critics.

Yet such maps, confessedly imperfect, serve a most excellent purpose—they give broader and more comprehensive views of the geological structure of the country, of the relative position and extent of the mineral and agricultural regions and of the bases of indigenous industries. They are important in all discussions of the distribution of plants and animals and even of population. Further, as regards the progress of geology, they stimulate investigation and publication, they provoke criticism and corrections and thus advance knowledge.

It is hardly necessary, however, to explain the reasons for the publication of a general geological map. Such a map has long been an acknowledged need. At the meeting of the American Association for the Advancement of Science, in 1872, a Committee was appointed to memorialize Congress upon the preparation and publication of a geological map of the United States, and it is hoped that suitable provision will ere long be made for one on a scale commensurate with the importance of the subject to the country.

Of the map now presented two editions have already been issued, one for the volume on "Industry and Wealth" at the Ninth Census, the other for the Report of the U. S. Commissioner of Mining Statistics. The third edition now presented contains many additions and corrections, but it is still claimed to be only approximately correct and to a great extent hypothetical, particularly west of the Mississippi River, as all maps of the kind must necessarily be, until accurate measured surveys of the surface and of the outcrops of the formations have been made.

The topographical or geographical basis of the map is the well-known Engineer's map, which has been carefully prepared in the office of the Chief of Engineers at Washington from the results of official explorations, having been added to from time to time, as the accumulation of data justified it. The scale of the map is about one hundred miles to the inch. Upon the parallel of 37° an inch extends over two degrees of longitude. An area of 25 square miles may be covered by the head of a pin. On such a scale detail must, of course, be sacrificed, and give place to general representation. The same is true of the topography. And the topographical features, essential guides in plotting the geology, are, over a great part of the country, and particularly on the western half of the map, very defective, and in some extended districts are entirely wanting. Yet for many of these districts a general knowledge of the geology permits them to be colored with tolerable accuracy. But the difficulty of successfully representing the geology in the absence of the usual topographical guides will be readily appreciated. It may be stated, as a general rule, that in regions where the topography is not known, the representation of the geology is to be considered as typical, or hypothetical and suggestive, rather than accurate.

For convenience of representation and of printing in colors, the formations are delineated in nine groups. The arrangement is not in every respect the most natural, but it best accords with the materials in existence. It is as follows:

EOZOIC.	{	EOZOIC and METAMORPHIC.
	{	CAMBRIAN and SILURIAN.
PALEOZOIC.	{	DEVONIAN.
	{	CARBONIFEROUS.
MESOZOIC.	{	TRIASSIC and JURASSIC.
	{	CRETACEOUS.
CENOZOIC.	{	TERTIARY.
	{	ALLUVIUM.
	{	VOLCANIC.

We have traced out and separately indicated each of these divisions as far as possible in the existing state of our knowledge, but no attempt has been made to trace the dividing lines of the Paleozoic over the western area, as will be presently explained.

The first group, the Eozoic and Metamorphic, includes the Laurentian, Atlantic, Labradorian, and Huronian, together with the granites and metamorphic rocks. The few metamorphic rocks of later age, whether Paleozoic or Mesozoic, in the Appalachian and Rocky Mountain regions, have been separated from the Eozoic as far as possible.

GENERAL OBSERVATIONS UPON THE REPRESENTATION OF THE GEOLOGY OF THE EASTERN PORTION OF THE UNITED STATES.

BY C. H. HITCHCOCK.

THE rocks of the first group form a continuous belt from the northeastern boundary southwesterly to Alabama. From their broadest expansion at the north, they gradually narrow southward through New England to New York and then expand southward through the Southern States. They form the mountain region of the Eastern States, and, together with the broad development of the same formations in Canada, skirting the Great Lake region and considerable areas about Lake Superior, form the margin or rim of the great interior region of comparatively horizontal Paleozoic formations, holding the vast coal areas of the continent. The natural geological and geographical outlets of this interior basin, with its stores of wealth in coal, iron, and fertile lands, are on the southwest, through the open valley of the Mississippi to the Gulf, and on the east, across the narrowest portion of the Eozoic at New York.

These Eozoic and Metamorphic rocks constitute what is generally known as the granitic region. It is the nucleus of the later rocks, of the Paleozoic on the west, and the Mesozoic and Cenozoic on the east. Of the principal divisions, the Laurentian is developed along the valley of the St. Lawrence, the Huronian in the west, and the Atlantic in the White Mountains of New Hampshire.

The Atlantic system is first carefully distinguished from the others in the first volume of the geological report of New Hampshire (1874). It is the same as the so-called White Mountain series, and has a large development along the Atlantic border. A considerable portion of the New England metamorphic rocks, particularly in Maine, is now referred to the Huronian system.

The Silurian and Cambrian systems are made to extend from the Paradoxides beds to the Lower Helderberg inclusive; in accordance with the general usage of American geologists. The Calciferous mica schists of Vermont, the Coös group and certain mica schists of New Hampshire, are provisionally included in this division. Certain schists in North and South Carolina, largely those called Taconic by Professor Emmons, are excluded, and referred to the Huronian upon the authority of Professor Kerr. A large area of quartzites in Minnesota and Dakota, consisting chiefly of the *Plateau du Coteau des Prairies*, are now for the first time ranked with this division. Heretofore opinion has been divided in respect to them, whether they should be called Huronian or Cretaceous.

The Devonian system is now separated from the Lower Carboniferous, and is chiefly developed over the interior of the continent.

The Coal measures are not separated from the Carboniferous, because a map representing them and other subdivisions is included in this publication. The representation of the entire Carboniferous system by itself enables one much better to understand the geological structure of the country. The Permo-Carboniferous strata are not separated from this division.

The Triassic and Jurassic formations are represented together. They constitute long lines of sandstone in the east, and Gypsiferous beds west of the Mississippi.

The Cretaceous formation may be traced almost continuously from the northeast end of Long Island through the Carolinas to Alabama; thence northerly along the Mississippi valley to the mouth of the Ohio River; thence southwesterly into Mexico, and northerly to the British Possessions, covering immense areas in the Territories and in the States of the Pacific coast. The formation is perhaps the most extensive of any in the country. With the approval of Prof. Kerr we have represented a continuous area of Cretaceous, nearly 200 miles long, from the Neuse River in North Carolina to the farther side of the Great Pedee basin in South Carolina. This area is usually covered by Tertiary or Alluvium, but displays Cretaceous sections along all the great transverse river valleys. Large Cretaceous areas in Minnesota cover Eozoic and Silurian deposits, and are therefore only partially represented on the map.

The Tertiary rocks lie outside of the Cretaceous along the whole Atlantic coast south of Cape Cod; and are immensely developed over the western portion of the country.

The Alluvium lies outside of the Tertiary along the coast, composing the peninsula of Florida and the Mississippi delta.

No volcanic rocks, properly so called, occur east of 103° west longitude Greenwich. This edition of the map differs in some portions from the first issue for the following reasons:

A small area of Cambrian has recently been described by the writer as occupying a part of the Saco River valley in Maine. The granite in northeastern Vermont, and near Montpelier, may be partly of Devonian age. Three small outliers of the Catskill formation are represented in New York upon the authority of Logan's map. This formation is everywhere included with the Carboniferous upon the authority of Chancellor Winchell. The Long Island rocks are still considered as Cretaceous. The ragged edges of the Carboniferous rocks in northeastern Pennsylvania are not preserved. In North Carolina the Eozoic system is expanded to include several isolated patches of gneiss in the low country. This expansion causes the eastern boundary of this system to harmonize with that in Virginia, as delineated by Prof. W. B. Rogers.

The geology of Georgia is very little known; the Cretaceous outliers are given upon the authority of Sir Chas. Lyell. The Silurian areas of Ohio and northern Illinois are

probably connected together across Indiana; the boundaries between the Silurian and Devonian, as given, being based upon Sir William Logan's map. The northwest part of Iowa, here colored as Cretaceous, is said by Prof. White in his Iowa report to be so deeply covered by drift that no rocks appear *in situ*. The Devonian along the Red River, in Minnesota, is given upon the authority of Dr. Winchell's Map. In Texas a few changes are made upon the authority of a manuscript map furnished by A. B. Roessler. The coal area of Northern Texas is separated from that of the Indian Territory by the overlying Cretaceous along the valley of Red River. The Tertiary area of the Cross Timbers region is retained in accordance with the results of this summer's explorations (1874), specially communicated by Prof. S. B. Buckley. Improvements will doubtless be made hereafter in the representation of the copper rocks about Lake Superior. We have not altered their delineation from that of the first edition.

A few general statements are suggested by even a casual inspection of the map. First, there is a wide contrast in color between the east and the west; indicating that the former, with its enormous supplies of coal and iron, is adapted by nature to be the manufacturing region, while the latter, with its immense plains and its veins of the precious metals, is more properly an agricultural and mining country. Second, the gradual thinning out of the Tertiary rocks on the Atlantic, suggests the probability of a considerable submergence off the coast of New England and the British Provinces in very recent times, so that the later rocks are entirely concealed. Third, the arrangement of the formations along the lower Mississippi valley indicates a submergence commencing at the close of the Paleozoic and continuing down to the present era—the sinking of large tracts of land in southeastern Missouri in conjunction with the earthquake of 1812, shows that the line is still weak. The successive development of the several divisions of the Cretaceous and Tertiary below the mouth of the Ohio, proves that the valley has been gradually reclaimed from the Gulf of Mexico. Quite recently, also, the western water-shed followed the Cretaceous outliers from southeastern Arkansas to the "Five Islands" near the mouth of Bayou Teche. Fourth, the overflows of lava are confined to the Rocky Mountain region and westward. There are no evidences of igneous overflows in the east later than the Jurassic. Fifth, the great plains west of the Mississippi, occupying more than a fourth part of the country, belong to nearly horizontal deposits of the Cretaceous and Tertiary. Sixth, the central portion of the main Rocky Mountain range seems to belong to the Eozoic system; but not to have been elevated extensively so early as the same formation along the Atlantic border. The principal epoch of Rocky Mountain elevation seems to have been in the later Tertiary.

GENERAL VIEW OF THE GEOLOGY OF THE WESTERN PORTION OF THE UNITED STATES.

By WILLIAM P. BLAKE.

THE following brief notices of the salient geological features of that portion of the United States west of the 100th meridian are designed to supplement and explain the Map and to assist in giving a general idea of the geographical range of the principal formations and their relation to each other. Some of the difficulties of the task of delineating the geology over such an extended region, as yet but imperfectly known, are stated in the foregoing joint article by Prof. Hitchcock and the writer, to which reference is made.

EZOIC AND PALEOZOIC.

Paleozoic formations have been traced to the shores of the Pacific, and their representation forms a conspicuous feature of the Map from the Rocky Mountains westward throughout the whole area, and especially in the great interior basin-region where there are numerous parallel mountain ranges trending from north to south. Over this western portion of the Map the divisions of the Paleozoic are not indicated by different colors as they are on the eastern portion. The single blue color represents the whole or any single member of the Paleozoic, either the Silurian, the Devonian, or the Carboniferous, or all of them. The divisions have not yet been traced out except in a few limited areas.

The best known member of the system is the Carboniferous limestone, believed in general to be the Sub-carboniferous, which has a wide extension, having been identified as far west as the seaward slopes of the Sierra Nevada, in the Humboldt Mountains, the Wahsatch, and in the Rocky Mountain system of elevation from Mexico to the northern boundary. It forms the summits of ranges about the Great Salt Lake, and is the prominent rock of many parallel ranges extending northward into Montana and beyond into British America. It is believed to constitute an important feature of the Salmon River ranges of mountains, comparatively unexplored, and of the Blue Mountains in southeastern Oregon. The formation is, in general, much uplifted, and forms the crest or highest portions of many mountain ranges up to an elevation of 13,000 feet or more. But in the broad region drained by the Colorado and its tributaries, the Carboniferous, together with older divisions of the Paleozoic, and the later formations of Mesozoic time, are comparatively undisturbed, and form a broad plateau region of nearly horizontal strata through which the streams have cut their way and expose unbroken sections of the whole series of rocks from the early Silurian, resting upon the Eozoic, to the Tertiary surmounted by volcanic outflows. The Mogollon Mountains of Arizona mark the southern limits of the plateau region, beyond which the formations are uplifted and extend in parallel ranges southeastward into Mexico. Thus a deep Carboniferous sea appears to have extended over the greater portion of the United States. A period of elevation succeeded with the deposition at the west as well as in the eastern portion of the country of sandy and clayey deposits, the foundation for the growth of plants and the formation of coal-beds. Coal measures and thin seams of coal are found in the Rocky Mountains at Santa Fé, and recently they have been shown to exist as far west as the Pancake range of mountains in Nevada (Lon. 115°) with workable beds of coal. So far as yet observed, coal-seams do not exist in the Carboniferous in the northwest.

Devonian beds have been recognized in the White Pine Mining District in Nevada and probably occur far to the north and south of that point in the same and other parallel ranges. They have also been identified in the Wahsatch, southeast of Salt Lake City, and no doubt have a very considerable geographical extension in connection with the Sub-carboniferous limestone. Devonian sandstones are reported in the Calitro Mountains, Arizona; but in a section near El Paso, from the Potsdam upwards, there is a notable absence of Devonian beds. This section is believed by Mr. Tenney to exhibit the equivalents of the Potsdam sandstone, the Trenton limestone and the Oneida conglomerates with the Carboniferous resting unconformably upon them. An absence of Upper Silurian and Devonian beds has also been noted by Hayden in sections about the Black Hills and the Laramie range. But according to Comstock, the whole Paleozoic series, from the Lower Silurian to the Carboniferous, inclusive, is found upon the eastern slope of the Wind River Mountains dipping away from the metamorphic rocks.

Limestones of the Quebec group have been identified by Bradley, near Malade City, Idaho. The equivalent of the Potsdam sandstone is described by Hayden and others as existing in the Black Hills and northern ranges of the Rocky Mountains, especially in the Big Horn Mountains at the head of Powder River and in the range known as the Tetons. A quartzite underlying the limestones of the Wahsatch and resting unconformably upon the upturned edges of Eozoic rocks, is referred by the writer to the Lower Silurian. The Primordial has also been observed by Clayton in southern Nevada (Lon. 116°), and on Schell Creek, seventy-five miles northeast of White Pine.

It may be said, in general, that the prevailing formations in the silver-mining districts throughout Nevada are made up of limestones and sandstones of Paleozoic age, either Carboniferous, Devonian, or older, in connection with Eozoic, granitic, syenitic, porphyritic, trachytic, and volcanic rocks. Dikes of porphyry and dioritic rocks are numerous, but, in general, are too narrow and limited in their breadth to be satisfactorily delineated on the Map.

The phenomena of uplift and plication of the strata are exhibited on a broad scale in the Rocky Mountains and westward in all the mountain systems, though, in general, the folding is not abrupt and steep, and monoclinical ridges are most common. The principal area of folding lies to the westward of the Wahsatch range in the Great Basin, where the parallel mountain ranges are numerous and inclose long and narrow valleys partially filled by the debris and wash from the adjoining ridges, so that the rocks are covered from view. The region of the greatest lateral compression is the Sierra Nevada, where most of the strata stand on edge. The Cretaceous and Tertiary formations of the Coast Mountains are also plicated.

The rifts and fissures of the rocks giving rise to veins and mineral deposits follow, in general, the lines of easiest fracture presented by the upraised strata, parallel to the general axes of uplift. A general longitudinal arrangement results, and determines to a great extent the distribution of population, lines of communication, settlement, and occupation of the country.

There are evidences in several places of considerable dislocations and breaks in the strata for great distances; as, for example, along the eastern base of the Sierra Nevada, and in the Colorado plateau, where Powell has observed a succession of vertical displacements extending in a northwesterly and southeasterly direction, one of these lines of break being nearly under the extinct volcano of San Francisco Mountain and coincident with the edge of the mesa terminating the plateau on the south.

The wide extension of the Eozoic rocks as the foundation of the western part of the Continent is well established. They underlie the Paleozoic unconformably, and are in general crystalline and uplifted at high angles. In the Rocky Mountain system, particularly near Santa Fé in New Mexico, in Colorado, and in Wyoming, gneissic strata are traversed by veins and dykes of flesh-red granite. Farther west this granite disappears and gray granite prevails, especially in the Wahsatch, the Humboldt, and the Sierra Nevada. In the Wahsatch the Paleozoic series rests upon the upturned edges of older formations now in the condition of compact granite but retaining distinct traces of the original layers of deposition. This granite is flanked by gneissic beds, and it closely resembles the granite of the Humboldt range, and of the Sierra Nevada, which two great ranges may also be regarded as prominent lines of exposure of the most ancient rocks. The Eozoic is also exposed at many points in the ridges of the Great Basin, at the bottom of the cañon of the Colorado, and southward through Arizona into Mexico. In Montana Territory the rocks are gneissic, and are traversed by gold-bearing quartz veins.

MESOZOIC.

The most widely distributed and recognized member of the Mesozoic series is the Cretaceous, which underlies the Great Plains westward from the Missouri, forms the tablelands of Texas known as the Llano Estacado, and appears all along the eastern base of the Rocky Mountains. Beyond this chain it is spread over the great plateau region of the Colorado River, finding its principal limit on the north and west in the Wind River, the Uintah, and the Wahsatch Mountains. Farther west it reappears east of the Cascades in Oregon, is heavily developed about Puget's Sound and Vancouver's Island, and, together with uplifted Tertiary beds, forms the bulk of the ranges of the Coast Mountains in California.

In southwestern Texas the lower members of the formation consist of thick beds of compact limestone, forming cliffs hundreds of feet in height along Devil's River and the Rio Grande, while the higher members forming the Llano become more clayey and sandy. Coarser materials also prevail in the formation upon the western coast, where sandstones and shales prevail and pass upwards conformably into the Eocene and Miocene Tertiary.

East of the Rocky Mountains the Cretaceous is overlaid by Jurassic and Triassic strata, the latter being largely developed and exposed at the surface in northern Texas, the Indian Territory and Kansas. This member of the Mesozoic consists chiefly of red shales, marls and sandstones, with an abundance of gypsum. The Triassic beds are also found throughout the Colorado Basin and extend west of the Virgin. They have been identified in several of the uplifts of the Great Basin area, particularly in the Virginia and Pine Nut ranges near the eastern base of the Sierra Nevada, associated with syenitic and other

plutonic rocks, and also in the west ranges of the Humboldt Mountains, notably at Star Mountain, rising to a height of 9000 feet and largely made up of Triassic strata.

Jurassic, and probably Triassic beds, highly folded, form a part of the western slope of the Sierra Nevada of California, and are the chief repositories of the gold-bearing veins and of the copper ores. With these beds the Cretaceous formations are not conformable. Thus the great uplift of the Sierra Nevada, and of many parallel ranges in the Great Basin, appear to have taken place at the close of the Jurassic period, introducing a great change in the topographical and physical conditions of the Continent.

The relations of the Mesozoic, in the Sierra Nevada, to the Paleozoic, have not been satisfactorily shown. The Carboniferous has been identified near Fort Reading by Trask, and in the Map the limestones of the range to the southward have been considered as belonging to that system. But of whatever age, they as well as other and apparently older strata, in a metamorphosed condition, are all conformable with the Mesozoic.

CENOZOIC.

Tertiary deposits over the western part of the Continent are found, in general, nearly coincident in geographical distribution with the Cretaceous, there being no break in the continuity of the deposits from below upwards. Along the Pacific border, the Eocene, Miocene, and Pliocene divisions have been recognized and are all of marine origin and attain a great thickness. They partake, in the Coast Mountains, of the plications of the Cretaceous, but are, in general, nearly horizontal along the base of the Sierra Nevada.

Between the Rocky Mountains and the Missouri River, on the Great Plains, extensive areas are covered with Tertiary beds through which the rivers have cut their way to the underlying Cretaceous. So also in the Green River basin, north of the Colorado plateau in Wyoming, there is a wide area covered with horizontal Tertiary deposits eroded by streams to a great depth. These are not only of marine origin but are mingled with brackish and fresh-water deposits which, as well as extended basins in the Tertiary of the Upper Missouri region, were deposited in shallow lakes partially or wholly shut off from the sea. These deposits in Wyoming overlie unconformably an earlier series of Eocene beds, characterized at the base by the general presence of workable seams of lignitic coal, found not only along the Rocky Mountains and in the Green River basin but in California and Oregon; thus showing that at the close of the Cretaceous epoch the greater part of this western area had emerged from the sea and was covered with a wide-spread luxuriant vegetation.

In coloring the Map no effort has been made to discriminate between these Tertiary formations of different periods. The yellow coloring is comprehensive, including all the sedimentary formations later than the Cretaceous, excepting, only, certain areas of alluvium and modern lacustrine deposits. It is to be particularly noted that in the region of the Great Basin, and in a portion of Montana, Idaho, and Oregon, this color represents not only the Tertiary but the most recent deposits washed down by rains and streams from the adjoining mountains, and spread out in gentle slopes.

The modern lacustrine deposits, to which reference has been made, constitute one of the most interesting records presented to us in the whole series of formations. They show the former extent of immense fresh-water lakes, now either wholly or partially dried up, leaving behind them floor-like beds of fine clay and well-marked terraces and water-lines. The largest of these ancient lakes may be designated as the Humboldt, the Timpanogos (of which the present Great Salt Lake is the remnant), the Tulare, and the Coahuilla, the last having occupied the long valley at the head of the Gulf of California now a desert.

VOLCANIC.

Lofty extinct volcanoes with enormous outpourings of lava form a striking feature of the geology of the western portion of the United States. The extent of the igneous outbursts is shown approximately by the vermilion coloring. The broadest area covered by lava is in the valley of the Columbia River, and of the Snake River in Oregon. The principal field extends in a nearly unbroken plain over five degrees of longitude and three of latitude. There is a continuous line of extinct cones and lava outflows along the Sierra Nevada of California, and the Cascade Range of Oregon, from latitude 36° to the northern boundary. A large part of the Cascade Range is made up of the outpourings of volcanoes, and at the gorge of the Columbia the superimposed lava beds attain a thickness of between 3000 and 4000 feet, resting upon horizontal Miocene or Pliocene deposits.

The interior region east of the Sierra Nevada is studded at intervals with extinct cones and lava streams, many of them looking as fresh as if they were now cooling. Some of the more important of the extinct volcanoes of the interior have poured floods of lava out over the Cretaceous and more recent formations of the Colorado plateau. Lava plains of great length and breadth are found along the Gila River and in New Mexico. Another great center of igneous action exists upon the head-waters of the Yellowstone and the Snake River, from which lava appears to have flowed throughout the whole length of the Snake River valley, joining the lava fields of the Columbia. The great geysers of the Yellowstone region show that thermal action has not yet wholly ceased, and similar evidences of volcanic heat are exhibited at intervals along the eastern base of the Sierra Nevada, and in the Coast Mountains of California.

GLACIERS AND EROSION.

There is no extensive drift formation corresponding to the great northern drift of the Eastern States, nor has there been such a wide-spread and deep erosion of the whole surface as that which scooped out the valleys of the great lakes and swept away a large portion of the Paleozoic strata from Maine to Alabama. The erosion of the western area has been comparatively local, being confined chiefly to river valleys, but is exhibited on a stupendous scale in all the mountain ranges, especially on the western slope of the Sierra Nevada, where transverse valleys have been cut out of the rocks to a depth of 3000 feet or more. Farther in the interior the Great Cañon of the Colorado is the grandest example known of river erosion, this stream having cut out a channel a mile or more in depth through the horizontal strata of all ages.

Enormous accumulations of bowlders and gravel deposited by streams are found upon the flanks of the Sierra Nevada, and are the chief repositories of the placer gold. The

deposits appear to be in part the result of ancient systems of drainage, and in part to be due to glacial action. The Sierra Nevada, the Cascades, and the high ranges of the Rocky Mountains have all been the theatre of enormous glaciation by local and wide-spread glaciers. These glaciers have left lateral and terminal moraines of great extent, particularly in the region above the Yosemite Valley, California, where the ice-sheet must have been of unusual thickness, and at the head-waters of Kern River about Mount Williamson. The effects of glaciers have been traced as far south as latitude 35°, and remnants of glaciers are still to be found in the deep and protected valleys of the higher mountains in California and Oregon, increasing in magnitude to the northward until, in Alaska, they are of magnificent proportions, filling broad valleys and descending to the sea-level.

The geology on the whole is much more intricate and complicated than at the east. The transitions from one formation to another are rapid and sudden. It is a region of great disturbance, of broken, irregular topography, of high mountains, deep valleys, and of great variety in climate, soil, and productions. The coast is precipitous and the good harbors are few. The chief geographical outlets from the interior are the Columbia River in the northwest, the Golden Gate at San Francisco, and the Colorado Valley on the south, leading to the Gulf of California; but this drains a comparatively inaccessible and barren region. Practically the outlet of the interior basin is by railway to San Francisco, all the longitudinal valleys north and south being tributary to one great east and west line. For the Rocky Mountain region, the Rio Grande and the valleys tributary to the Mississippi excavated in the later and yielding formations of the Secondary and Tertiary period, give the most direct and advantageous means of communication.

GEOLOGICAL MAPS AND PUBLICATIONS.

The sources of information from which we have drawn in the preparation of the Map are very various. The numerous reports of State Geological surveys have been freely used. Space does not permit a presentation of the full list of geological reports and other publications upon the geology of the Eastern States. As might be expected, the materials accessible have been found to be of very unequal value. In some of the States very satisfactory work has been done, and this has been properly recorded without difficulty; but the adjoining territory perhaps has not been examined, and it has been very difficult to continue the representations into the unknown region. Different authorities have not used the same classification, and it has been necessary to make divisions where the author has given a single color.

In the extreme west it has repeatedly been found impossible to locate recorded observations, from the fact that rivers or natural boundaries mentioned are not to be found on the maps. Again, the extent of formations is seldom so described as to permit of accuracy in plotting except at a single point. It would be well if our explorers should keep constantly in view the importance of so tracing out the boundaries of formations, and recording them on maps or sketches on a large scale, that they can be used in the preparation of reduced maps. Some of the exploring parties of late have been more interested in the science of palæontology than in structural geology, and while collecting fossils have failed to obtain information of the extent and distribution of formations.

The great work of geological exploration of the west (west of the 100th meridian), may be said to have fairly commenced in 1853, when geologists were appointed to accompany each of the Pacific Railroad explorations and the survey of the Mexican boundary. The results thus obtained form the basis of that portion of the map.

For the Upper Missouri and the Rocky Mountain region we are chiefly indebted to the labors of Prof. Hayden; for the northwestern boundary region, to the map of Prof. Bell; for the White Pine region in Nevada, to the Survey of the 40th parallel; for the Cañon of the Colorado, to Prof. Newberry and to J. W. Powell; and for the Uintah Mountains, to Prof. Marsh of the Yale Exploring Expeditions. These more recent contributions to our knowledge of the geology of the West have been supplemented by personal explorations.

The earliest publication of a general Geological Map of the United States was by Maclure in 1809, in a Memoir before the American Philosophical Society. It was separately published in a small volume in Philadelphia in 1817. The coloring does not extend westward beyond the mouth of the Kansas in the Missouri. He adopted the Wernerian classification—the Primitive, Transition, Secondary, and Alluvial.

Featherstonhaugh, in 1835, gave a colored geological section extending from the Atlantic Ocean across New Jersey, Delaware, Maryland and Virginia, through the Western States to Missouri, and thence southwestward to Texas.

Sir Charles Lyell, in 1845, published a Geological Map of the United States and Canada, compiled chiefly from the results of the State surveys. The coloring did not extend much beyond the meridian of 95°.

In 1853, Prof. Jules Marcou published a Geological Map of the United States and British Provinces of North America, with an explanatory text, geological sections, etc., and in October of the same year Prof. Edward Hitchcock published a Geological Map of the United States and Canada accompanying an "Outline of the Geology of the Globe and of the United States in particular."

Another map by Prof. Marcou appeared in Peterman's Journal in July 1855. It was presented at the May meeting of the Geological Society of France and was published in March 1856, and again in the Geology of North America in 1858.

Prof. W. B. Rogers, in 1855, compiled a map for A. Keith Johnston's Physical Atlas, published in 1856.

After the return of the Pacific Railway exploring expeditions in 1854-'55 a map of the region west of the 100th meridian was prepared by one of the writers. It was compiled in the Engineer's office, War Department, from the results of various surveys, and it was exhibited with explanations at the Albany meeting of the American Association in 1856, but it was never published. Shortly after, the map illustrating the General Geological Features of the country west of the Mississippi River, compiled from the surveys of W. H. Emory and from the Pacific Railroad Surveys and other sources, by Prof. James Hall assisted by J. P. Lesley, Esq., was published in the Report of the United States and Mexican Boundary Survey, 1857.

- 1806.—Abstracts of Public Documents relative to the late discoveries in exploring the Missouri, Red, and Washita Rivers. 8vo. Washington.
- 1809.—LEWIS and CLARKE.—The Travels of Capts. Lewis and Clarke; performed in 1804, 1805, and 1806. 2 vols, 8vo. Philadelphia.
- 1811.—PIKE, ZEBULON MONTGOMERY.—Exploratory Travels through the Western Territories of North America, in the years 1805, 1806, and 1807. 4to. London.
- 1823.—JAMES, EDWIN.—Account of an Expedition from Pittsburgh to the Rocky Mountains, in the years 1819 and 1820, under the command of Major Stephen H. Long. 2 vols, 8vo. Philadelphia.
- 1843.—NICOLLET, J. N.—Report intended to illustrate a map of the hydrographical basin of the Upper Mississippi River. 8vo. Washington.
- WIED, NEUWIED, MAXIMILIAN DE.—Voyage dans l'Interior de l'Amérique du Nord (1832, 1833, and 1834). 3 vols, 8vo, with a folio Atlas of Plates. Paris.
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THE GOLD AND SILVER MINES OF THE WEST.

BY PROF. ROSSITER W. RAYMOND, U. S. COMMISSIONER OF MINING STATISTICS.

THE most important event in the history of mining in the United States was the discovery of gold in California, which led to the rapid development, not only of a new industry, but of a new empire. The settlement of the Pacific slope was making but slow progress under the inducements of a scanty commerce in furs and hides. The liberal grants offered by the Government to agricultural pioneers in Oregon, had attracted to the Willamette Valley and other favored points in that Territory a limited population; but the government of the Mexicans in California was positively unfavorable to enterprise. It is true that gold was known to exist in the country. Rumors of it were current among the trappers, and placers had actually been worked in what is now Los Angeles county; but the *padres* of the neighboring mission of San Fernando had discouraged the business as demoralizing to their flocks; and the existence of the precious metal was not widely known. Still less was its distribution northward suspected. The discovery of gold, January 19, 1848, at Sutter's sawmill, on the south fork of the American River, afterward famous as Coloma, in Eldorado county, was the beginning of the new epoch. This discovery was made by James Wilson Marshall, a partner in the mill, who observed in the *débris*, washed down by the tail-race, a glittering fragment of a mineral unknown to him. Suspecting it to be gold, he sought for further specimens, and obtained, in the course of a few days, several ounces of it. Tests subsequently made established its character; and the news spread with great rapidity, arousing an excitement throughout this country, and even in European countries, which has never been paralleled. March 15, 1848, a San Francisco newspaper contained a paragraph giving the tidings. In May, the same paper announced the suspension of publication; and the editors and workmen, imitating their fellow-citizens of every class, went off to the diggings. Two years later, the population of California had risen from 15,000 to 100,000, and the gold-bearing zone extending along the west flank of the Sierra to Oregon, had been put under active exploitation. The placers of the southern Counties of Oregon were opened in 1852; those of the John Day and Powder rivers in 1860. Gold was discovered in Idaho, on the banks of the Pen D'Oreille River, in 1852; but the active development of the Territory dates from the discovery of the Oro Fino mines in 1860, and the opening, two or three years later, of the rich Boise Basin. Montana was found to be auriferous in 1858 (possibly earlier), and in 1860 placer-mining was inaugurated. In 1862, a considerable immigration from Pike's Peak (then the general name for Colorado) set in. The gulches of Colorado began to be worked in 1859; and that Territory was rapidly settled, chiefly by immigrants from the East—in contrast to Nevada, Idaho, Oregon, and Arizona, the pioneer population of which was largely an overflow of the restless enterprise of California. In Arizona, gold is said to have been discovered in 1858 on the Gila River. In Nevada and Utah, no gold placers of importance have been found, though the metal is not entirely absent from the mountain ravines, and in some instances, particularly at the Comstock lode, in Nevada, it constitutes a considerable portion of the value of argentiferous ores.

The first form of gold-mining in these States and Territories was that of diggings. The miner loosened the auriferous soil with a pick, and shoveled it into a pan, from which, by skillful manipulation in water, the clay, sand and pebbles were removed, and the heavier particles of gold-dust left behind. The first improvement on the pan was the rocker; afterward the "tom" was introduced, from Georgia, and with it the sluice. In 1850 and 1851 the two latter devices began to be generally employed, in consequence of the greater convenience of water-supply afforded by the mining ditches. The first ditch of importance was made in 1850; and its success so stimulated imitation that, in the course of eight years, six thousand miles of mining canals had been constructed, at a cost of more than \$15,000,000, in California alone.

The development of the gold-mining industry was attended with much excitement, and many fluctuations. A phenomenon more frequent in early days than at present was that of the "stampedes" or sudden migrations of whole communities, on receipt of tidings of rich discoveries in new localities.

Perhaps the most remarkable of these was the so-called Fraser fever in 1858, when, in the course of four months, 18,000 men, nearly one-sixth of all the voters in California, went to Fraser River in British Columbia, expecting to find another virgin gold-field and to restore the "flush times" of 1849. The excitement reached its climax before any gold had been received from the new diggings in San Francisco, and was founded wholly upon rumors and reports of rich deposits on a bar of Fraser River, and upon the presumption that large and valuable placers would be found in the upper basin of that stream. The first discoveries were made in the spring; and the fever died out as suddenly as it had arisen, five-sixths of the adventurers returning before the end of the year.

At the present time the resources of the Pacific States and Territories are sufficiently well known to prevent these miscellaneous and excited migrations of population. It is not likely that new deposits will be discovered, offering large returns to individual labor without capital or machinery. The present chief sources of the gold product of the West are three: first, old and well-known placer-mining regions, where the ground continues to be worked with sluices and to pay a reasonable profit to miners, who usually operate in partnerships and companies (as do the Chinese); secondly, deep placers and cement deposits, which are worked by drifting and blasting, and by the hydraulic process, usually in the hands of powerful and wealthy joint-stock companies; and thirdly, quartz mines, operated by individuals or companies.

The following table, offered as an approximate estimate of the gold product of the United States since 1847, is the result of a careful study of numerous treatises and partial statistics, in the light of much personal observation of the principal producing districts. Down to 1862 it follows the table compiled by J. Arthur Phillips, and published in his

"Gold and Silver." From 1862 to 1866 the production of California is calculated by deducting from the Express receipts of uncoined treasure at San Francisco from "the northern and southern mines," the receipts from Nevada, and adding 10 per cent to the remainder, to cover amounts shipped in private hands. From 1866 to 1873 inclusive the reports of the United States Mining Commissioner have been followed as a general authority; but as these do not separate the product of gold from that of silver, the division has been made by estimate, based on the known conditions and relations of the industry of different localities. Under the head of "Other States and Territories" is included the product of gold from Oregon, Washington, Idaho, Montana, Colorado, etc., and one-third the product of the Comstock lode in Nevada, that being the average proportion of gold by value in the Comstock bullion. The values are given in United States gold coin.

ESTIMATE OF GOLD PRODUCT OF THE UNITED STATES SINCE 1847.

Years.	California.	Other States and Territories.	Total.	Years.	California.	Other States and Territories.	Total.
1848	\$10,000,000		\$10,000,000	1862	\$34,700,000	\$ 4,500,000	\$39,200,000
1849	40,000,000		40,000,000	1863	30,000,000	10,000,000	40,000,000
1850	50,000,000		50,000,000	1864	26,600,000	19,500,000	46,100,000
1851	55,000,000		55,000,000	1865	28,500,000	24,725,000	53,225,000
1852	60,000,000		60,000,000	1866	25,500,000	28,000,000	53,500,000
1853	65,000,000		65,000,000	1867	25,000,000	26,725,000	51,725,000
1854	60,000,000		60,000,000	1868	22,000,000	26,000,000	48,000,000
1855	55,000,000		55,000,000	1869	22,500,000	27,000,000	49,500,000
1856	55,000,000		55,000,000	1870	25,000,000	25,000,000	50,000,000
1857	55,000,000		55,000,000	1871	20,000,000	23,500,000	43,500,000
1858	50,000,000		50,000,000	1872	19,000,000	17,000,000	36,000,000
1859	50,000,000		50,000,000	1873	18,000,000	17,000,000	36,000,000
1860	45,000,000	\$1,000,000	46,000,000				
1861	40,000,000	3,000,000	43,000,000	Total	\$986,800,000	\$252,950,000	\$1,239,750,000

Silver-mining in the West, apart from the early operations of the Spaniards in New Mexico and perhaps in Arizona, may be said to date from the discovery of the Comstock vein in 1859. This vein is in Nevada, on the east flank of the Sierra. According to some accounts, it was discovered as early as 1857, and the placer-diggings in the cañon below its outcrop were found as early as 1849 and worked by a small population from 1852. The gold contained a large proportion of silver, in some claims nearly one-half the value of it—a circumstance which was considered a misfortune by the miners, since it reduced the value per ounce of the gold-dust as currency from \$17 or \$18 to \$10 or \$12. In the vein itself the proportion of gold has usually been about one-third of the total value of the bullion. The revelation that the gray sulphuret of silver from the vein was a rich ore worth thousands of dollars per ton gave rise to perhaps the most intense excitement that has ever swept through the West, since the first discovery of gold. As usual in such cases, many older districts were suddenly depopulated and the mining industry was sadly demoralized. The State of Nevada was rapidly overrun by pioneers, and the silver districts of Esmeralda, Lander, and Humboldt counties, were explored and developed with an energy which proved in many cases premature. The Washoe excitement maintained for three years its predominance; but all the silver-mining enterprises of the State shared in the encouragement afforded by the first success of the mines of Virginia City. In 1863 the panic swept away some thousands of wild-cat speculations, and the Comstock mines themselves fell greatly in nominal value. A ruinous litigation, involving millions of dollars of expenditure, assisted this reaction. The discovery within the last three years of immense bodies of ore at the depth of more than 1500 feet below the surface in the Comstock lode, has brought the product of that vein to a figure not inferior to those of its best days. The silver-mining districts of Owyhee in Idaho, Unionville, Reese River, Belmont, Pioche, White Pine, and Eureka in Nevada, continue to be productive. The latter district and the silver districts of Utah and some of Montana and New Mexico, as well as that of Cerro Gordo in California, produce argentiferous galena and carbonate of lead, which are reduced by smelting in shaft furnaces. The Washoe ores and those of Pioche are treated by the so-called Washoe process, consisting of crushing in stamp-mills and subsequent amalgamation in pans. The ores of Reese River, Belmont, and Unionville in Nevada, and of Georgetown, Colorado, are treated by preliminary roasting with salt, and subsequent amalgamation. From Colorado and Utah considerable quantities of rich ore are shipped to American and foreign smelting works.

THE TOTAL PRODUCT OF SILVER IN THE UNITED STATES SINCE 1848 IS ESTIMATED AS FOLLOWS:

From 1848 to 1858 inclusive, \$50,000 per annum	\$550,000	1866	\$10,000,000
1859	100,000	1867	13,500,000
1860	150,000	1868	12,000,000
1861	2,000,000	1869	13,000,000
1862	4,500,000	1870	16,000,000
1863	8,500,000	1871	22,000,000
1864	11,000,000	1872	25,750,000
1865	11,250,000	1873	36,500,000
		Total	\$186,800,000

The mining districts of the Pacific Slope are generally ranged in parallel zones following the prevailing direction of mountain ranges. This generalization, first pointed out by Prof. Blake, has been more fully illustrated and connected with the geological history of the country by Mr. Clarence King, who says:

"The Pacific coast ranges upon the west carry quicksilver, tin, and chromic iron. The next belt is that of the Sierra Nevada and Oregon Cascades, which, upon their west slope, bear two zones, a foot-hill chain of copper mines, and a middle line of gold deposits. These gold veins and the resultant placer mines extend far into Alaska, characterized by the occurrence of gold in quartz, by a small amount of that metal which is entangled in iron sulphurets, and by occupying splits in the upturned metamorphic strata of the Jurassic age. Lying to the east of this zone, along the east base of the Sierras, and stretching southward into Mexico, is a chain of silver mines, containing comparatively little base metal, and frequently included in volcanic rocks. Through Middle Mexico, Arizona, Middle Nevada, and Central Idaho is another line of silver mines, mineralized with complicated association of the base metals, and more often occurring in older rocks. Through New Mexico, Utah, and Western Montana lies another zone of argentiferous galena lodes. To the east, again, the New Mexico, Colorado, Wyoming, and Montana gold belt is an extremely well-defined and continuous chain of deposits."

In my report as United States commissioner of mining statistics, rendered March, 1871, I remarked upon this subject as follows:

"These seven longitudinal zones or chains of mineral deposits must not, in my opinion, be held to constitute a complete classification. The belts of the Coast Range and the west slope of the Sierra are well-defined, both geologically and topographically; but it is not so easy to separate into distinct groups the occurrences of gold and silver east of the Sierra. For instance, the gold of Eastern Oregon, Idaho, and Western Montana, together with such occurrences in Nevada as those of the Silver Peak and New Pass districts, and numerous instances of sporadic occurrence of particular ores of silver or argentiferous base metals, cannot be brought within the classification above given. Either more zones must be recognized, or a greater mineralogical variety must be acknowledged in those already laid down. The latter alternative is, I think, the more reasonable. According to the principles set forth in a discussion of mineral deposits in my last report, it appears evident that the agencies which affect the general constitution of geological formations are far wider in their operation than those which cause the formation of fissures; and that the causes influencing the filling of fissures are still more local in their peculiarities than those which form the fissures themselves. Thus, of the area covered by rocks of a given epoch, more or less uniform in lithological character, only a small portion may have been exposed to conditions allowing deposits of useful minerals, even when such deposits are contemporaneous, as in the case of coal. Still more limited is the field for the formation of fissures; but it must be freely confessed that in the case before us, the corrugation of half the Continent into parallel mountain ranges offers good grounds for the expectation of vast longitudinal systems of fissures. When we come to consider the filling of these fissures, however, it is evident that the mineralogical character of the vein-material must vary, to some extent, as to the gangue, but to a still greater extent as to the nature of the ores. Even single mines, in the course of extensive exploitation, have produced ores differing as widely as do those of the different zones enumerated by Mr. King. I am, in fact, strongly inclined to consider freedom from base metals, for instance, a peculiarity due in many cases to secondary processes, and not to be relied upon as characteristic for single veins even, to say nothing of whole groups, districts, and Continental zones.

"Nevertheless, the generalizations of Prof. Blake and Mr. King on this subject are highly interesting and valuable. The criticism here made is not in opposition to their views so much as in qualification of a possible rash application on the part of the general public. The zonal parallelism does exist, though in a somewhat irregular way; and it is clearly referable, as these writers have shown, to the structural features of the country, the leading feature of which is the longitudinal trend of the mountain ranges.

"Subordinate to this trend (or, more strictly, resulting from the same causes as produced it) appear the predominant longitudinal strike of the great outcrops of sedimentary rocks, the longitudinal axes of granite outbursts, and, finally, the longitudinal vents of lava overflows and the arrangement of volcanoes in similar lines. It is evident that in crossing the country from east to west we traverse a series of different formations, while, by following routes parallel with the main mountain ranges, we travel upon the continuous outcrops of the same general age.

"The distribution of mineral deposits east of the Rocky Mountains follows somewhat different laws. Here we have but one longitudinal range—that of the Alleghanies, which is accompanied by a gold-bearing zone of irregular extent and value. In the Southern States the strata flanking this range present a remarkable variety of mineral deposits. On the eastern slope of the Rocky Mountains, again, occurs what may perhaps be denominated a zone or longitudinal series of coal-fields. But between these mountain boundaries the geological formations of the country cluster, as it were, around centers or basins. We have such a group in Michigan, another in the Middle States, and a third in the Southwest.

"The deposits of the different metals, ores, and useful minerals, in the country east of the Rocky Mountains, vary widely in age. The ores of gold, copper, and iron, in the pre-Silurian schists of the South; the galena and cobalt ores of the Southwest, and the copper

ores of Lake Superior, in the lower Silurian rocks; the argillaceous iron ores of New York, and other States west of New York, in the Upper Silurian, and the salines of the same group; the bitumen, salt, coal and iron ores of the Sub-carboniferous; the coal and iron of the Carboniferous; the coal, copper, and barytes of the Triassic; the lignites of the Cretaceous, and the fossil phosphates of the Tertiary period, are instances which may serve to show how great is this variety. It is not within the province of this report to discuss the mineral deposits of the Mississippi Basin, the Appalachian Chain, or the Atlantic Coast. I shall content myself with brief mention of two points. The first is the greater relative age of the metalliferous deposits as compared with those of the inland basin and the Pacific slope. On this side the period of greatest activity in such formations was over before it began in the West. The great gold and silver deposits beyond the Rocky Mountains appear to be post-Devonian, post-Jurassic, and even Tertiary in their origin. The vast volcanic activity which affected so wide an area in California, Oregon, Washington, Idaho, and Nevada, is not represented in the East.

"The other point is the peculiar relative position of our coal and iron deposits. This was eloquently described by Mr. Abram Hewitt, United States Commissioner to the Paris Exposition, in his admirable review of the iron and steel industry of the world. I cannot do better than quote his forcible words:

"The position of the Coal Measures of the United States suggests the idea of a gigantic bowl filled with treasure, the outer rim of which skirts along the Atlantic to the Gulf of Mexico, and thence, returning by the plains which lie at the eastern base of the Rocky Mountains, passes by the great lakes to the place of beginning, on the borders of Pennsylvania and New York. The rim of the basin is filled with exhaustless stores of iron ore of every variety, and of the best quality. In seeking the natural channels of water communication, whether on the north, east, south, or west, the coal must cut this metalliferous rim; and in its turn, the iron ore may be carried back to the coal, to be used in conjunction with the carboniferous ores, which are quite as abundant in the United States as they are in England, but hitherto have been left unwrought, in consequence of the cheaper rate of procuring the richer ores from the rim of the basin. Along the Atlantic slope, in the highland range, from the borders of the Hudson River to the State of Georgia, a distance of one thousand miles, is found the great magnetic range, traversing seven entire States in its length and course. Parallel with this, in the great limestone valley which lies along the margin of the coal-field, are the brown hematites, in such quantities at some points, especially in Virginia, Tennessee, and Alabama, as to fairly stagger the imagination. And finally, in the coal basin is a stratum of red fossiliferous ore, beginning in a comparatively thin seam in the State of New York, and terminating in the State of Alabama in a bed fifteen feet in thickness, over which the horseman may ride for more than one hundred miles. Beneath this bed, but still above water level, are to be found the coal-seams, exposed upon mountain sides, whose flanks are covered with magnificent timber, available either for mining purposes or the manufacture of charcoal iron, passing westward, in Arkansas and Missouri, is reached that wonderful range of red oxide of iron, which, in mountains rising hundreds of feet above the surface, or in beds beneath the soil, culminates at Lake Superior in deposits of ore which excite the wonder of all beholders; and returning thence to the Atlantic slope, in the Adirondacks of New York, is a vast, undeveloped region, watered by rivers whose beds are of iron, and traversed by mountains whose foundations are laid upon the same material. In and among the coal-beds themselves are found scattered deposits of hematite and fossiliferous ores, which by their proximity to the coal, have inaugurated the iron industry of our day. Upon these vast treasures the world may draw for its supply for centuries to come, and with these the inquirer may rest contented, without further question—for all the coal of the rest of the world might be deposited within this iron rim, and its square miles would not occupy one-quarter of the coal area of the United States.'

"This vivid description rests upon a geographical rather than a geological grouping. But it is none the less intimately connected with the underlying geological facts. Its strongest application is, however, economical. If any material thing may stand as the type of force, it is coal, the deposits of which may well be called vast storehouses of power—the product of solar activity through uncounted years—laid up for the use of man; and iron, on the other hand, may symbolize the inert, dead matter, awaiting the touch of power to wake it into efficient life. These are prime elements in our universe of industry. Take them away and our present civilization is annihilated. Put them together in the hand of an intelligent and mighty nation, and that nation could recall the world from the chaos of barbarism. But they need each other; and it is in the wonderful combination of both, as well as the exhaustless abundance of each, that America finds sure promise of enduring power.

"Thus East and West bear witness of our great inheritance of natural wealth. Every period of geological change has been laid under contribution to endow with rich legacies some portion of our land. Our territory epitomizes the processes of all time, and their useful results to man. Divided, yet in a stronger sense united, by mountain chains and mighty rivers, our diversified mineral resources may figuratively represent, as I firmly believe they will literally help to secure and maintain, our characteristic national life—a vast community of communities, incapable alike of dissolution and of centralization; one, by mutual needs and affections, as the Continent is one; many, by multiform industries and forms of life, as the members of the Continent are many."

THE COAL MEASURES OF THE UNITED STATES.

[PLATES XI and XII.]

BY PROF. C. H. HITCHCOCK, HANOVER, N. H.

THE observations made by American Geologists establish the fact of a fourfold division of the Carboniferous series, viz.: 1. The lowest, sandstones and conglomerates known as the Waverly sandstones of Ohio, Marshall, Napoleon, and Michigan groups of Michigan, Catskill of New York, the Vespertine of Pennsylvania, the Knobstone of Kentucky, etc. 2. Mississippi group, or Carboniferous or Mountain limestone. This is supposed to be the equivalent of the Umbral red shales of Pennsylvania and Virginia. 3. Millstone grit, or a series of sandstones and conglomerates, the Seral of Pennsylvania and Virginia, the Conglomerate of Ohio, etc. 4. The Coal Measures. It is from this upper division that the chief supply of our coal is derived. In some regions there are said to be good workable beds below the Millstone grit; and in such cases they are included in the lower division upon the map.

There is considerable diversity of opinion in respect to the minute subdivision of the Coal Measures. Hence, the map will show only a division in two parts, the upper and lower. The line of demarcation in the Appalachian basin is the Pittsburgh bed or its supposed equivalent. In the Illinois and Missouri basins the dividing line cannot be synchronized with the same horizon, but the division is a natural one.

A glance at the map shows the coal to be grouped in the following natural basins. It will be interesting to compare these Coal Measure areas with the limits of the entire Carboniferous System as given in the General Geological Map of the United States.

- New England Basin.*
- Anthracite Basins of Pennsylvania.*
- Appalachian Coal Field.*
- Michigan Basin.*
- Illinois Basin.*
- Missouri Basin.*
- Texas Coal Field.*

THE NEW ENGLAND BASIN.

This lies in Massachusetts and Rhode Island and is estimated to cover 750 sq. m. The coal is a plumbaginous anthracite, used to advantage in some smelting furnaces. Perhaps eleven different beds exist; and as seen at the Aquidneck Mine, Portsmouth, R. I., their maximum thickness is 23 feet. In a sketch of the Rhode Island part of the field, printed in the Proceedings of the American Association for the Advancement of Science for 1860, I estimated the whole thickness of the Coal Measures at 6,500 feet, and the Coal Measures proper at 2,500 feet. According to Lesquereux the plants from this field correspond with those of the Salem and Mammoth Anthracite and the lower Freeport Bituminous beds in Pennsylvania.

THE ANTHRACITE BASINS OF PENNSYLVANIA.

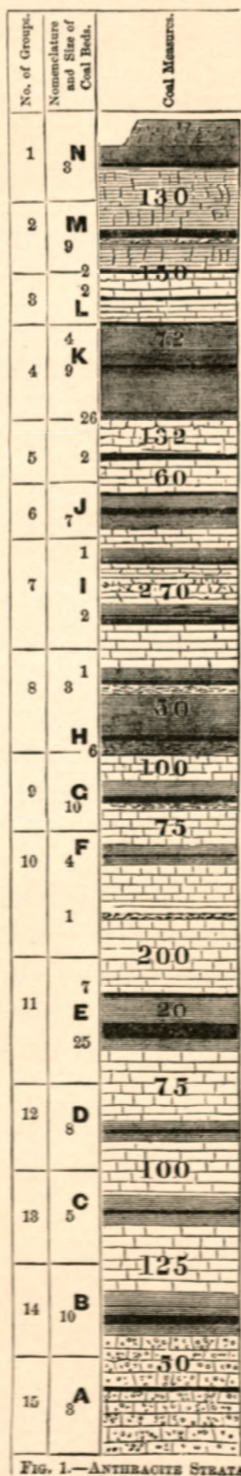
The statistics prove these to be the most important in the country, yet they occupy a very insignificant space upon the map. They are usually divided into three groups,

	Square Miles.
The first, Southern or Schuylkill Basin and Mine Hill,	146
The second, Middle or Shamokin, 50; Mahanoy, 41; and Lehigh Basins, 37,	128
The third, Northern, or Wyoming and Lackawanna Basin,	198
	472

The first and second of these basins are shown upon an enlarged scale near the bottom of the map. [Plate XII.]

Originally these basins must have formed part of a single coal field, which by later elevating forces has been extensively folded, the character of the coal changed from bituminous to anthracite, and the strata broken into fragments through fractures and erosion. This is shown by the similarity in number, succession and thickness of the beds of coal in the several parts; also by the constancy of the character of the conglomerate forming the floor of the Coal Measures.

Fig. 1 is a section of the coal strata at Pottsville, Pa., made by Daddow and Bannan. We are under obligations to D. Appleton and Co. of New York, for the privilege of copying it from their electrotype in James Macfarlane's treatise upon The Coal Regions of America. A, the lowest bed, is not worked. B, or the Buck Mountain, is a very important bed, 25 to 30 feet thick at Plymouth, and in some of the Lehigh basins. The third seam, C, is not usually workable. D, the Skidmore or Wharton, is from 6 to 12 feet thick, and valuable. E is the Mammoth, the largest and best of all the anthracite coal-beds, from 12 to 70 feet thick; but its best size is about 30 feet, as in the Lehigh basins, producing more coal than when at its maximum size. In parts of the Mahanoy basin it is 70 or 80 feet thick. This bed is said to correspond with the upper bed of the lower bituminous coal measures. F is supposed to be the equivalent of the small seams in the barren measures, and G, or the Primrose, may represent the Pittsburgh and Cumberland beds in the Appalachian Field. The upper anthracite beds above H may correspond to the Redstone, Sewickly, and Waynesburg beds in other Sections.



The obtaining of exact information respecting the amount of coal in any basin is at present impracticable. If we know the area in square miles and the thickness of the beds along a given section, the multiplication of the area by the thickness should give the precise number of cubic feet in the field; but the beds vary so much that all such estimates must be regarded only as approximate. The estimates that follow are those based upon the best attainable information.

Prof. H. D. Rogers reports that the first Coal Field contains an average thickness of 100 feet of coal, and that the second and third carry about 60 feet; the general average of all three coming to about 70 feet. Daddow and Bannan enumerate 14 beds at Pottsville, having the maximum thickness of 205 and the minimum of 60 feet; while the accompanying strata vary from 2,175 to 820 feet in thickness. There is no end to the details respecting the anthracite basins which are contained in the Geology of Pennsylvania, by H. D. Rogers, 1858; Coal, Wood, and Oil, by S. H. Daddow and Benj. Bannan, 1866; and the Coal Regions of America, by James Macfarlane, 1873.

APPALACHIAN COAL FIELD.

This basin comprises 59,105 sq. m. and is situated in the States of Pennsylvania, Maryland, Ohio, West Virginia, Virginia, Kentucky, Tennessee, Georgia, and Alabama. Reckoning by States, the areas are distributed as follows:

	Square Miles
Pennsylvania (H. D. Rogers),	12,302
Maryland (P. T. Tyson),	550
Ohio (J. S. Newberry),	10,000
West Virginia and Virginia (W. B. Rogers),	16,000
Kentucky (Joseph Lesley),	8,983
Tennessee (James M. Safford),	5,100
Georgia (H. D. Rogers),	170
Alabama, rough estimate from map,	6,000

Several peculiarities in the structure of this basin are suggested by an inspection of the map. 1. It is much broader over its northern area, contracts through Tennessee and Northern Alabama, but expands considerably at its termination in Alabama, though by no means to such an extent as in West Virginia and Ohio. 2. The peculiar basin structure is best seen in the northern half; while the upper measures are wholly wanting south of West Virginia, save a minute portion in Alabama. 3. Considered in connection with its elevation above the sea, nearly the whole of the Appalachian Coal area is an elevated plateau, 2,000 feet above the sea in Tennessee, the principal depression lying along the Ohio River below Pittsburgh. 4. The northern and western edges have suffered greatly from denudation. The smallness of the scale prevents the perfect representation of this outline, but the numerous isolated patches in Northern Pennsylvania, which were once connected together, indicate forcibly the immense amount of loss this basin has sustained. The absence of much of this raggedness along the eastern border illustrates the fact of the operation of different forces in that region. There have been extensive upthrows and downthrows along the eastern border, shown on the map in the narrow band of older rocks in southeastern Kentucky. Perhaps on account of these oscillations of level the coal has disappeared from immense areas in Virginia, Tennessee, Georgia, and Alabama. The narrow lines of lower Carboniferous rocks in Virginia, on the General Geological Map [Plate XI], may indicate the former eastern extent of the coal there. 5. The basin is subdivided by minor undulations which are of the greatest consequence in the location of mines. Much remains to be done in tracing out these folds; but I will mention those that are well known. They are the most marked in Pennsylvania, where they are eight in number. First is the small Broad Top basin. The extent of this and the other sub-basins can be best comprehended by referring to the General Geological Map, where the lower Carboniferous rocks are not separated from the Coal Measures. The second is the Cumberland basin of Maryland. Though connected directly with a projection from the great basin to the west, it is not quite certain that the connection is through the upper division. But there is a distinct anticlinal axis along the angle of the bend, separating the second from the third basin. The third basin, commonly called the First in Geological treatises, commences with the small area east of Williamsport, known as Mahoopeny mountain passes somewhat south of west toward Snowshoe and then southwesterly into Maryland, being divided again by the ridge lying partly in Pennsylvania and partly in Maryland. The fourth basin begins with the Barclay and McIntyre regions, passes to the small patches in the great bend of the north branch of the Susquehanna and continues up the west branch. This basin may be traced southwesterly to the east of the long pink ridge called Laurel Hill, and upon it are situated the figures 244 in Pennsylvania, and 90 in West Virginia. The fifth basin commences at Blossburgh, may be traced by undulations of the lower strata to connect with a much shorter spur from the main basin and passes down to the southwest side of the Laurel Hill Range into West Virginia. The sixth basin cannot be traced by names upon our map, but it commences on the Tioga River in New York, crosses the P. and E. R. R. three miles above Emporium, and terminates at the Kiskiminetas River two and one half miles from its mouth. The seventh basin commences with the Smethport outlier, passes to Ridgway and crosses the Alleghany just above the great bend between the large letters E and N on the map, pointing towards Pittsburgh. The eighth basin is said to occupy the rest of the Coal Measures lying to the west of those enumerated. These undulations have not yet been identified in West Virginia and Kentucky. Possibly the anticlinal axis at the Kanawha salines may correspond with the Laurel Hill ridge spoken of above. Their distinctness in the north may be explained by the seemingly greater exposure there to the plicating forces.

The Ohio River runs through the most depressed portion of the whole basin. It may be remarked that a very narrow exposure of the lower measures follows the Ohio both at the northern and southern limits of the upper group. This is occasioned by the river erosion.

In Tennessee an anticlinal axis divides the area into two basins. Its course is indicated by the extension northeasterly from Alabama of the narrow white strip west of the Tennessee River.

In Alabama there are four basins. First is the *Coosa* field, the long narrow strip crossing the Coosa River, with the small area nearly reaching to the Georgia line. Second, the *Cahawba*, a narrow club-shaped area, extending farthest south of any. This is supposed to be on the same line with the long trough terminating at Chattanooga. Third, is the eastern border of the great expanse to the northwest known as the *Black Warrior* field, and connecting with the eastern basin in Tennessee. Fourth, the balance of the coal in Alabama may be comprised in one basin. The dips are highly inclined to the east in the first basin, but show less evidences of elevation and disturbance in proceeding northwesterly. These facts are compiled from statements furnished by R. P. Rothwell and J. M. Safford.

A few details concerning the character of the Coal Measures in different parts of the Appalachian Field now to be presented, will illustrate their subdivision minutely, as well as the amount of coal present.

H. D. ROGERS' SYSTEM OF COAL MEASURES OF PENNSYLVANIA FROM MERCER TO GREENE COUNTIES.

Table with 3 columns: No., Feet., and description for ALLEGHANY RIVER. I.—LOWER COAL MEASURES.

Table with 3 columns: No., Feet., and description for PITTSBURGH REGION. II.—BARREN MEASURES.

Table with 3 columns: No., Feet., and description for MONONGAHELA RIVER. III.—UPPER COAL MEASURES.

Table with 3 columns: No., Feet., and description for WASHINGTON AND GREENE COUNTIES. IV.—UPPER BARREN GROUP.

Table with 3 columns: No., Feet., and description for WASHINGTON AND GREENE COUNTIES. IV.—UPPER BARREN GROUP.

COMPARISON OF UPPER COALS, BY J. J. STEVENSON.

Table comparing coal measures between OHIO, PENNSYLVANIA, and WEST VIRGINIA.

TENNESSEE COALS.

Through the kindness of Prof. J. M. Safford we are enabled to present further details of the distribution of the coal-beds in Tennessee in the small map annexed.

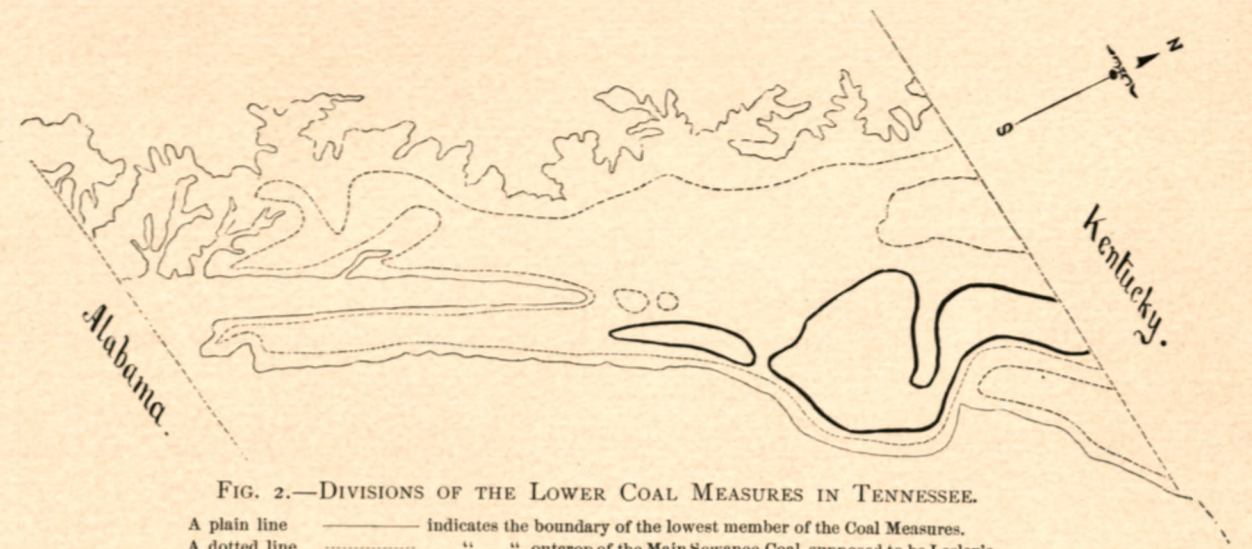


FIG. 2.—DIVISIONS OF THE LOWER COAL MEASURES IN TENNESSEE.

Legend for Figure 2: A plain line indicates the boundary of the lowest member of the Coal Measures. A dotted line indicates the outcrop of the Main Sewanee Coal, supposed to be Lesley's bed B of Pennsylvania. A broad line indicates the upper part of the Lower Coal Measures.

The outline of the Coal Measures is indicated by a simple line, and it will be found to correspond essentially with the delineation upon our map. Within this is a dotted line agreeing with the outcrop of the main Sewanee coal.

THE MICHIGAN BASIN.

The Michigan Basin has an area of 6,700 square miles, with 123 feet of measures, and eleven feet (maximum) of coal. In the center the coal is thickest, thinning out to nearly the thickness of paper around the edges.

THE ILLINOIS BASIN.

The Coal Measures of the Illinois Basin occupy about 47,188 square miles, in the States of Illinois, Indiana, and Kentucky. Some authors think the beds of coal in this basin are the equivalents of corresponding ones in the Appalachian field.

Dr. J. S. Newberry shows conclusively that the Silurian rocks in Southern Ohio constituted a mountainous ridge long before the Carboniferous era, and thinks it clear that the coals could never have been united in Ohio.

In this field the beds of coal are not so thick as in the Appalachian, though their number is about the same. The thickness of the measures is also greatly reduced, while the limestones are more abundant, thus giving evidence of different conditions of formation.

Indiana.—The measures in this State occupy 6,500 square miles, contain twelve beds of coal with an aggregate thickness of 40 feet above the millstone grit, according to Prof. Cox's Section.

The western zone is by far the most extensive, and the coals are of good quality and considerable thickness. The irregular outlines of these divisions were specially furnished us for our map by Prof. Cox.

SECTION OF THE COAL MEASURES IN OHIO, BY J. S. NEWBERRY.

Table with 3 columns: No., Feet., and description for OHIO SECTION. I.—LOWER COAL MEASURES.

Table with 3 columns: No., Feet., and description for OHIO SECTION. UPPER COAL MEASURES.

Table with 3 columns: No., Feet., and description for OHIO SECTION. UPPER COAL MEASURES.

WEST VIRGINIA SECTION, BY W. B. ROGERS. ABRIDGED.

Table with 3 columns: No., Feet., and description for WEST VIRGINIA SECTION. LOWER COAL GROUP.

Table with 3 columns: No., Feet., and description for WEST VIRGINIA SECTION. LOWER COAL GROUP.

Table with 3 columns: No., Feet., and description for WEST VIRGINIA SECTION. UPPER COAL GROUP.

CONNECTED SECTION OF THE COAL MEASURES IN INDIANA, BY E. T. COX.

LOWER PART.		UPPER PART.	
	ft. in.		ft. in.
Shales and thin Coal.....	2	Coal J.....	2
Measures.....	47	Measures.....	17 7
Coal A.....	3	Coal K.....	5
Measures.....	20	Measures.....	40
Coal B.....	2	Coal X.....	4
Millstone Grit.....	265 3	Measures.....	49
Coal F, third block.....	4	Coal L.....	8
Measures.....	23 6	Measures.....	41
Coal G, second block.....	4	Coal M.....	6
Measures.....	17	Measures.....	31 3
Coal H.....	1 6	Coal N.....	4 6
Measures.....	13	Measures.....	45
Coal I, main block.....	4 4		
Measures.....	16	Total feet.....	659 5

Illinois.—The measures in this State occupy 36,800 square miles, are 600 feet thick, and contain ten beds of coal with an aggregate thickness of 38 feet. The workable coals belong to the lower division. In the section the beds are numbered from below upward.

LOWER SERIES.

No. 1 ranges from two to three feet in thickness.
 No. 2 ranges from two to five.
 No. 3 ranges from three to four feet, and is local in its development.
 No. 4 has been seen only at Cuba, where it is four and one-half feet thick.
 No. 5 is almost universally developed, and is extensively worked. It varies from three to nine feet in thickness.
 No. 6 is much like 5 in its development and valuable qualities, varying from three to seven feet in thickness.
 The five seams of the upper series range from a few inches to two feet in thickness, and are of scarcely any practical value. The limits of the upper part were furnished specially for the map by A. H. Worthen, State Geologist.

Usually a coal basin displays its lowest beds upon all sides, and the lower measures extend beneath the upper, with greater thickness in the middle. The Illinois basin shows certain peculiarities in its structure varying from the normal type. It may be seen partly by reference to the smaller general map. At the south end the underlying strata are of Carboniferous age, just older than the Coal Measures to the north in Illinois; these are outcrops of the Devonian and Silurian, the lower members of the latter system adjoining the Carboniferous on the north side of the field. The upper Coal Measures rest upon Silurian rocks in Northern Illinois instead of the lower Coal series. It would appear, therefore, that there must have been a gradual sinking of the land to the north during the age of the Coal Measures, and the newer beds have been brought successively into direct contact with much older formations. Our map exhibits the lower division upon the east and west sides of the upper, but not on the north. There is a somewhat similar state of things in Western Kentucky.

Kentucky.—In Western Kentucky this field occupies 3,888 square miles, according to Major S. S. Lyon's survey. A revision of the vertical column, by E. T. Cox, makes the measures 612 feet thick, including the millstone grit. There seem to be nine beds of coal in this area, having the following thicknesses respectively, commencing with the lowest, two, four, three, two-and-a-half, five, two-and-a-half, five, two, and three feet; making 29 feet in all. The reports of Kentucky need to be studied with great care, since they were prepared before the discovery of serious errors in their sections. Several of the beds are repeated in consequence of the presence of a fault on the Ohio River near Henderson, and hence the number of beds are given in the reports as twice their proper number. Our map shows the boundaries of the lower division, as given by S. S. Lyon expressly for us, while the line of the upper measures has been drawn by a comparison of the statements in the reports with the facts sent in for Illinois and Indiana. We shall soon have reliable maps of this State from the Survey now in progress under the direction of Prof. N. S. Shaler.

THE MISSOURI BASIN.

This is the largest of all the Coal Fields of the country in territorial expanse, amounting to 84,343 square miles, though thinner and with fewer beds of coal than the Appalachian. The lower division occupies all the eastern border, while the higher portions are situated upon the western side and pass beneath Permo-Carboniferous, and Cretaceous strata. The territory has been very little studied.

Iowa.—The Coal Measures of Iowa are divided by Prof. C. A. White, State Geologist, into three parts, each about 200 feet in thickness. The area of the lowest division is 6,100 square miles, of the middle, 3,400, and of the upper, 8,500, in all 18,000. The lowest is the most important for producing coal, and occupies the eastern border of the tract, as shown upon our map. The middle and lower divisions are grouped together as the lower member upon our map.

LOWER DIVISION.		UPPER DIVISION, WINTERSSET SECTION.	
Nos.	Thickness, ft. in.	Nos.	ft. in.
1-3	Shales, limestones, etc.....	17-32	Shales, sandstones, limestones.....
4	Coal, Lacona.....	33	Coal, Marshall.....
5-7	Sandstones and shales.....	34-41	Shales, etc.....
8	Coal, Pandora.....	42	Coal, Lyonsdale.....
9-18	Shales, etc.....	43, 44	Shales.....
16	Coal, Wheeler.....	2-5	Limestone, etc.....
		6	Coal.....
		7-16	Limestones, clays, carbonaceous shales, etc.....

As the lower divisions extend beneath the higher, it is probable that the whole 18,000 square miles are to be regarded as workable territory.

Missouri.—According to G. C. Brodhead, State Geologist, the Coal Measures cover an area of about 23,100 square miles in Missouri. He divides the series into three parts, as in Iowa—the upper, or barren measures, occupying 8,406, the middle 2,000, and the lower 12,420 square miles. Upon our map the middle and lower divisions of Brodhead are called the lower member, and upon the map the attempt has been made to make others correspond in distribution with the corresponding members in Iowa.

The aggregate thickness of the upper division is 137 feet, including about four feet of coal in two seams of one foot each, and a few streaks. The middle division is 324 feet thick with seven feet of coal, including two workable seams of 21 and 24 inches, a third of one foot worked under favorable circumstances, besides six seams of extreme thinness. The lower division is from 250 to 300 feet thick, embracing five workable beds, varying from one-and-one-half to four-and-one-half feet each in thickness, and thin seams between six and eleven inches, besides unimportant streaks—in all, 13 ft. 6 in. The total thickness is therefore near 1900 feet of Coal Measures and 24 ft. 6 in. of coal.

The following is a condensed vertical section of the Coal Measures, as drawn up by the State Geologist, only the numbers of the strata are reversed so as to make this conform to the list already given for other States.

LOWER DIVISION.		
No.	Thickness.	Locality.
1 (32)	Coal, clay 10 inches at base.....	Ralls, Audrain, St. Louis, St. Charles and Montgomery, Henry and Johnson.
2	Measures.....	Macon, Henry, and Johnson.
3	Coal.....	Macon.
4	Measures.....	Randolph, Boone, Callaway, Johnson, Henry, Vernon, Bates, Adair, Sullivan, Putnam, Audrain, and Macon.
5	Coal.....	Henry.
6	Measures.....	Johnson.
7	Coal.....	Johnson.
8	Measures.....	Johnson.
9	Coal.....	Johnson, Henry, Chariton.
10	Measures.....	
11	Coal.....	
12	Measures.....	
13	Coal.....	
14	Measures.....	
15	Coal.....	
MIDDLE DIVISION.		
16	Measures.....	Lafayette, Johnson, Carroll, and Livingston.
17	Coal.....	
18	Measures.....	Lafayette and Ray.
19	Coal.....	
20	Measures.....	Lafayette, Johnson, and Ray.
21	Coal.....	
22	Measures.....	Cass, Johnson, Lafayette, Livingston, Grundy.
23	Coal.....	
24	Measures.....	Pleasant Hill, Missouri City, and Princeton, Mercer County.
25	Coal.....	
26 (7)	Measures.....	
UPPER DIVISION.		
27	Coal.....	Platte County.
28	Measures.....	
29	Coal.....	Andrew, Buchanan, DeKalb, Gentry, Platte.
30	Measures.....	
31	Coal.....	Holt, W. part of Nodaway and northwardly.
32 (1)	Measures.....	

Nebraska.—The area marked Carboniferous in this State, upon Dr. Hayden's map, measures about 3,600 square miles. The outcrops belong entirely to the upper of the three divisions of Iowa and Missouri; all geologists agree that it is not likely to afford any good workable beds of coal. Beds of the thickness of six, eleven, fifteen, and twenty-two inches, are reported from different counties. The coal is usually inferior, but may be used in the neighborhood to some advantage in the absence of all other fuel, but good workable coals are yet to be discovered in Nebraska. They may yet be found at considerable depths.

Kansas.—Prof. Swallow estimates the area occupied by the Coal Measures in Kansas at 17,000 square miles. The same three divisions occur here as in Iowa and Missouri, but we have not the means of separating them upon the map. The rocks dip slightly to the northeast, and consequently the upper unproductive division is the one most largely developed.

The elaborate section of the Coal Measures given by Prof. Swallow shows 22 different seams of coal, varying from a few inches to seven feet in thickness. Ten are over a foot thick. The measures amount to 2000 feet in thickness, being made up of more than 80 different seams of limestone.

SUMMARY OF SWALLOW'S SECTION IN ASCENDING ORDER.

No.	Thickness.
1	Lower Carboniferous Formation.....
2	Lower Coal series, contains 24 layers, five beds coal.....
3	Fort Scott Marble series, 7 layers, coal bed 2 ft. 6 in.....
4	Fort Scott series, 12 layers, two coal seams, 6 in. and 16 in.....
5	Pawnee limestone series, 9 layers, 6 inches coal.....
6	Marais de Cygne coal series, 25 layers, 4 seams coal.....
7	Well rock series, 11 layers, coal 1 to 5 inches.....
8	Spring rock series, 9 layers, two seams coal, 6 in. to 1 foot, and 4 to 8 inches.....
9	Cave rock series.....
10	Stanton limestone series, 5 layers, coal 12 to 30 inches.....
11	Chocolate limestone series, 10 layers.....
12	Upper Coal Measures, 56 layers, 3 seams coal, 1 to 3 and 4 to 10 inches.....

Indian Territory.—The Coal Measures are made to cover as much as 13,600 square miles upon the map. Little is known of the coal outcrops. The officers of the Missouri, Kansas, and Texas R. R. Company find good banks of coal at several places along their line several feet thick.

Arkansas.—There are two beds of coal in Arkansas beneath the millstone grit, according to D. D. Owen and Lesquereux. They are each four or five feet in thickness. Owen estimates the area occupied by the coal-bearing rocks in this State at 12,000 square miles. Macfarlane states it to be 9,043 square miles.

TEXAS BASIN.

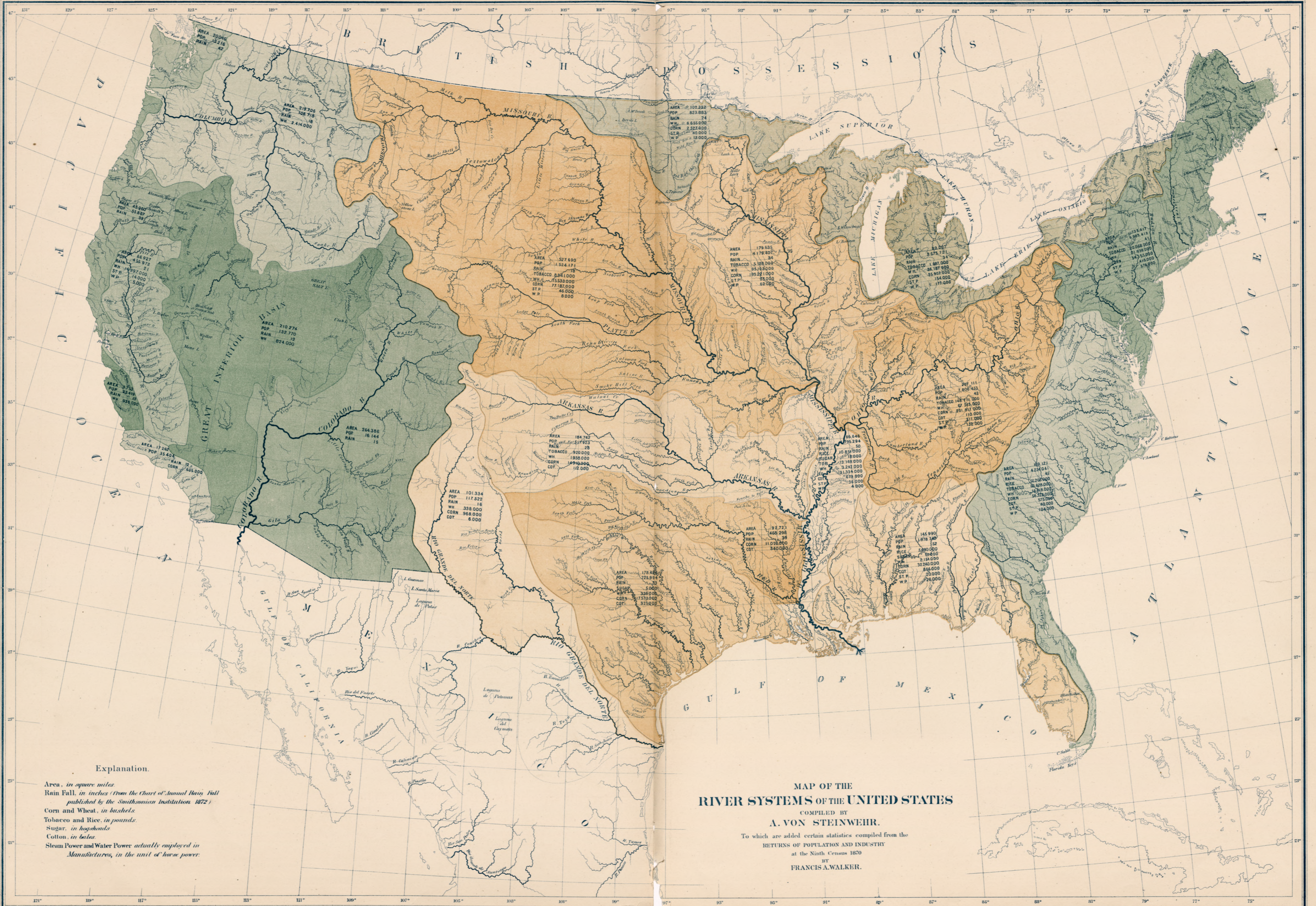
According to A. R. Roessler in the "Almanac," the measures occupy 6,000 square miles in this State. Our map is copied from one furnished by him. B. F. Shumard estimates the thickness of the measures at 300 feet. S. B. Buckley says there are from two to four seams of coal at Fort Belknap, and six miles further north another five feet thick. This field may be the continuation of the Missouri, as the space between them, along the valley of Red River, is occupied by newer and overlying formations.

Arizona.—Near Camp Apache, Mr. G. K. Gilbert of the expedition under the direction of Lieut. G. M. Wheeler, reports a bed of coal belonging to the true Carboniferous series. Two other examples are mentioned by Prof. Blake.

TRIASSIC COAL.

The map does not extend far enough west to allow of the delineation of Rocky Mountain areas underlain by beds of lignite. The outcrops of a later coal are shown in Virginia and North Carolina. The best known is the Chesterfield County field near Richmond, Va., estimated at 185 square miles. Coal was mined here before the opening of collieries in any other part of the country. The thickness of the beds vary, the largest being at the Creek Pit, where 52 feet of clear coal are contained in a thickness of 58 feet. The two other Triassic areas in Virginia are not known to contain beds of coal. The most southern one in North Carolina is known as the Deep River Basin, containing 5 beds, having a thickness of three, one, three, two, and four feet respectively. It is known to be 30 miles in length with a width of 12 to 14 miles. The other is the Dan River field, about 40 miles in length and from four to seven miles wide. The coals are less promising than in the other field.

There are other Triassic areas in the field of the map, but they are not represented, as no coal of any consequence is known to occur in them.



Explanation.

- Area, in square miles.
- Rain Fall, in inches (From the Chart of Annual Rain, Fall published by the Smithsonian Institution, 1872)
- Corn and Wheat, in bushels.
- Tobacco and Rice, in pounds.
- Sugar, in hogheads.
- Cotton, in bales.
- Steam Power and Water Power actually employed in Manufactures, in the unit of horse power.

**MAP OF THE
RIVER SYSTEMS OF THE UNITED STATES**
COMPILED BY
A. VON STEINWEHR.
To which are added certain statistics compiled from the
RETURNS OF POPULATION AND INDUSTRY
at the Ninth Census 1870
BY
FRANCIS A. WALKER.

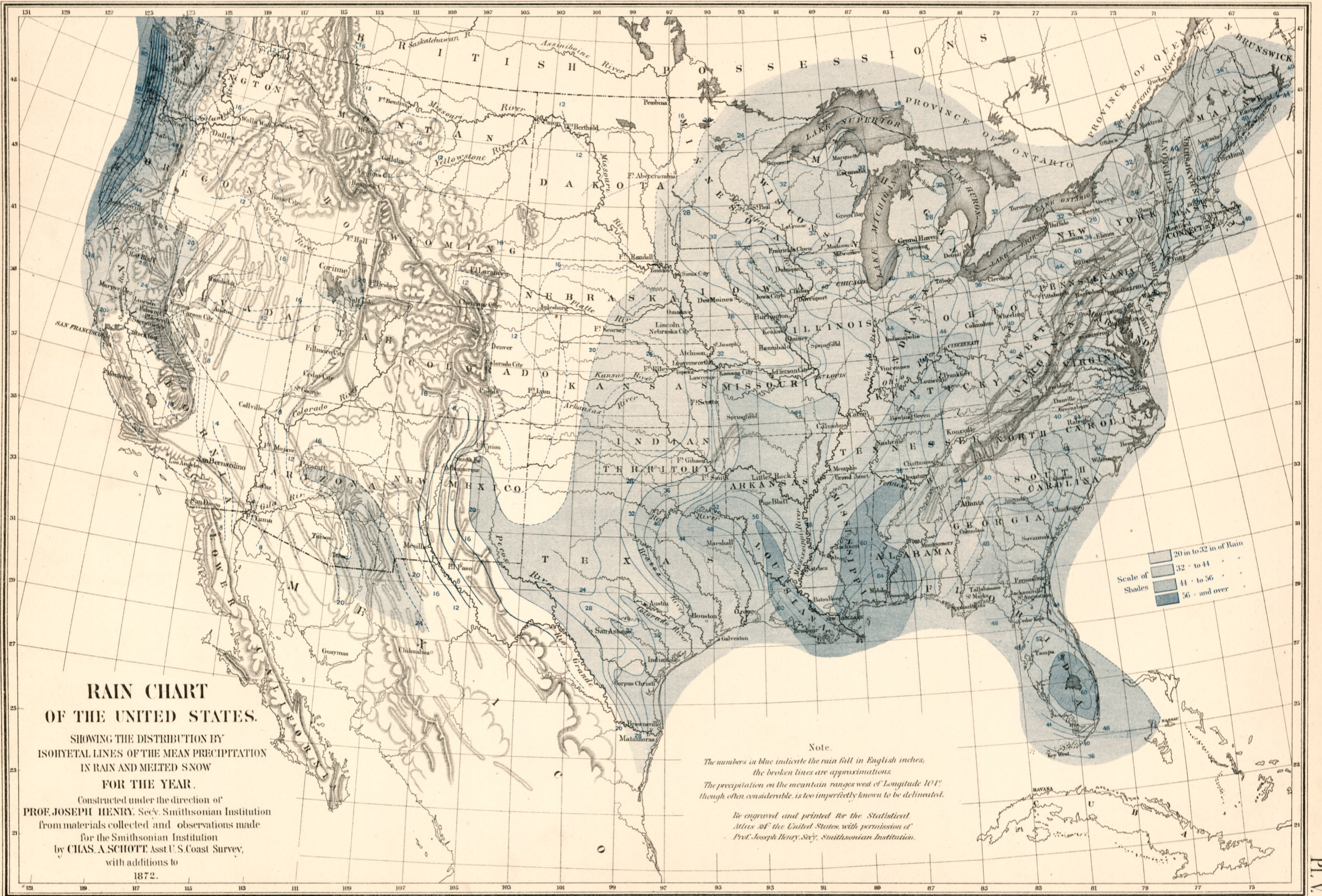


SCALE.

Under 40 acres to the Sq. Mile

I	Under 40
II	40 - 120
III	120 - 240
IV	240 - 360
V	360 - 560
	560 and over

MAP
 SHOWING IN FIVE DEGREES OF DENSITY
 THE DISTRIBUTION OF
WOODLAND
 WITHIN THE TERRITORY OF THE
 UNITED STATES.
 1873.
 Compiled by
 W^m H. BREWER.



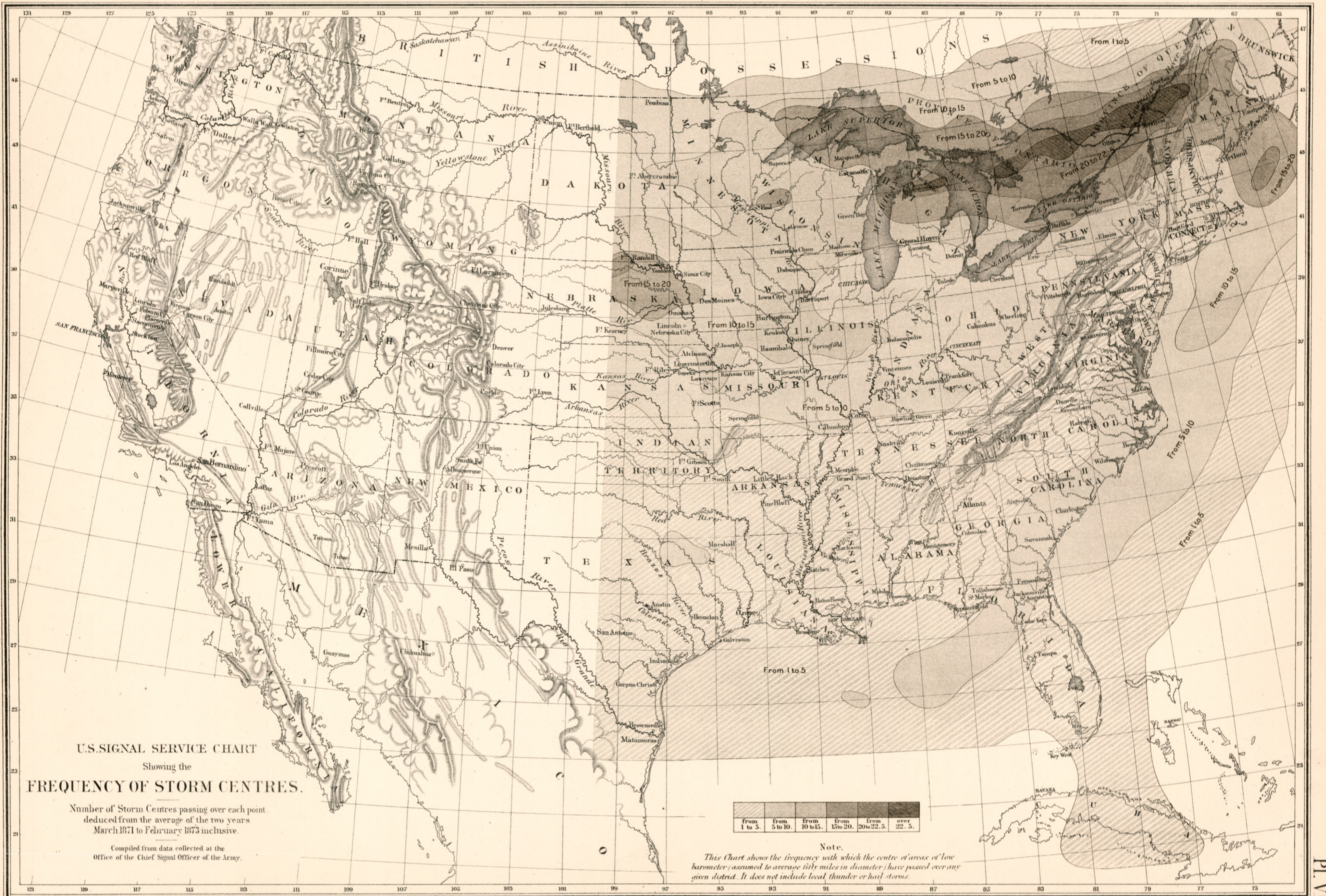
**RAIN CHART
OF THE UNITED STATES.**

SHOWING THE DISTRIBUTION BY
ISOHYETAL LINES OF THE MEAN PRECIPITATION
IN RAIN AND MELTED SNOW
FOR THE YEAR.

Constructed under the direction of
PROF. JOSEPH HENRY, Secy. Smithsonian Institution
from materials collected and observations made
for the Smithsonian Institution
by **CHAS. A. SCHOTT**, Asst. U.S. Coast Survey,
with additions to
1872.

Note.
The numbers in blue indicate the rain fall in English inches,
the broken lines are approximations.
The precipitation on the mountain ranges west of Longitude 101°
though often considerable, is too imperfectly known to be delineated.

Engraved and printed for the Statistical
Atlas of the United States, with permission of
Prof. Joseph Henry, Secy. Smithsonian Institution.



U.S. SIGNAL SERVICE CHART
 Showing the
FREQUENCY OF STORM CENTRES.

Number of Storm Centres passing over each point
 deduced from the average of the two years
 March 1871 to February 1873 inclusive.

Compiled from data collected at the
 Office of the Chief Signal Officer of the Army.

From 1 to 5.	From 5 to 10.	From 10 to 15.	From 15 to 20.	From 20 to 22.5.	From 22.5 to 25.
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Note.
 This Chart shows the frequency with which the centre of areas of low
 barometer (assumed to average fifty miles in diameter) have passed over any
 given district. It does not include local thunder or hail storms.

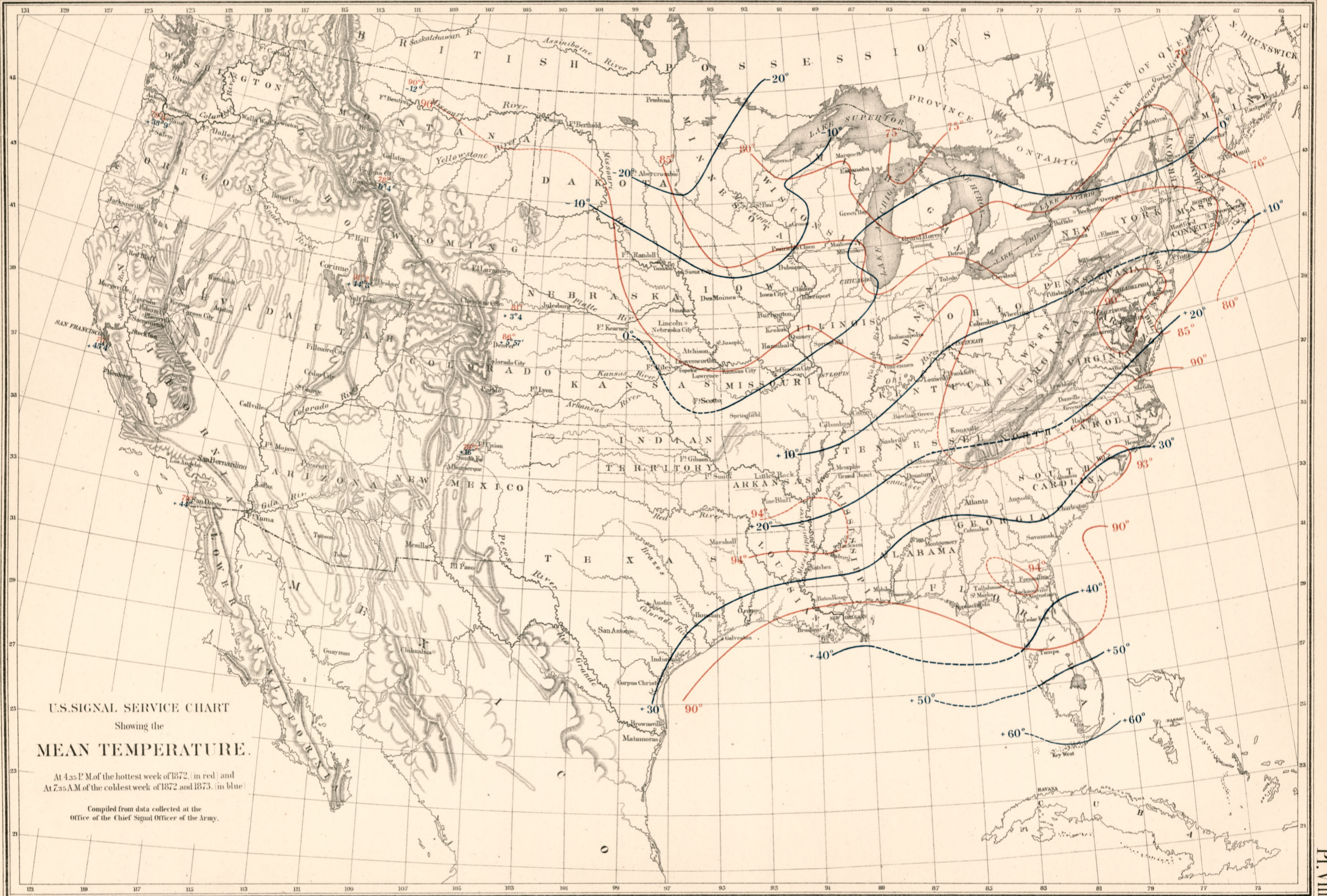


**TEMPERATURE CHART
OF THE UNITED STATES.**

SHOWING THE DISTRIBUTION
BY ISOTHERMAL LINES OF THE MEAN TEMPERATURE
FOR THE YEAR.

Constructed under the direction of
PROF. JOSEPH HENRY Secy. Smithsonian Institution
by **CHAS. A. SCHOTT**, Asst. U.S. Coast Survey,
in October, 1872.

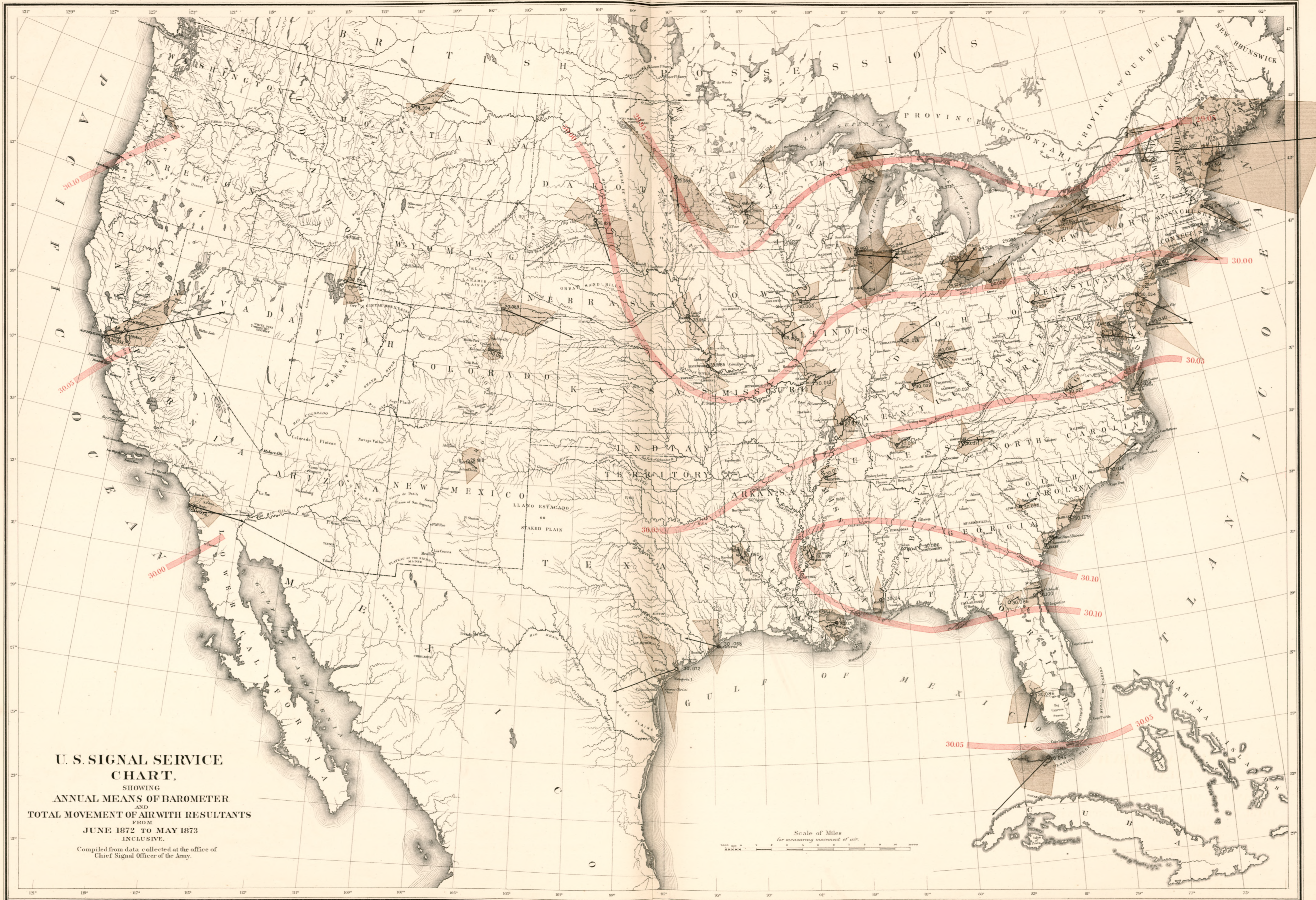
*Engraved and printed for the Statistical
Atlas of the United States, with permission of
Prof. Joseph Henry, Secy. Smithsonian Institution.*



U.S. SIGNAL SERVICE CHART
 Showing the
MEAN TEMPERATURE.

At 4.35 P.M. of the hottest week of 1872. (in red) and
 At 7.35 A.M. of the coldest week of 1872. and 1873. (in blue)

Compiled from data collected at the
 Office of the Chief Signal Officer of the Army.



**U. S. SIGNAL SERVICE
CHART.**
SHOWING
ANNUAL MEANS OF BAROMETER
AND
TOTAL MOVEMENT OF AIR WITH RESULTANTS
FROM
JUNE 1872 TO MAY 1873
INCLUSIVE.
Compiled from data collected at the office of
Chief Signal Officer of the Army.

Scale of Miles
for measuring movement of air.

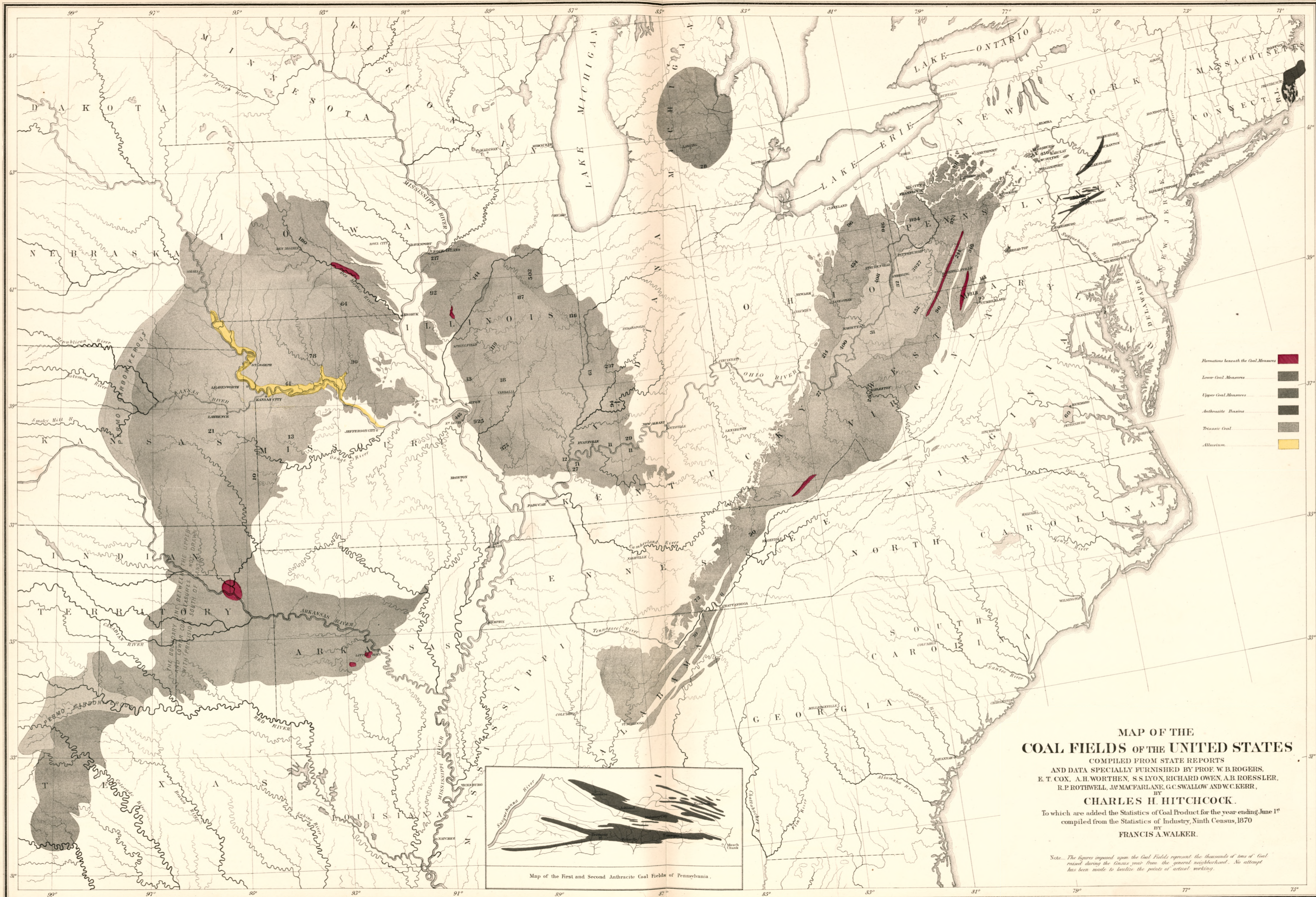


HYPOMETRIC SKETCH OF THE UNITED STATES.

*The level curves of 400 and 800 feet of Elevation constructed by A. Gingot.
 The level curves of 2000, 4000 and 8000 feet of Elevation
 constructed by Chas. A. Schott, Ass't U.S. Coast Survey.*

Reproduced from the "Vital Statistics" Ninth Census, 1870.

Shore line from the Coast Survey, mountains from Government Surveys.



**MAP OF THE
COAL FIELDS OF THE UNITED STATES**

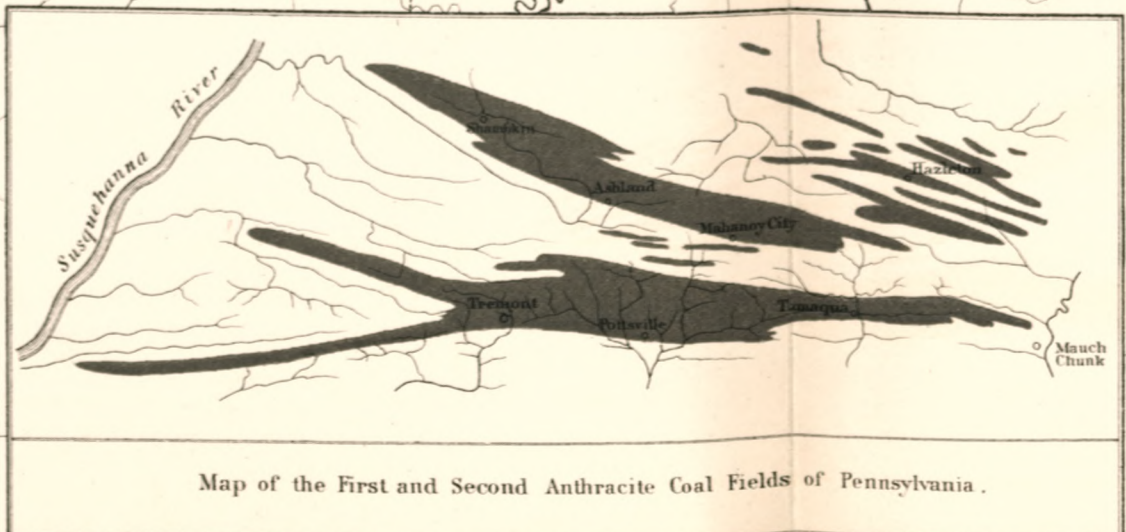
COMPILED FROM STATE REPORTS
AND DATA SPECIALLY FURNISHED BY PROF. W. B. ROGERS,
E. T. COX, A. H. WORTHEN, S. S. LYON, RICHARD OWEN, A. B. ROESSLER,
R. P. ROTHWELL, J. MACFARLANE, G. C. SWALLOW AND W. C. KERR,
BY

CHARLES H. HITCHCOCK.

To which are added the Statistics of Coal Product for the year ending June 1st
compiled from the Statistics of Industry, Ninth Census, 1870

BY
FRANCIS A. WALKER.

Note.—The figures imposed upon the Coal Fields represent the thousands of tons of Coal raised during the Census year from the general neighborhood. No attempt has been made to localize the points of actual working.



Map of the First and Second Anthracite Coal Fields of Pennsylvania.



EXPLANATION OF COLORS.

- EOZOIC
- CAMBRIAN AND SILURIAN
- DEVONIAN
- CARBONIFEROUS AND PERMIAN
- TRIASSIC AND JURASSIC
- CRETACEOUS
- TERTIARY
- ALLUVIUM
- VOLCANIC

Note: There may be some Metamorphic Paleozoic formations included in the Atlantic portion of the Eozoic. In the western portion the Metamorphic Mesozoic formations are only partially separated from it. The Paleozoic System and the Cenozoic System are not subdivided west of 100° W. Long Greenwich except in the case of a few Post tertiary lacustrine areas and deltas.

**GEOLOGICAL MAP
OF THE
UNITED STATES**

COMPILED BY
C. H. HITCHCOCK AND W. P. BLAKE

from sources mentioned in the text.

1874.

Lith. by J. Bien N.Y.

AREAS AND POLITICAL DIVISIONS OF THE UNITED STATES 1776—1874.

BY S. W. STOCKING, UNITED STATES PATENT OFFICE.

[PLATE XV.]

THE Area Map [Plate XV.] and this explanatory text with tables are an amplification of the Area Map and "Historical Notes" in Volume I. of the Ninth Census of the United States [1870]. The map is intended to display the areal changes occasioned by successive political boundaries during the era of States. Upon it extensive tracts of territory including more than an existing State or Territory, and also the present States or Territories, are designated by name, and minor parcels are distinguished by letter.

The matter explanatory of the map consists of—1st. An alphabetical list (pp. 3 to 6) of existent and obsolete civil divisions. Under the name of each existing civil division, is placed a brief description of each parcel of land which contributes to its present area. Here the parcels are specified by their letters on the map. 2d. A Table (pp. 8 to 9) showing the original extent and subsequent areal changes of each political division, and the transfers, among such divisions of each parcel of territory smaller than the political division of which it is now a part. Here, also, the parcels are designated by the letters which they bear upon the map. By the combined use of this table and the map any reader can easily reconstitute the States and Territories as they were at any one of the numerous dates indicated, and by means of tracing-paper, draw in a few minutes a map of the United States which shall be true and precise for the date taken. 3d. A Table (p. 7) presenting area and population, together with average density of settlement at the successive censuses.

The area of the United States in its original extent and its subsequent accessions, though represented on the map in colored masses, with names and dates, yet requires a more precise and ample presentation. To this the remainder of the text is devoted.

A map, dated A. D. 1776, covering territory co-extensive with the United States A. D. 1874, presents these features: At the northeast, but south of the River St. Lawrence, Massachusetts begins with the former Sagadahoc territory and province of Maine, continues over its present area to New York, while, westward of Pennsylvania, broadening from the latitude of its present southern boundary to that of Lake Winnepiseogee in New Hampshire, it reaches a western limit on the River Mississippi. New York has its present area, and north of Massachusetts has a boundary on New Hampshire, which extends between New York and the northeastern spur of Massachusetts. Rhode Island appears as on the maps of to-day. Connecticut has its present area, while beyond Pennsylvania it extends to the River Mississippi. Pennsylvania has no corner, as now, between New York and Lake Erie. New Jersey, Delaware, and Maryland present forms familiar to modern maps. Virginia reaches over to the Mississippi river and northward to the western territory of Connecticut. North Carolina and Georgia, in full width, and South Carolina, in a narrow belt, enfold the land to the common western river. On the south of Georgia, peninsular East Florida trends westward to the River Appalachicola, and West Florida asserts a disputed northern limit at the parallel of the mouth of the Yazoo river in the westland of Georgia. Quebec, reaching southward over the southern trapping grounds of the Hudson's Bay Company and over the western lands of Massachusetts, Connecticut, and Virginia, claims to cover the whole territory between the Ohio and Mississippi rivers and the great lakes. Between the Mississippi river and the Stony Mountains, lies Louisiana, a Spanish dependency. Beyond to the Pacific stretches the vast expanse of the older Spanish America. And at the extreme northwest, there points towards the opposing continent a peninsula whose forbidding coast has been hitherto but a few times visited by European navigators.

The British dependencies which thus occupied the land east of the Mississippi—the Floridas and Quebec excepted—by the acts of their delegates in Congress (1776) became the original Thirteen States. In the next year (November 15, 1777) their Congress, as a basis of a general government, adopted Articles of Confederation. The first of these Articles reads, "The style of this Confederacy shall be the United States of America." The Articles were referred to the several States for their approval. The different views respecting the unsettled lands at the west were the chief hindrance to the ratification of the Articles and the completion of the Confederacy. Each State carefully claimed the largest extent of soil and jurisdiction which its most favorable charter or the most liberal construction of acts of discovery and exploration could be made to comprehend. The doctrine was maintained that each State succeeded to royal rights and domain within its limits; and that right of soil and jurisdiction so vested in the State could not, against its will, be deported to any Confederacy. Hence the seven States having extensive claims to western lands tenaciously resisted any attempt to restrict their boundaries in behalf of the Confederacy, while the six States whose areas had precise limitation and small extent from the eastern sea-coast, as earnestly insisted that, as the unoccupied west must be conquered or defended from inroad by the joint efforts and at the common expense of all, so it should be possessed by the general government for the common welfare. The immediate result of the controversy appears in two provisions of the Articles of Confederation. One asserts that "each State retains its sovereignty, freedom and independence, and every power, jurisdiction, and right" not expressly delegated to the United States; and another, after prescribing a court and procedure for the settlement of areal and other disputes between States, concludes with, "Provided, also, that no State shall be deprived of territory for the benefit of the United States." These provisions were unsatisfactory to

the States having small areas, and their approvals to the Articles were given singly and with reluctance. Maryland, sturdily asserting her right in common with all other States to a share in the western lands, at last stood alone in dissent. Then Congress, by Resolutions (September 6 and October 10, 1780), urged upon the States the policy of surrendering to the United States a portion of their unoccupied western territory, and asserted the conditions which should bind the Confederacy on the acceptance of such cessions. These, briefly stated, were guarantees that the ceded lands should be used for the common benefit, and when peopled should be divided into republican States to be admitted into the Confederacy on an equality with its original States. Thereupon New York, Connecticut, and Virginia offered to cede their western lands, and upon this evidence that there would be a western public domain, Maryland authorized its delegates in Congress to sign the Articles of Confederation, which they did on the day of the first (New York) cession, and by their signatures completed the Confederacy.

[The States ratified the Articles of Confederation by the signatures of their delegates in Congress, in the following order: In 1778; July 9, Massachusetts Bay, Rhode Island and Providence Plantations, Connecticut, New York, Virginia, and South Carolina; July 21, North Carolina; July 22, Pennsylvania; July 24, Georgia; August 8, New Hampshire; November 26, New Jersey. In 1779; February 12, and May 5, Delaware; and finally in 1781, March 1, Maryland.]

As these authorized cessions were not then made, other States held warily to their unsettled wilds. Again and again Congress, first by an address to the States (April 18, 1783), afterward by a Resolution (April 29, 1784), urged territorial concessions as a source of common revenue, a removal of jurisdictional and other disputes, and a means for promoting and perpetuating the harmony and unity of the States. One after another the States made their cessions until Georgia (1802) made the final response to the appeal.

[The prominent details of these cessions may be presented chronologically as follows:

New York authorized a cession in February 1780, and executed it March 1, 1781. It was renewed by deed April 19, 1785. The claims ceded were titles acquired by treaties with the Six Nations of Indians and covered the whole territory from the lower of the Great Lakes southward across the valley of the River Ohio as far as the Cumberland Mountains. October 29, 1782, the cession was accepted by the United States.

Virginia offered to cede, by Act of January 2, 1781. Congress, by Act of September 13, 1783, agreed to accept the cession as offered. Thereupon Virginia, by Act of October 20, 1783, authorized its delegates in Congress to complete the transfer, which was done by deed, March 1, 1784. The deed conveyed all the title and claims of the State of Virginia to territory northwest of the River Ohio. Virginia, by virtue of conquests of her militia, asserted title as far north as Lakes Erie and Michigan, but due recognition of the ancient charter boundary of the colony of Connecticut, places the northern limit of the cession on the forty-first parallel of north latitude and permits it to comprise only those parts of the States of Ohio, Indiana, and Illinois, situated south of that parallel. In this cession there was reserved to the State of Virginia, as military bounty lands for her soldiery, both in the militia and in the Continental line, the entire territory (6,570 square miles) in the present State of Ohio, and between the Scioto and Little Miami rivers from their sources to the River Ohio.

Massachusetts, November 13, 1784, authorized a cession by her delegates in Congress. April 18, 1875, Congress agreed to accept the cession, and April 19, 1785, it was executed. It included all title of the State of Massachusetts to territory west of the present western boundary of the State of New York, and covered the land from the State of Pennsylvania to the Mississippi river, and giving the full extent of the first charter of the colony, between the latitude of the southern boundary of the western extremity of the present State of Massachusetts and the latitude of a league north of the inflow of Lake Winnepiseogee in the State of New Hampshire.

Connecticut, October 10, 1780, having offered to cede with restrictions which were unsatisfactory to the United States, on the second Thursday of May, 1786, again authorized a cession. May 26, 1786, Congress expressed readiness to accept the cession as proposed; and September 14, 1786, the cession was accomplished by the execution of a deed and its acceptance by Congress. This cession embraced the soil and jurisdiction of the territory east of the River Mississippi between the latitudinal parallels of 41° and 42° 2', and west of a meridian one hundred and twenty miles west of the present western limit of the State of Pennsylvania. Connecticut, by Act of October, 1797, authorized the release to the United States of jurisdiction over the land between the eastern boundary of her former cession and the present western boundary of the State of Pennsylvania. This transfer was consummated May 30, 1800. The State retained the right of soil in the same territory, which, lying in the present State of Ohio between 41° and 42° 2', and reaching from the western boundary of the State of Pennsylvania westward one hundred and twenty miles, has ever since been known as "The Western Reserve of Connecticut." In 1792 the State conveyed five hundred thousand acres in the western part of this reserve to certain of its citizens as compensation for their property destroyed by fire and pillage during the Revolution. September 9, 1795, the State alienated the remainder of this Reserve for one million and two hundred thousand dollars. This sum was appropriated as a fund whose annual interest is pledged to the support of schools.

South Carolina, August 19, 1787, by her delegates in Congress, authorized by a previous act of the State Legislature, executed a deed of cession, and April 2, 1790, Congress accepted the deed. It conveyed an oblong parcel of land from twelve to fourteen miles in width and now forming the northernmost portions of the States of Georgia, Alabama, and Mississippi.

North Carolina, December 22, 1789, by Act, authorized a cession. Pursuant to that Act, the Senators of the State in Congress executed a deed of cession, which the United States accepted by Act of April 2, 1790. The deed conveyed the area of the present State of Tennessee.

Georgia, February 5, 1788, by Act, authorized its delegates in Congress to cede to the United States substantially that territory of the former British Province of West Florida which projects north of the 31st parallel of north latitude. Congress, by Resolution of July 15, 1788, rejected this proposed cession. April 7, 1798, Congress, by Act, authorized a Commission to meet a like Commission from the State of Georgia empowered to treat concerning the conflicting territorial claims of the Confederacy and the State. By Act of May 10, 1800, Congress authorized the Commissioners on the part of the United States to finally settle the controversy and pass cessions. April 24, 1802, by Articles of agreement and cession entered into by these commissioners, Georgia ceded to the United States her claims to the whole territory between her present western boundary, shortened at its northern end by twelve to fourteen miles (the western limit of T' on the map), and the River Mississippi; while the United States ceded to Georgia that part of the cession by South Carolina to the United States which lies east of the present western boundary of Georgia (T). These Articles were ratified by the State of Georgia, June 16, 1802.

This agreement included, among others, provisions for—1st, payment, out of proceeds from the sale of land in the cession, of \$1,250,000 to the State of Georgia as a reimbursement of its expenses in relation to the territory ceded; 2d, the appropriation of 500,000 acres, or the proceeds of at most that quantity of land, to satisfy the claims against the land of the cession; and 3d, extinguishment of the Indian title to specified parts of the cession. It resulted that the United States, in addition to the cession to Georgia, paid not far from \$3,000,000 for this cession from Georgia.]

The Original Public Land of the United States.—The Confederacy asserted jurisdiction over all of that portion of the present territory of the United States east of the Mississippi river from the present British possessions on the north to Florida on the south. The con-

cessions from the States to the Confederacy, which have been described, divided this region into two distinctive portions: one along the coast, whose soil was vested in the thirteen States in severalty; another, inland, whose soil and exclusive jurisdiction were possessed by the Confederacy. These State and Federal domains were separated by an irregular line along the present western boundaries of the States of New York, Pennsylvania, West Virginia, North Carolina and Georgia. Westward of this line, and separated into two parcels by the territory of the present State of Kentucky, lay the original public domain of the young Confederacy, comprising 406,952 square miles, while the aggregate area of the thirteen States was but 420,892 square miles.

The Original Territorial Government.—Plans for the erection of governments on this domain, early engaged the attention of the Congress of the Confederacy. Coincident with the cession by Virginia, Jefferson, its delegate in Congress, anticipating prompt cessions from the remaining States, reported from a committee a plan of government for the whole public territory. This plan required seventeen new States, each covering about two degrees of latitude, arranged in two tiers separated by meridians, each tier containing eight States, the seventeenth State to be east of the eastern tier and between the Ohio River and the western boundary of Pennsylvania. The report included the famous proviso that "after the year 1800, there shall be neither slavery nor involuntary servitude in any of the said States other than in the punishment of crimes, whereof the party shall have been duly convicted." When the proviso was put to vote three States were unrepresented. Three, Maryland, Virginia and South Carolina, voted nay—North Carolina was divided. The four New England States, with New York and Pennsylvania, voted aye. Failing to receive the additional vote necessary to complete a majority, the proviso was stricken out of the report, which was thereupon adopted. This ordinance was in no instance applied in erection of a government.

Again (July 13, 1787), soon after the region northwest of the River Ohio had been transferred to the Confederacy by the cessions of New York, Virginia, Massachusetts and Connecticut, another ordinance was enacted, erecting "The territory northwest of the River Ohio." To this ordinance were appended six articles, the last of which provided for the future formation, on the land within the Territory, of not less than three nor more than five States, as follows: the western State, between the Mississippi, Ohio, and Wabash Rivers and a north line from Port Vincent on the latter river to British territory; the middle State, between the last recited line, the Ohio River and a north line from the mouth of the Great Miami to the border line; the eastern State, between the last described line, the Ohio River, the State of Pennsylvania and the national boundary. Authority was reserved to create two States in that part of the territory north of the latitudinal parallel of the southern extremity of Lake Michigan. It will be noticed that the meridional boundaries between those projected States which were plotted on the River Ohio now separate the States of Illinois, Indiana and Ohio, while the northern part of the original Territory has included the entire States of Michigan and Wisconsin, and furnished a part of the territory of the State of Minnesota.

Article VI. of the Ordinance of 1787 was as follows: "There shall be neither slavery nor involuntary servitude in the said territory, otherwise than in punishment of crimes, whereof the party shall have been duly convicted: Provided always that any person escaping into the same, from whom labor or service is lawfully claimed, in any one of the original States, such fugitive may be lawfully reclaimed and conveyed to the person claiming his or her labor or service as aforesaid." This inhibition of slavery, save that it was immediate, is in the very terms of the defeated proviso in the first or Jeffersonian project. At the submission of this ordinance to vote, eight States were represented in Congress and all voted for the measure. The passage of the Article was possibly secured by the appension of the proviso respecting the return of fugitives from slavery and by the tacit understanding that slavery would be permitted in the public domain south of the Ohio River.

Original Area of the United States.—Meanwhile, and prior to the last two of the cessions by the States, the independence of the States forming the Confederacy had been recognized by Great Britain in the Provisional Treaty of Peace signed at Paris, November 30, 1782, and in the definitive Treaty of Peace between Great Britain and the United States concluded at Paris, September 3, 1783. By the second Article of the Treaty, the boundaries of the territory of the United States were declared.

[In substance they ran from the mouth of the St. Croix River to its head and thence "due north from the source of the St. Croix River to the Highlands; along the said Highlands which divide those rivers that empty themselves into the River St. Lawrence from those which fall into the Atlantic Ocean, to the northwesternmost head of the Connecticut River," and down that river to and westward along the forty-fifth parallel, to and along the middle of the Ontario, Erie, Huron, Superior, and Long Lakes and their water connections "to the most northwestern point of the Lake of the Woods, and thence on a due west course to the River Mississippi," thence down the middle of that river to and along the thirty-first parallel, to and along the middle of the River Appalachicola to its junction with the Flint River, and thence straight to the head of and down the River St. Mary's to the Atlantic Ocean, and included all islands within twenty leagues of the Atlantic coast.]

The western and southern boundaries of this original area of the United States were confirmed by treaty with Spain, the contiguous owner, October 27, 1795. The northern line was the subject of protracted and difficult negotiations with Great Britain. The Treaty of London, November 19, 1794, included provisions for determining the River St. Croix and its source, and the source of the Mississippi River. By Treaty of Ghent, December 24, 1814, three Commissions were authorized: one to settle title to islands off the coast of Maine; another, to determine the boundary from the source of the River St. Croix to the River St. Lawrence; and a third, to lay the line from the River St. Lawrence to the western point of Lake Huron, and also, as a separate duty, thence to the most northwestern water of the Lake of the Woods. The first Commission, November 24, 1807, awarded Moore, Dudley and Frederick islands to the United States and all other islands in Passamaquoddy Bay, and also the Isle of Grand Menan to Great Britain. The third Commission defined their portion of the boundary line in their decision dated at Utica, New York, June 18, 1822. The second Commission failed to agree, and after repeated attempts, all disputes affecting this boundary of the Treaty of 1783 were adjusted by the Webster-Ashburton Treaty of Washington, August 9, 1842, where may be found the present line from the Atlantic Ocean to the St. Lawrence River, and from the western terminus of the work of the Utica Commission, to the westernmost water of the Lake of the Woods, and thence—confirming the Treaty of October 20, 1818—due south to the forty-ninth parallel.

It will be seen that the United States commenced its career as an acknowledged government with the landed area which it now possesses east of the River Mississippi and north of the State of Florida, and, westward of that State, north of the thirty-first parallel, being an extent of 827,844 square miles.

The Union of the United States of America.—The States having found their Confederacy too feeble for the exigencies of a protracted war for independence, provided "a more perfect union" by adopting (September 17, 1787), in the Congress of the Confederacy, the Constitution of the United States, with provisions for its submission to the several States for ratification by conventions to be called by the Legislatures and chosen by the people in each State. The last ratification was secured within three years of the adoption of the Constitution by Congress, when the Union consisted of the Thirteen States and the one Territory of the Confederacy.

[The States ratified the Constitution of the Union by signatures of their Delegates in succession as follows: Delaware, December 7, 1787; Pennsylvania, December 12, 1787; New Jersey, December 18, 1787; Georgia, January 2, 1788; Connecticut, January 9, 1788; Massachusetts, February 6, 1788; Maryland, April 28, 1788; South Carolina, May 23, 1788; New Hampshire, June 21, 1788; Virginia, June 26, 1788; New York, July 26, 1788; North Carolina, November 21, 1789; Rhode Island, May 29, 1790.

The ratification of nine States was sufficient to establish this union between the ratifying States. Accordingly the ratification of New Hampshire established, and that of Rhode Island completed, the Union.]

CESSIONS BY FOREIGN POWERS TO THE UNITED STATES.

The French Cession.—Spain having held during thirty-seven years the Province of Louisiana which she had received (1763) from France, receded it October 1, 1800, to France, and France, April 30, 1803, ceded it to the United States. After this accession negotiations with Great Britain were begun, to determine its northern boundary. In 1807 an agreement was reached, but not formally perfected, and, the war of 1812 intervening, the settlement of the boundary was deferred to October 20, 1818, when, by Convention, it was extended from the most northwestern point of the Lake of the Woods to and along the 49th parallel to the Stony [Rocky] Mountains. The line was extended no further westward, among other reasons, in order that no offence might be given to Spain, which asserted title by discovery to the whole Pacific slope of the continent. Yet it was agreed, to prevent collisions, and without prejudice to the claims of the parties or of outside powers, that any country claimed by either party to the convention should be free to both parties during ten years. The part of the eastern boundary of this cession, on the Mississippi River as far south as the 31st parallel, and its southeastern boundary on the Gulf of Mexico, were undisputed. But the remainder of the eastern and the whole of the western boundary was in controversy between the United States and Spain. The western limit at the north, as asserted by France and maintained by the United States, was the Pacific Ocean. Spain, however, claimed title—by prior discovery on the northwestern coast—as far eastward as the Rocky Mountains; and held that—as against such discovery—the title of France, rested solely on discovery and exploration of the River Mississippi, covered no more than the basin drained by that river and its tributaries, and consequently ended westwardly at the Rocky Mountains. At the southwest, the United States maintained an extent of the French cession, including the country east of the Rio Grande. But Spain having long kept a line of garrisons in that region, held the French territory to have been bounded by the Sabine River. These conflicting demands were satisfied by Treaty at Washington, February 22, 1819. By this authority, the border line between Spanish possessions in the southwest and the territory of the United States ran from the Gulf of Mexico up the western bank of the Sabine River to the 31st parallel of north latitude, thence north to and along the Red River, to and along the 23d meridian (100th Greenwich), to and along the southern bank of the Arkansas River to its source, and thence due north to and along the 42d degree of north latitude to the Pacific Ocean. This line, in this discussion, will be regarded as having been the southwestern boundary of the Province of Louisiana. On the east the Treaty of 1763 had confined the French cession to the Mississippi River as far south as the 31st parallel, whence eastward various boundaries have been asserted.

[The United States construed the cession of France (1803) to include all of the region between the 31st parallel and the Gulf of Mexico, and between the Mississippi River and the Perdido River, now the western boundary of the State of Florida. The ground of this construction seems to have been that the original Province of Louisiana extended eastward to the Perdido, and that, if France, at its cession to Spain, had not actual possession, it yet had a possessory right reaching to the Perdido, which it ceded to Spain (1763), which Spain receded to France (1800), and which France (1803) ceded to the United States.

On the contrary, Spain asserted that the Province of Louisiana had its boundary at the southeast as expressed in the Treaty of 1763 between Great Britain and France, namely, "The River Iberville and Lakes Maurepas and Pontchartrain," the waters skirting the so-called "Island of New Orleans," westerly and southerly from the River Mississippi to the Gulf of Mexico, and that the successive transfers had carried that province with that eastern boundary into the possession of the United States. Under this construction of the cession of 1803, it embraced, east of the Mississippi, only the small "Island of New Orleans."]

Under the construction of the cession adopted by the United States, the Province of Louisiana is now covered by those portions of the States of Alabama and Mississippi which lie south of the 31st parallel, by the entire States of Louisiana, Arkansas, Missouri, Iowa, Nebraska, and Oregon, and by that part of the State of Minnesota west of the Mississippi River and all that part of the State of Kansas on the North of the Arkansas River and east of the 23d meridian (100th Greenwich); by the entire Territories of Dakota, Washington, Idaho, and Montana, the part of the Territory of Colorado east of the Rocky Mountains and north of the Arkansas River, by that entire part of the Territory of Wyoming north of the 42d parallel and east of the meridian of the source of the River Arkansas and by what is known as the Indian Country. This accession of area for which the United States paid, in principal and in interest, more than \$23,500,000, added (adopting the United States view of the cession), 1,171,931 square miles to the public domain, extended the United States from ocean to ocean, and completed its possession of the central river and basin of the Continent.

The Spanish Cession.—The next addition to the area of the United States was contributed by Spain. At the time of the conclusion of the Definitive Treaty of Peace between the United States and Great Britain (September 3, 1783), Great Britain ceded to Spain the Provinces of East and West Florida without definition of their boundaries. Hence arose two opponent constructions of the Treaty, affecting the province of West Florida. Great Britain held the northern boundary of the province which she ceded to be the 31st parallel from the Appalachicola to the Mississippi River, and by a simultane-

ous treaty acknowledged the territory north of that parallel to belong to the United States, which government also adhered to a boundary on the 31st parallel. In opposition, Spain claimed that, by the Treaty, the province of West Florida was ceded, and that, on the day of the Treaty the province remained as extended May 15, 1767, by Great Britain, including the country between the same rivers as bounded the original province and northward from the 31st parallel to that of the mouth of the Yazoo River. This country Spain took into possession and held until, by authority of Joint Resolution of Congress, January 15, 1811, and Acts of the same date and of March 3, 1811, passed in secret session, and first published in 1818, the United States took it into possession. On February 22, 1819, the controversy was ended by the Treaty of Washington, whereby Spain ceded to the United States its Provinces of East and West Florida. In accordance with the construction maintained by the United States respecting the southeastern limit of the French cession and the northern limit of the Spanish cession, the latter added the territory of the present State of Florida, 59,268 square miles, to the area of the United States at a cost of nearly six and one-half millions of dollars.

By the same Treaty, Spain agreed to that line between her western American possessions and the United States which has herein been adopted as the southwestern boundary of the French cession, and ceded to the United States all her claims to any territory east or north of that line.

After this cession by Spain, Great Britain and the United States had only their own rights to consider in the settlement of the northwestern boundary. Hitherto the line had rested on the forty-ninth parallel of north latitude at the Rocky Mountains. By Article I. of the Treaty of 1846, it was stipulated that the boundary should be extended from the Rocky Mountains westward along the same (49th) parallel "to the middle of the channel which separates the continent from Vancouver's Island, and thence southerly through the middle of the said channel and of Fuca's Straits to the Pacific Ocean." The British government claimed that the "channel" of this Article of the Treaty is the so-called Straits of Rosario. The United States maintained it to be the Canal de Haro. The question was submitted to the arbitration of William I. Emperor of Germany, who gave decision October 21, 1872, in favor of the Canal de Haro. So it has required nearly ninety years for the national boundary at the north to traverse the continent.

The Texan Annexation.—The next expansion of the limits of the United States was southwestward. The United Mexican States having achieved their independence of Spain, under the Treaty at Cordova February 24, 1821, by Treaty of Mexico, January 12, 1828, ratified that boundary with the United States of America which had been acknowledged (1819) by Spain, when possessed of their territory. Subsequently the people of "Texas and Coahuila," one of the United States of Mexico, revolted from the authority of that Republic, and in convention March 2, 1836, declared the Independent Republic of Texas. By an act of the legislature of that republic passed December 19, 1836, its boundaries were declared to be on the north and east the old line settled (1819) by the United States and Spain, and on the south and west from the mouth of the River Sabine and three leagues from the coast to the mouth of and up the Rio Grande to its source and thence due north to the 42d parallel of north latitude. By Joint Resolution of March 3, 1837, the United States of America acknowledged the independence of the Republic of Texas; by Joint Resolution of March 1, 1845, gave assent to the admission of Texas as a State into the Union; and by Joint Resolution of December 29, 1845, the Republic, with the limits just now recited, was declared to be one of the United States of America. This was an annexation of 376,163 square miles of territory making the total area of the United States 2,435,176 square miles.

The Mexican Cessions.—The old Spanish provinces of Texas and of Coahuila, were separated by the River Nueces. At the institution of the Mexican Republic these provinces were united as the State of "Texas and Coahuila." The River Nueces was, however, still regarded as the future boundary between the probable separate States of Texas and of Coahuila as contemplated by the Constitution of the United Mexican States. On the annexation of the Republic of Texas to the United States of America, Mexico insisted that Texas only—and not Coahuila—had revolted, and consequently that its proper western boundary lay on the River Nueces. On the contrary, the Texan Republic had asserted a wider revolt and a western boundary on the Rio Grande. The United States annexed Texas as bounded on the west by the Rio Grande and maintained that boundary. The ensuing war was concluded by a Treaty (February 2, 1848), wherein the United States of Mexico ceded to the United States of America all claims to the area asserted by the former Republic of Texas, and to the vast tract of land west of the Rio Grande and of a meridian from its source to the 42d parallel of north latitude, south of that parallel, east of the Pacific Ocean and north of the present boundary of the United States, excepting the Mesilla valley south of the River Gila.

The latter territory, known as the Gadsden Purchase, was ceded by Mexico, December 30th, 1853.

The money consideration passing from the United States for the first Mexican cession was \$15,000,000, and for the second cession \$10,000,000. The first cession (exclusive of the "Texan annexation") added 545,783 square miles, and the second cession 45,535 square miles to the area of the United States, and increased it to an aggregate of 3,026,494 square miles.

Russian Cession.—There remains to be noticed but one further increment to the area of the United States. Russia, by Treaty of March 30, 1867, ratified June 20, 1867, for consideration of \$7,200,000, ceded her territory in America, which has been named Alaska.

[On the east this cession has limit on the line which, by Treaty between Great Britain and Russia (1825) separated their territory. It begins at the southernmost point of Prince of Wales Island, which is on the parallel of 54° 40', runs northward along Portland Channel to the junction of the fifty-sixth parallel of north latitude with the Continent, and thence along the summits of the mountains parallel to the coast to and along the one hundred and forty-first meridian to the Arctic Ocean. But where the crest of the mountains skirting the coast from the specified parallel to the meridian is more than ten marine leagues from the ocean, there the boundary is a line not more than ten marine leagues from the coast and parallel to its windings. The remainder of the boundary of this Russian cession originated in the Treaty by which the cession was made. It commences in the Arctic Ocean on the 64th meridian of West Longitude (141st Greenwich) descends Behring Straits midway between the islands of Krusenstern and Radmanov to 65° 30' (142° 30' Greenwich) just south of the nearest points of Asia and America, continues between the island of St. Lawrence and Cape Chonkotski to the 95th meridian (172d Greenwich), thence midway between Alton and Copper Islands to 116° (167 East Longitude from Greenwich), and thence coastwise to include the Aleutian Isles.]

Alaska is separated from the main territory of the United States by that western part

of the British Possessions which lies between the parallels of 54° 40' and 49° north latitude, its southernmost point being nearly four hundred miles distant from the northern boundary of the Territory of Washington. Its area is estimated at 577,390 square miles.

Summary of the Area of the United States.—The Russian cession completed the present area of the United States. Originally, as limited by Treaty with Great Britain (1783), this area—expressed in square miles—was (after the cessions of States to the United States), in the States, 420,892; out of the States, 406,952,—in all, 827,844. The additions are (1803), from France, the province of Louisiana, 1,171,931; (1819) from Spain, Florida, 59,268; (1845) the Texan annexation, 376,133; (1848) the first Mexican cession, 545,783; (1853) the second Mexican cession, 45,535; and finally (1867) the Russian cession Alaska, 577,390,—making the total area of the United States 3,603,884 square miles.

DESCRIPTION OF THE PARCELS OF TERRITORY COMPOSING EACH EXISTING OR OBSOLETE POLITICAL DIVISION OF THE UNITED STATES.

[The italic letters refer to the Area Map, Plate XV.]

ALABAMA, the State of: area, 50,722 sq. m.; is composed of *A*, *B*, *C*, and *D*, ceded by the States of Georgia and South Carolina, and by France.

A. Alabama, now in the State of: estimated area, 1,700 sq. m. Is a strip of land twelve to fourteen miles wide across the northern part of the State and adjoining the southern boundary of the State of Tennessee. Ceded by the State of South Carolina. Transfers: from the Territory south of the River Ohio to the Mississippi Territory and to the State of Alabama.

B. Alabama, now in the State of: estimated area, 27,722 sq. m. Lies between the States of Georgia and Mississippi and between *A* and a line drawn due east from the mouth of the Yazoo River to the Chattahoochee River. Ceded by the State of Georgia. Transfers: from the Mississippi Territory to the State of Alabama.

C. Alabama, now in the State of: estimated area, 19,000 sq. m. Between the States of Georgia and Mississippi and the southern boundary of *B* and the 31st parallel. Ceded by the State of Georgia. Transfers: from the Mississippi Territory to the State of Alabama.

D. Alabama, now in the State of: estimated area, 2,300 sq. m. Between the Perdido River and the State of Mississippi and between the 31st parallel and the Gulf of Mexico. Ceded by France. Transfers: from the Mississippi Territory to the State of Alabama.

ALASKA, (the unorganized territory of:) area, 577,390 sq. m. Ceded by Russia. [See Russian Cession, *ante*.]

ARIZONA, the Territory of: area, originally, 126,141 sq. m. Consisted of *E* and *Bi*; *Ck* was added from Mexico and *Bi* was transferred to the State of Nevada; now consists of *E* and *Ck*; area, 113,916 sq. m. Ceded by Mexico. Transfers: from the Territory of New Mexico to the Territory of Arizona.

E. Arizona, now in the Territory of: estimated area, 82,381 sq. m. All of the territory north of the River Gila. Ceded by Mexico in 1848. Transfers: from the Territory of New Mexico to the Territory of Arizona.

Ck. Arizona, now in the Territory of: estimated area, 31,535 sq. m. The part of the territory south of the River Gila. Ceded by Mexico in 1853. Transfers: from the Territory of New Mexico to the Territory of Arizona.

ARKANSAW TERRITORY (obsolete) was *F*; 52,198 sq. m. Ceded by France. Transfers: from the Province of Louisiana, to the District of Louisiana, to the Territory of Louisiana, to Arkansas Territory.*

ARKANSAS, the State of: identical in extent with Arkansas Territory.

CALIFORNIA, the State of: area, 188,981 sq. m. Ceded by Mexico.

COLORADO, the Territory of: area, 104,500 sq. m. Composed of *H*, *I*, *J*, *K*, and *L* Ceded by France and Mexico.

H. Colorado, now in the Territory of: area, 4,000 sq. m. Bounded on the north by the Arkansas River, east by the 25th meridian, south by the 37th parallel, and west by the 26th meridian. Ceded by the State of Texas. Transfers: from the Territory of Kansas to the Territory of Colorado.

I. Colorado, now in the Territory of: area, 14,000 sq. m. Bounded on the north and south by the 38th and 37th parallels, east by the 26th meridian, and west by the Rocky Mountains. Ceded, the part north of the Arkansas River (if any), by France; south of the river, by the State of Texas. Transfers: from the Territory of New Mexico to the Territory of Colorado.

J. Colorado, now in the Territory of: area, 40,965 sq. m. Bounded north by the 40th parallel, east by the 25th meridian, south by the Arkansas River westward to the 26th meridian and by the 38th parallel, and on the west by the Rocky Mountains. Ceded by France. Transfers: from the Territory of Kansas (being, with *H*, the portion of the Territory of Kansas which was not included in the State of Kansas) to the Territory of Colorado.

K. Colorado, now in the Territory of: area, 16,035 sq. m. Bounded north and south by the 41st and 40th parallels, east by the 25th meridian, and west by the Rocky Mountains. Ceded by France. Transfers: from the original Territory of Nebraska to the Territory of Colorado.

L. Colorado, now in the Territory of: area, 29,500 sq. m. Bounded north and south by the 41st and 37th parallels, east by the Rocky Mountains, and west by the 32d meridian. Ceded by Mexico. Transfers: from the Territory of Utah to the Territory of Colorado.

CONNECTICUT, the State of: area, 4,750 sq. m. One of the original thirteen States. At first extended westward to the Mississippi. By two cessions [see Cessions by States, *ante*] Connecticut ceded to the United States all claims to territory west of the State of Pennsylvania, excepting a reservation in the State of Ohio. There remained a claim to the northern part of the State of Pennsylvania. By virtue of it, Connecticut granted lands in the valley of Wyoming, on which the grantees, emigrants from Connecticut, settled, and erected civil governments in conflict with those of the State of Pennsylvania. During the existence of the Confederacy, the conflicting claims of these States were submitted to a

* As all of the parcels of territory west of the Mississippi River which were ceded by France (save that part of the State of Louisiana lying west of the River Mississippi) were successively in the Province, the District, and the Territory of Louisiana, mention of these transfers will be omitted in subsequent descriptions of parcels.

federal court organized under a provision of one of the Articles of Confederation, and judgment was rendered (1782) giving title of the lands in question to Pennsylvania.

DAKOTA, the Territory of: area, 150,932 sq. m. At first it consisted of *N, O, P, Bd,* and *Ay*; area, 310,867 sq. m.: then *Bd, P,* and *Ay* were set off to the Territory of Idaho; area then, 148,932 sq. m.: next, *Bd, P, Bc, Bf,* and *Be* were received from the Territory of Idaho; area then, 240,597 sq. m.: next were transferred to the Territory of Wyoming all of the parcels last above mentioned, excepting *P,* which has since been taken into the Territory of Montana. The Territory of Dakota now consists of *N* and *O*.

N. Dakota, now in the Territory of: area, 81,960 sq. m. Bounded north by the 49th parallel, east by the western boundary of the States of Minnesota and Iowa, south by the Missouri River, and west by the Missouri and White Earth Rivers. Ceded by France. Transfers: from the Territory of Missouri to the Territories of Michigan, Wisconsin, Iowa, Minnesota, and Dakota.

O. Dakota, now in the Territory of: area, 66,972 sq. m. Bounded north by the 49th parallel, east by the White Earth and Missouri Rivers, south by the present northern boundary of the State of Nebraska west of the mouth of Niobrara River, and west by the 27th meridian. Ceded by France. Transfers: from the original Territory of Nebraska to the Territory of Dakota.

DELAWARE, the State of: area 2,120 sq. m. One of the original thirteen States.

DISTRICT OF COLUMBIA, THE: area, 64 sq. m. Consisted of *Co* and *Cn*, 100 sq. m. Ceded by the States of Maryland and Virginia. *Cn*, 36 sq. m. was afterwards ceded to the State of Virginia.

Prior to the Union, the Federal Governments were peripatetic.* By Article I, Section 8 and Clause 16 of the Constitution of the Union, Congress was empowered "to exercise exclusive legislation in all cases whatsoever over such *district* (not exceeding ten miles square) as may by cession of particular States and the acceptance of Congress become the seat of government of the United States."

The State of Maryland, by Act of December 23, 1788, ceded to Congress territory ten miles square, for the seat of government of the United States. The State of Virginia, by Act of December 3, 1789, ceded territory ten miles square, or a less quantity, to the United States in Congress assembled for the same purpose. By Act of July 16, 1790, (amended March 3, 1791) a "district" of territory not exceeding ten miles square on the River Potomac, near the Eastern Branch, was accepted for the permanent seat of the Federal Government. Provisions were included in the Act, for surveying and bounding the District, and Philadelphia was made the seat of government during ten years, and on and forever after the first Monday of December 1800, the District was made the seat of the Federal Government. By Proclamation of the President, March 30, 1791, a district ten miles square, located and bounded as therein defined, was declared to be the Federal District. By Act of February 27, 1801, Congress assumed exclusive jurisdiction. By Act of July 9, 1846, the cession of Virginia was retroceded.

FLORIDA, the State of, (the Territory obsolete:) area, 59,268 sq. m. Ceded by Spain. *S* was Spanish "East Florida"; *Di*, part of "West Florida."

GEORGIA, the State of: area, 58,000 sq. m. One of the original thirteen States. Was composed of *U, B, C, As,* and *At*; now composed of *T* and *U*.

T. Georgia, now in the State of: estimated area, 1,500 sq. m. Is a strip of land twelve to fourteen miles wide across the northern end of the State of Georgia, adjoining the States of North Carolina and Tennessee. Ceded by the State of South Carolina to the United States and by the United States to the State of Georgia when the latter State made its cession to the United States. Transfers: from the Territory South of the River Ohio to the State of Georgia.

U. Georgia, now in the State of: estimated area, 56,500 sq. m. Is the State except *T*, being the part of the original State of Georgia which remained after the cession by the State of Georgia to the United States.

IDAHO, the Territory of: area, 86,294 sq. m. At first it consisted of *V, Be, Bj, Ax, Ay,* *P, Bd, Bc,* and *Bf*; area, 326,373 sq. m.: next, *Ay* and *Ax* were taken from it to form the Territory of Montana, and *Bd, P, Bc, Bf,* and *Be* were set off to the Territory of Dakota; area of the Territory then, 90,932 sq. m.: and, lastly, *Bj* was transferred to the Territory of Wyoming. The Territory now consists of *V*, ceded by France. Transfers: from the Territory of Oregon to the Territory of Washington, to the Territory of Idaho.

ILLINOIS, the Territory of, (obsolete:) estimated area, 144,662 sq. m. Was composed of *W, X, Y,* and *Z*.† Transfers: from the Territory Northwest of the River Ohio to the Territory of Indiana, to the Territory of Illinois. Absorbed by the States of Illinois and Wisconsin, the part of the State of Minnesota east of the Mississippi River, and that portion of the State of Michigan west of the eastern boundary of the Territory.

ILLINOIS, the State of: area, 55,410 sq. m. Transfers: from the Territory of Illinois.

INDIANA, the Territory of, (obsolete:) original estimated area, 205,151 sq. m. Comprised *W, X, Y, Z, Ab, Ac, Ad, Ae,* and *Cg*. Afterward *Bs* and *Ar* were added; estimated area then, 226,194 sq. m. Ceded as was the Territory of Illinois. Transfers: from the Territory northwest of the River Ohio to the Territory of Indiana. Absorbed by the States of Indiana, Michigan, Illinois, Wisconsin, and that portion of Minnesota east of the Mississippi River, except the parcel *Bs*, now in the State of Ohio.

INDIANA, the State of: area, 33,809 sq. m. Composed of *Ab* and *Ac*. Ceded as was the Territory of Illinois.

Ab. Indiana, now in the State of: estimated area, 1,200 sq. m. Bounded on the south by a line drawn east from the southern extremity of Lake Michigan to the present eastern boundary of the State; on the east by the present eastern boundary of the State; on the north by a line drawn due east and west ten miles north of the southern boundary of this parcel; on the west by a line from the southern point of Lake Michigan northward to

its intersection with the northern boundary line of this parcel. Transfers: from the Territory northwest of the River Ohio successively to the Territories of Indiana and Michigan and to the State of Indiana.

Ac. Indiana, now in the State of: estimated area, 32,609 sq. m. Being the State of Indiana, less *Ab*, with the same transfers as *Ab*, except that it was never in the Territory of Michigan.

INDIAN COUNTRY, THE (unorganized:) area, 68,891 sq. m. This is a geographical, but not an organized political division of the United States. By Act of June 30, 1834, regulating trade and intercourse with Indians, this Country was declared to be "all that part of the United States west of the Mississippi [River] and not within the States of Missouri and Louisiana and the Territory of Arkansas." This was the extent of the remainder of the area of the Territory of Missouri after the State of Missouri had been taken from it (1,010,305 sq. m.). By the statute above mentioned this country was separated into two portions. The northern was for the purposes of the Act annexed to the United States Judicial District in the State of Missouri, and the southern (substantially the present Indian country), for the same judicial purposes, to the Territory of Arkansas.

The Indian Country has since been reduced successively, by the Territory of Iowa; by *Aw* added to the State of Missouri; by the Territory of Oregon; by the original Territory of Nebraska, which comprised the country between the Rocky Mountains on the west and the River Missouri on the east, and extended southward to the parallel of the present southern boundary of the State of Nebraska; and by the Territory of Kansas. The remainder constitutes the present area of the Indian Country, sometimes styled the Indian Territory, which for judicial purposes is attached to the western Judicial District in the State of Arkansas.

IOWA, the Territory of, (obsolete:) estimated area, 194,536 sq. m. Consisted of *Af, Ag, Ah, Ai,* and *N*. Absorbed by the State of Iowa, by that part of the State of Minnesota lying west of the River Mississippi, and by the portion of the Territory of Dakota lying east of the River Missouri.

IOWA, the State of: area, 55,045 sq. m. As first admitted consisted of *Af* and *Ah*; now consists of *Af* and *Ag*. Ceded by France.

Af. Iowa, now in the State of: estimated area, 36,720 sq. m. Bounded north, east, and south by the present boundaries of the State, and on the west by the meridian of 17° 30'. Ceded by France. Transfers: from the Territory of Missouri successively to the Territories of Michigan, Wisconsin, Iowa, and to the State of Iowa.

Ag. Iowa, now in the State of: estimated area, 18,325 sq. m. Bounded on the north and south by the present like boundaries of the State of Iowa, on the east by the meridian of 17° 30', and on the west by the Big Sioux and Missouri Rivers. Ceded by France. Transfers: the same as *Af*.

KANSAS, the Territory of, (obsolete:) area, 126,283 sq. m. It consisted of *H, J, Aj,* and *Ak*. Ceded by France, except *H* and *Ak* and the part of *J* south of the Arkansas River, which was ceded by the State of Texas. The portion ceded by France was originally in the "Province of Louisiana;" the portion ceded by Texas first appears in this Territory. Absorbed by the State of Kansas and a portion of the Territory of Colorado.

KANSAS, the State of: area, 81,318 sq. m. Consists of *Aj* and *Ak*. Ceded, the part east of the 23d meridian and north of the Arkansas River, by France; the remainder by the State of Texas.

Aj. Kansas, now in the State of: estimated area, 73,542 sq. m. Bounded north and east by the present boundary of the State of Kansas, on the south by the present boundary of the State of Kansas westward to the 23d meridian, then northward on that meridian to and along the Arkansas River, westward to the 25th meridian, which bounds this parcel on the west. Ceded by France. Transfers: from the Territory of Missouri successively to the Territory of Kansas and to the State of Kansas.

Ak. Kansas, now in the State of: estimated area, 7,776 sq. m. Bounded on the north by the Arkansas River, east by the 23d meridian, south by the 37th parallel, and west by the 25th meridian. Ceded by the State of Texas. Transfers: from the Territory of Kansas to the State of Kansas.

KENTUCKY, the State of: area, 37,680 sq. m. Formed from the State of Virginia.

LOUISIANA, the Province of, (obsolete:) estimated area, 1,171,931 sq. m. (See French Cession, *ante*.)

LOUISIANA, the District of, (obsolete:) estimated area, 1,134,329 sq. m. Consisted of the then Territory of the United States west of the Mississippi River not included in the State of Louisiana. (See Indiana, *ante*.)

LOUISIANA, the Territory of, (obsolete.) Same area as the District of Louisiana; became the Territory of Missouri.

LOUISIANA, the State of: area, 41,346 sq. m. Originally consisted of *Am*; afterward *An* was added. Ceded by France.

Am. Louisiana, now in the State of: estimated area, 37,602 sq. m. Comprehends all of the State of Louisiana except the portion east of the Mississippi River and north of the "Rivers Iberville and Amite and Lakes Maurepas and Pontchartrain." Ceded by France. Transfers: from the Province of Louisiana to the Territory of Orleans, to the State of Louisiana.

An. Louisiana, now in the State of: estimated area, 3,744 sq. m. Being the part of the present State of Louisiana not included in *Am*. Ceded by France. Transfers: from the Province of Louisiana to the Territory of Orleans, to the State of Louisiana.

MAINE, the State of: area, 35,000 sq. m. Formed chiefly from the State of Massachusetts. Consists of *Ao* and *Cg*, parts of the original State of Massachusetts, and of *Cr*, that portion west of the River Kennebec and north of a right line connecting the confluence of the Kennebec and Dead Rivers with Lake Umbagog. The last parcel would appear never to have been in the Provinces of Main or Massachusetts Bay, or in the State of Massachusetts. If this view be correct, then this tract (*Cr*) was a parcel of the original public land of the United States, as defined by Treaty (1803) with Great Britain.

MARYLAND, the State of: area, 11,124 sq. m. One of the original thirteen States. Originally, was *Ap* and *Co*. The District of Columbia (*Co*), 64 sq. m., was ceded by the State of Maryland to the United States.

MASSACHUSETTS, the State of: area, 7,800 sq. m. One of the original thirteen States.

* "The American Association" and "The United Colonies" convened at Philadelphia (1774-6); "The Thirteen United Colonies" at Philadelphia (1776), where they became "The United States," whose Congress met at Baltimore (1776), at Philadelphia (1777), at Lancaster and also at York in the State of Pennsylvania (1777), and again at Philadelphia (1778-83). There the "Thirteen United States" was succeeded by "The Confederacy," whose Congress convened at Philadelphia (1776), at Princeton in New Jersey, 1783, at Trenton in New Jersey (1784), and finally at the city of New York (1785-89). There (April 30, 1789) the first President of the Union was inaugurated and the government of The United States in the Union was instituted.

† It will be understood without further mention, that those States, Territories, or parcels, formed out of The Territory Northwest of the River Ohio, were, at the south of the 41st parallel, upon the cession from the State of Virginia; thence northward to 42° 2', upon the cession of Connecticut; thence northward to 43° 43' 12", upon the cession of Massachusetts; and north thereof, upon the original public domain of the United States as defined by Treaty (1803) with Great Britain.

and consisted of *Cg*, *Ao*, and *Aq* (see Maine), and extended westward to the Mississippi River. Ceded to the United States its claims to territory west of the western boundary of the State of New York. [See Cessions by States, *ante*.] Massachusetts still asserted her right to territory within the State of New York and west of the Delaware River. This claim was founded on the inclusion of that territory, in the charter limits of the province of Massachusetts Bay, and on its allegation that the grant of New Netherland to the Duke of York conveyed no land farther west than the Delaware River. New York claimed this country under the grant to the Duke of York, and under rights of soil and sovereignty acquired by treaties with the Six Nations of Indians. The matter was put in suit before a federal court organized under one of the Articles of Confederation. But the contesting States appointed Commissioners who met at Hartford, Connecticut, December 16, 1786, and decided the issue by an agreement. New York received jurisdiction over the whole territory in dispute, and to Massachusetts was accorded right of soil and of pre-emption (from the Indians) to the territory from the meridian of the 82d milestone of the northern line of the State of Pennsylvania so far west as one mile east of the River Niagara, and also obtained confirmation of the title to "The Boston Ten Towns" which were east of that meridian. So Massachusetts secured no less than 5,230,000 acres or 8,172 square miles of the best arable land in the State of New York; an area greater and more evenly fertile than her present territory. After legislation granting and receiving sovereignty and jurisdiction by the States concerned, and after consent to the cession by Congress, the southwestern extremity of the State of Massachusetts known as the District of Boston Corner was, by the Proclamation of the Governor of the State of Massachusetts, dated January 11, 1855, declared ceded to the State of New York. Pursuant to an Act of the Legislature of Massachusetts, passed April 10, 1861, and to a Decree of the Supreme Court of the United States in the December term of 1861, the boundary between the States of Massachusetts and Rhode Island was so adjusted that these States interchanged parcels of territory. These two transactions transferred areas too small for further description, or for insertion in the succeeding table of parcels, or for delineation on the map of parcels.

MICHIGAN, the Territory of, (obsolete:) at first consisted of *Ab*, *Ad*, *Ar*, and *Bs*; estimated area, 41,243 sq. m.: next *Ae*, *Cg*, *X*, *Y*, and *Z* were added, and *Ab* was subtracted; estimated area then, 136,975 sq. m.: afterward *Af*, *Ag*, *Ah*, *Ai*, and *N* were added, increasing the area to 331,511 sq. m. The Territory is now covered by the States of Michigan, Wisconsin, Iowa, Minnesota, by parts of the States of Ohio and Indiana (*Bs* and *Ab*), and by the part of the Territory of Dakota which lies east of the Missouri and White Earth Rivers.

MICHIGAN, the State of: area, 56,451 sq. m. Consists of *Ad*, *Ae*, *Ar*, and *Y*.

Ad. Michigan, now in the State of: estimated area, 19,000 sq. m. Bounded on the south by a line drawn due east through a point ten miles north of the southern extremity of Lake Michigan to the eastern boundary of the State of Indiana, on the east by said boundary of Indiana extended northward until it intersects the western boundary of this piece of territory, which begins on the southern boundary of this parcel and runs northwardly through the middle of that lake to the point of intersection with its eastern boundary. Transfers: from the Territory Northwest of the River Ohio successively to the Territories of Indiana and Michigan and to the State of Michigan.

Ar. Michigan, now in the State of: estimated area, 20,443 sq. m. Being all of the State of Michigan east of the eastern boundary of the State of Indiana extended northward to the international boundary line. Same transfers as *Ad*.

Ae. Michigan, now in the State of: estimated area, 7,180 sq. m. Consists of all the territory (except *Cg*) bounded on the east by the western boundary of *Ar*, on the north by the international boundary line, on the west by the meridian of the eastern boundary of Illinois, on the south by the northern boundary of *Ab*. Same transfers as *Ad*.

Y. Michigan, now in the State of: estimated area, 9,828 sq. m. Bounded on the east by the western boundary of *Ae*, on the north and northwest by the international boundary line, on the south and southwest by the State of Wisconsin. Transfers: from the Territory Northwest of the River Ohio successively to the Territories of Indiana, Illinois, and Michigan, and to the State of Michigan.

MINNESOTA, the Territory of, (obsolete:) area, 165,491 sq. m. Consisted of *N*, *Z*, *Ai*, and *Ah*. Absorbed by the State of Minnesota and that portion of the Territory of Dakota lying east of the Missouri river.

MINNESOTA, the State of: area, 83,531 sq. m. It consists of *Z*, *Ah*, and *Ai*. Ceded, west of the Mississippi River, by France.

Z. Minnesota, now in the State of: estimated area, 26,000 sq. m. Bounded on the north by the international boundary line, on the east by the boundaries of the State, on the west by the Mississippi River and a line drawn due north from its source to the international boundary line. Transfers: from the Territory Northwest of the River Ohio successively to the Territories of Indiana, Illinois, Michigan, Wisconsin, and Minnesota, and to the State of Minnesota.

Ai. Minnesota, now in the State of: estimated area, 50,475 sq. m. Bounded on the north by the international boundary line, on the east by a line drawn from the international boundary line due south to the source of the Mississippi River, and by the Mississippi River, southward to and along the Northern boundary of *Ah*, to and southward along the meridian of $17^{\circ} 30'$, to and westward along the parallel of $43^{\circ} 30'$ to the western boundary of the State of Minnesota. Ceded by France. Transfers: from the Territory of Missouri successively to the Territories of Michigan, Wisconsin, Iowa, and Minnesota, and to the State of Minnesota.

Ah. Minnesota, now in the State of: estimated area, 7,056 sq. m. Bounded on the north by the parallel passing through the confluence of the Blue Earth or Mankato and the Minnesota Rivers, on the east by the Mississippi River, on the south by the parallel of $43^{\circ} 30'$, and on the west by the meridian of $17^{\circ} 30'$. Ceded by France. Transfers: from the Territory of Missouri to the Territories of Michigan, Wisconsin, and Iowa, and to the State of Iowa, again to the Territory of Iowa, to the Territory of Minnesota, and to the State of Minnesota.

MISSISSIPPI TERRITORY, (obsolete:) at first consisted of *C* and *At*; estimated area, 33,956 sq. m.: afterward *A*, *B*, *As*, and *Cm* were added; estimated area, 91,978 sq. m.: afterward, *D* and *Au* were added; area, 97,878 sq. m. The eastern part became the State of Alabama and the western the State of Mississippi.

MISSISSIPPI, the State of: area, 47,156 sq. m. Consists of *As*, *At*, *Au*, and *Cm*. Ceded by the States of South Carolina and Georgia, and by France.

Cm. Mississippi, now in the State of: estimated area, 1,700 sq. m. A strip of land twelve to fourteen miles wide across the northern part of the State next the State of Tennessee. Ceded by the State of South Carolina. Transfers: from the Territory South of the River Ohio to Mississippi Territory and the State of Mississippi.

As. Mississippi, now in the State of: estimated area, 26,900 sq. m. Lies south of *Cm* and north of *At*. Ceded by the State of Georgia. Transfers: from Mississippi Territory to the State of Mississippi.

At. Mississippi, now in the State of: estimated area, 14,956 sq. m. South of *As*, and bounded on the north by a line drawn due east through the mouth of the Yazoo River and on the south by the 31st parallel. Ceded by the State of Georgia. Transfers: from Mississippi Territory to the State of Mississippi.

Au. Mississippi, now in the State of: estimated area, 3,600 sq. m. All of the State of Mississippi south of the 31st parallel. Ceded by France. Transfers: from Mississippi Territory to the State of Mississippi.

MISSOURI, Territory of, (obsolete:) estimated area, 1,134,329 sq. m. Was a reorganization of the Territory of Louisiana with the same boundaries. Consisted of all of the "Province of Louisiana" except *Am*, *An*, *Au* and *D*. Its area was first diminished by that of the State of Arkansas and next by that of the State of Missouri. At the last reduction, the Territory seems to have lost both government and name. Its remaining area having been included in the Indian Country, was divided and attached for judicial purposes to the Territory of Arkansas and to the Judicial District in the State of Missouri. For the subsequent disposition of this area, see INDIAN COUNTRY, *ante*.

MISSOURI, the State of: area, 65,350 sq. m. Consisted first of *Av*, afterward *Aw* was added.

Av. Missouri, now in the State of: estimated area, 62,182 sq. m. Ceded by France. Is the State of Missouri east of the meridian passing through the confluence of the Kansas and Missouri Rivers. Transfers: from the Province to the District and Territory of Louisiana, and to the Territory and State of Missouri. Was the original State of Missouri.

Aw. Missouri, now in the State of: estimated area, 3,168 sq. m. Ceded by France. Consists of all the State west of *Av*. Transfers: same as *Av*, except that it was not in the original State of Missouri.

MONTANA, the Territory of: area, 143,776 sq. m. Consists of *Ax* and *Ay*. Ceded by France.

Ax. Montana, now in the Territory of: area, 27,507 sq. m. Bounded north by the 49th parallel, east by the Rocky Mountains to their junction with the Bitter Root Mountains, west by the Bitter Root Mountains to the 39th meridian, and on that meridian northward to the 49th parallel. Ceded by France. Transfers: from the Territory of Oregon to the original Territory of Washington, to the Territory of Idaho, to the Territory of Montana.

Ay. Montana, now in the Territory of: area, 116,269 sq. m. Bounded north by the 49th parallel, east by the 27th meridian, south by the 45th parallel to the 34th meridian, southward on that meridian to the parallel of $44^{\circ} 30'$, westward on that parallel to the Rocky Mountains, and on the west by the Rocky Mountains. Ceded by France. Transfers: from the original Territory of Nebraska to the Territories of Dakota, Idaho, and Montana.

P. Montana, now in the Territory of: area, 2,000 sq. m. Bounded north by the parallel of $44^{\circ} 30'$, east by the 34th meridian, and south and west by the Rocky Mountains. Ceded by France. Transfers: from the original Territory of Nebraska to the Territory of Dakota, to the Territory of Idaho, to the Territory of Dakota, to the Territory of Montana.

NEBRASKA, the Territory of, (obsolete:) Ceded by France. At first consisted of *Az*, *K*, *O*, *Bc*, *Bd*, *P*, and *Ay*; area, 351,558 sq. m.: then *K* was set off to the Territory of Colorado; area then, 335,523 sq. m.: next, *O*, *P*, *Ay*, and *Bd* were set off to the Territory of Dakota, and at the same time *Be* was added from the Territory of Washington, and *Bf* from the Territory of Utah; area then, 121,994 sq. m.: next, *Bc*, *Be*, and *Bf* were set off to the Territory of Idaho. The remainder of the Territory, area 75,995 sq. m., became the State of Nebraska.

NEBRASKA, the State of: area, 75,995 sq. m. Ceded by France.

NEVADA, the Territory of, (obsolete:) area, 73,574 sq. m. Consisted of *Bg*. Ceded by Mexico. Transfers: from the Territory of Utah to the Territory of Nevada.

NEVADA, the State of: area, 104,125 sq. m. Consists of *Bg*, *Bh*, and *Bi*.

Bg. Nevada, now in the State of: area, 73,574 sq. m. Bounded north and south by 42d and 37th parallels, east by the 38th meridian, and west by a part of the eastern boundary of the State of California. Ceded by Mexico. Transfers: from the Territory of Utah to the Territory of Nevada, to the State of Nevada.

Bh. Nevada, now in the State of: area, 18,326 sq. m. Bounded north and south by the 42d and 37th parallels respectively, east and west by the 37th and 38th meridians respectively. Ceded by Mexico. Transfers: from the Territory of Utah to the State of Nevada.

Bi. Nevada, now in the State of: area, 12,225 sq. m. Bounded north by the 37th parallel, east by the 37th meridian, southeast by the Colorado River, and west by the boundary line of the State of California. Ceded by Mexico. Transfers: from the Territory of Arizona to the State of Nevada.

NEW HAMPSHIRE, the State of: area, 9,280 sq. m. One of the original thirteen States.

NEW JERSEY, the State of: area, 8,320 sq. m. One of the original thirteen States.

NEW MEXICO, the Territory of: area, 121,201 sq. m. At first consisted of *Bm*, *De*, *Bi*, *E*, and *I*; area, 215,807 sq. m.: afterward were added *Ck* and *Cl*, being the second cession from Mexico; area then, 261,342 sq. m.: first, *I* was set off to the Territory of Colorado; area then, 247,342 sq. m.: next, *E*, *Bi*, and *Ck* were cut off to form the Territory of Arizona. Ceded by Mexico and by the State of Texas.

Bm. New Mexico, now in the Territory of: estimated area, 42,000 sq. m. The Territory north of the Gila River and west of the Rio Grande. Ceded by Mexico in 1848.

De. New Mexico, now in the Territory of: estimated area, 65,201 sq. m. Bounded south and east by the 32d parallel and the 26th meridian, north by the parallel of 37°, and west by the Rio Grande. Ceded by the State of Texas (1850).

Cl. New Mexico, now in the Territory of: area, 14,000 sq. m. West of the Rio Grande and south of the Gila. Ceded by Mexico in 1853.

NEW YORK, the State of: area, 47,000 sq. m. One of the original thirteen States. Originally consisted of *Bu* and *Bo*. (See Massachusetts, the State of.)

NORTH CAROLINA, the State of: area, 50,704 sq. m. One of the original thirteen States. At first consisted of *Bp* and *Bq*. Ceded *Bq* to the United States.

OHIO, the Territory Northwest of the River (obsolete:) estimated area, 265,558 sq. m. This was the first of the Territories. It comprised all the parcels west of the western boundary of the State of Pennsylvania, and between the Ohio and Mississippi Rivers, now covered by the States of Ohio, Indiana, Illinois, Michigan and Wisconsin, and that part of Minnesota east of the Mississippi River, and of a line drawn northward from the source of the Mississippi River to the international boundary line. [See the foot-note at the Territory of Illinois and the text of "The Original Territory," *ante*.]

OHIO, the Territory South of the River (obsolete:) estimated area, 50,500 sq. m. Consisted of the Territory now covered by the State of Tennessee, and of *Cm*, *A* and *T*, now in the States of Mississippi, Alabama and Georgia.

At the establishment of the Union of the United States, its public land, it would appear, consisted of the original Territory Northwest of the River Ohio, and of three other parcels, *Cr* now in the State of Maine, *Cp* now in the State of Pennsylvania, and thirdly, the cession of South Carolina. The three parcels not civilly organized were isolated from each other and from the solitary Territory, and were otherwise then unfit for political organization. The cession of North Carolina added a region—the area of the present State of Tennessee—contiguous to the South Carolina cession, and by Act of May 26, 1790, the combined cessions of the States of South and North Carolina were declared to be "one district" for a government like that of the Territory Northwest of the River Ohio, except as otherwise provided in the conditions of the Act of April 2, 1790, by which the North Carolina cession was accepted. The new Territory (*Bq*, *Cm*, *A*, and *T*—50,500 sq. m.) lay, as the States then were, east of the River Mississippi, west of the Carolinas, south of Virginia, and north of Georgia. The conditions of the Act accepting the North Carolina cession were ten in number, the eighth of which required that the laws of North Carolina should remain in force until changed by the Legislature of the new Territory. There was appended to the fourth condition "Provided always that no regulations made or to be made by Congress shall tend to emancipate slaves." So the first Free Territory was balanced by the first Slave Territory. After the erection of the State of Tennessee, the remainder of this Territory (*T*, *Cm* and *A*) was styled in legislation "The Territory of the United States south of the State of Tennessee" until the cession of *T* to Georgia, and the inclusion of *Cm* and *A* in Mississippi Territory.

OHIO, the State of: area, 39,964 sq. m. Formed as a State from the Territory Northwest of the River Ohio. Consisted of *Br*. Afterward *Bs* was added.

Br. Ohio, now in the State of: estimated area, 39,364 sq. m. The portion of the State south of a line drawn due east through the southernmost extremity of Lake Michigan. Transfers: from the Territory Northwest of the River Ohio to the State of Ohio.

Bs. Ohio, now in the State of: estimated area, 600 sq. m. Bounded south by *Br*, and on the north by a line from the southernmost point of Lake Michigan to the northernmost point of Miami Bay. Transfers: from the Territory Northwest of the River Ohio to the Territory of Michigan, to the State of Ohio.

OREGON, the Territory of, (obsolete:) area, 288,345 sq. m. Originally composed of *Bt*, *Bu*, *V*, *Bj*, *Be*, and *Ax*, being all of the then Territory of the United States north of the 42d parallel and west of the Rocky Mountains; next, *Bu*, *V*, *Ax*, *Bj*, and *Be* were cut off to form the original Territory of Washington. The remainder of the Territory became the State of Oregon. Ceded by France. Transfers: from the Territory of Oregon to the State of Oregon.

OREGON, the State of: area, 95,274 sq. m. Ceded by France. From the Territory of Oregon to the State of Oregon.

ORLEANS, the Territory of, (obsolete:) consisted of *Am*, *An*, *Au*, and *D*, estimated area, 47,246 sq. m. Ceded by France. Transfers: from the "Province of Louisiana." Now constitutes the whole of the State of Louisiana and those parts of the States of Mississippi and Alabama which are south of the 31st parallel.

PENNSYLVANIA, the State of: area, 46,000 sq. m. One of the original thirteen States. Was *Bv*; afterward *Cp* was added.

Bv. Pennsylvania, now in the State of: area, 45,684 sq. m. All of the State south of the 42d parallel. Is the original State of Pennsylvania.

Cp. Pennsylvania, now in the State of. All north of the 42d parallel and west of the State of New York: area, 316 sq. m. By the cession of the State of New York in 1781, and of the State of Massachusetts in 1785, the United States acquired title to this parcel of territory. By Resolution of Congress, passed June 6, 1788, the right of soil was conditionally sold to the State of Pennsylvania, and a survey of the parcel was ordered. By Resolution of September 4, 1788, the right of government and jurisdiction was relinquished to the State of Pennsylvania. By Treaty, concluded January 9, 1789, with the Indian tribes known as the Six Nations, the Indian title to this parcel was vested in the State of Pennsylvania. By Act of Congress passed January 3, 1792, the President was authorized to issue letters patent granting this parcel to the State of Pennsylvania. Such letters patent were issued March 3, 1792.

RHODE ISLAND, the State of: area, 1306 sq. m. One of the original thirteen States. [See Massachusetts, *ante*.]

SOUTH CAROLINA, the State of: area, 34,000 sq. m. One of the original thirteen States. At first included *Bx*, *Cm*, *A* and *T*. *Cm*, *A* and *T*, were ceded to the United States.

TENNESSEE, the State of: area, 45,600 sq. m. Formed from Territory ceded by the State of North Carolina.

TEXAS, the State of: area, 274,356 sq. m. By Joint Resolution of Dec. 29, 1845, admitted as a State, comprising then, *The Texan Annexation*, shown on the map, and described, *ante*. By Act of Sept. 9, 1850, Congress proposed that the State of

Texas cede to the United States the territory shown upon the map as the *Texas Cession*, and relinquish all claims against the United States for liability of the debts of Texas and on account of the property of Texas which accrued to the United States at annexation; and that the United States, in consideration of such acts, pay to the State of Texas, ten millions of dollars in five per cent stock redeemable in fourteen years. By Act of the Legislature, Nov. 25, 1850, these propositions were accepted by the State of Texas, and by the President's Proclamation, Dec. 13, 1850, the Act of Sept. 9, 1850 was declared to be in full force.

UNORGANIZED TERRITORY WEST OF THE INDIAN COUNTRY: estimated area, 10,800 sq. m. Bounded by 36° 30' and 37° of latitude and by the 23d and 26th meridians. Ceded by the State of Texas. Originally was the remainder of the Texas Cession after the formation of the Territory of New Mexico. It then consisted of *Cj*, *H*, and *Ak*, area 22,576 sq. m. *H* and *Ak* have been included in the Territory of Kansas. On some maps the parcel (*Cj*) which remained, is included in the Indian Country. This is incorrect, for the Indian Country was defined in the year 1834, when the western boundary of the United States at this latitude was the 100th meridian (Greenwich), and when consequently this parcel did not belong to the United States, but to Mexico. No subsequent legislation has placed this parcel in the Indian Country or in any State or Territory.

UTAH, the Territory of: area, 84,476 sq. m. Ceded by Mexico, 1848. Originally included *Bz*, *Bg*, *Bh*, *Cd*, *Bf*, and *L*; area, 220,196 sq. m. First, *L* was set off to the Territory of Colorado; area, then, 190,696 sq. m. Next, *Bf* was set off to the Territory of Nebraska, and *Bg* to the Territory of Nevada; area, then, 106,382 sq. m. Next, *Bh* was set off to the State of Nevada; area, then, 88,056 sq. m. Next, *Cd* was set off to the Territory of Wyoming.

VERMONT, the State of: area, 10,212 sq. m. From the State of New York.

VIRGINIA, the State of: area, 38,348 sq. m. One of the original thirteen States. Originally included *Ce*, *Cf*, *Cn*, and *Al*, and the portions of the States of Ohio, Indiana, and Illinois, which lie south of the 41st parallel. First, ceded these last-named portions of existing States to the United States; next, the State of Kentucky was formed from its westernmost territory; next, ceded 36 sq. m., *Cn*, to become a part of the District of Columbia. *Cn* was subsequently retroceded. Finally, the State of West Virginia was erected from the territory of Virginia.

Ce. Virginia, now in the State of: area, 38,312 sq. m. Being the present State of Virginia, less *Cn*. No transfers.

Cn. Virginia, now in the State of: area, 36 sq. m. That portion of the State of Virginia which was formerly a part of the District of Columbia. Transfers: from the State of Virginia to the District of Columbia, and again to the State of Virginia.

WASHINGTON, the Territory of: area, 69,994 sq. m. Originally included *Bu*, *V*, *Ax*, *Bj*, and *Be*; area, 193,071 sq. m. All parcels but *Bu* were taken into the Territory of Idaho. Ceded by France. Transfers: from the Territory of Missouri, to the Territory of Oregon, to the Territory of Washington.

WEST VIRGINIA, the State of: area, 23,000 sq. m. Formed from the State of Virginia.

WISCONSIN, the Territory of, (obsolete:) area, 274,460 sq. m. Originally included *X*, *Cg*, *Af*, *Ag*, *Ah*, *Ai*, *Z*, and *N*. All of it west of the Mississippi River was afterward included in the Territory of Iowa. The part east of the Mississippi River not included in the State of Wisconsin was afterward included in the Territory of Minnesota.

WISCONSIN, the State of: area, 53,924 sq. m. Consists of *X* and *Cg*. Ceded as was the Territory of Illinois.

X. Wisconsin, now in the State of: estimated area, 53,424 sq. m. All of the State, except that part on the east of the projected eastern boundary of the State of Illinois. Transfers: from the Territory Northwest of the River Ohio successively to the Territories of Indiana, Illinois, Michigan, and Wisconsin, and to the State of Wisconsin.

Cg. Wisconsin, now in the State of: estimated area, 500 sq. m. Being that point of land between Green Bay and Lake Michigan which lies east of the eastern boundary of the State of Illinois extended northward. Transfers: from the Territory Northwest of the River Ohio successively to the Territories of Indiana, Michigan, and Wisconsin, and to the State of Wisconsin. Unlike the rest of the State of Wisconsin, this parcel was never included in the Territory of Illinois.

WYOMING, the Territory of: area, 97,883 sq. m. Consists of *Bc*, *Bd*, *Be*, *Bf*, *Bj*, and *Cd*.

Bc. Wyoming, now in the Territory of: area, 30,621 sq. m. Bounded north and south by the 43d and 41st parallels respectively, east by the 27th meridian, west by the Rocky Mountains. Ceded by France. Transfers: from the original Territory of Nebraska successively to the Territories of Idaho, Dakota, and Wyoming.

Bd. Wyoming, now in the Territory of: area, 43,666 sq. m. Bounded north by the 45th parallel, east by the 27th meridian, south by the 43d parallel, and west by the Rocky Mountains and 34th meridian. Ceded by France. Transfers: from the Territory of Nebraska successively to the Territories of Dakota, Idaho, Dakota again, and Wyoming.

Be. Wyoming, now in the Territory of: area, 4,638 sq. m. Bounded on the northeast by the Rocky Mountains, south by the 42d parallel, and west by the 33d meridian. Ceded by France. Transfers: from the original Territory of Oregon successively to the Territories of Washington, Nebraska, Idaho, Dakota, and Wyoming.

Bf. Wyoming, now in the Territory of: area, 10,740 sq. m. Bounded north and south by the 42d and 41st parallels respectively, east by the Rocky Mountains and west by the 33d meridian. Ceded by Mexico (1848). Transfers: from the Territory of Utah successively to the Territories of Nebraska, Idaho, Dakota, and Wyoming.

Bj. Wyoming, now in the Territory of: area, 4,638 sq. m. Bounded northeast by the Rocky Mountains, south by the 42d parallel, east and west by the 33d and 34th meridians respectively. Ceded by France. Transfers: from the original Territory of Oregon to the Territories of Washington, Idaho, and Wyoming.

Cd. Wyoming, now in the Territory of: area, 3,580 sq. m. Bounded north and south by the 42d and 41st parallels respectively, and east and west by the 33d and 34th meridians respectively. Ceded by Mexico (1848). Transfers: from the Territory of Utah to the Territory of Wyoming.

AREA, POPULATION, AND AVERAGE DENSITY OF SETTLEMENT OF EACH STATE OR TERRITORY AT EACH CENSUS.

STATES AND TERRITORIES.	1870. (a) (b)			1860. (b) (c)			1850. (d)			1840.			1830.			1820.			1810. (e)			1800.			1790.				
	Square Miles.	Persons.	Persons to a Square Mile.	Square Miles.	Persons.	Persons to a Square Mile.	Square Miles.	Persons.	Persons to a Square Mile.	Square Miles.	Persons.	Persons to a Square Mile.	Square Miles.	Persons.	Persons to a Square Mile.	Square Miles.	Persons.	Persons to a Square Mile.	Square Miles.	Persons.	Persons to a Square Mile.	Square Miles.	Persons.	Persons to a Square Mile.	Square Miles.	Persons.	Persons to a Square Mile.		
THE UNITED STATES.....	3,603,884	38,558,371	10.70	3,026,494	31,443,321	10.39	2,980,959	23,191,876	7.78	2,059,043	17,069,453	8.29	2,059,043	12,866,020	6.25	2,059,043	9,638,453	4.68	1,999,775	7,239,881	3.62	827,844	5,308,483	6.41	827,844	3,929,214	4.75		
THE STATES.....	1,984,467	38,115,641	19.21	1,723,029	31,040,840	18.01	1,544,224	23,047,891	14.99	912,614	16,891,107	18.50	800,197	12,724,111	15.91	738,015	9,515,659	12.89	509,572	7,036,541	13.81	523,330	5,234,534	10.00	511,686	3,893,523	7.61		
1 Alabama.....	50,772	996,992	19.66	50,772	964,201	19.01	50,772	771,623	15.21	50,772	590,756	11.66	50,722	309,527	6.10	50,722	127,901	2.52
38 Alaska (unorganized territory)..	577,390	(h)	(h)
68 On pub. ships in serv. of the U.S.	

(a) The land-surface of the United States, 3,603,884 square miles, when increased by the water surface of the great lakes and rivers, gives a total area to the United States of about 4,000,000 square miles.

(b) The excess of the total area of the United States at 1870 over the total area at 1860 represents the Russian Cession, or Alaska; the excess at 1860 over 1850, the Second Mexican Cession, or "Gadsden Purchase"; of 1850 over 1840, the Texan Annexation and First Mexican Cession; of 1810 over 1800, the French Cession, or "Province of Louisiana."

(c) In the first quarter of the year 1861, the State of Kansas and the Territories of Colorado, Dakota, and Nevada were formed. The Census of 1860 recognized these new organizations. The areas at the year 1861 wrought with the population returned at 1860 afford better comparison with the areas and population at 1870 than do the above columns at 1860. Columns for the year 1861 are made by the following changes in the columns at 1860. Place Kansas among the States—thus 81,318; 107,206; 1.30. The totals of the States become 1,804,347; 31,148,046; 17.21. Place Colorado, Dakota, and Nevada among the Territories named, and strike out the numbers for the Territories of Kansas and Minnesota. The Territorial columns for 1861 become: The Territories, 1,222,147; 295,275; 0.24; Colorado, 104,500; 34,277; 0.33; Dakota, 310,867; 4,837; 0.01; District of Columbia, 64; 75,080; 1,173.13; Indian Country, 58,191; (No census); Unorganized territory, 10,800; (No census); Nebraska, 121,994; 28,841; 0.24; Nevada, 73,574; 6,857; 0.09; New Mexico, 247,342; 93,516; 0.38; Utah, 106,382; 40,273; 0.38; Washington, 188,433; 11,594; 0.06.

(d) At 1790, the Western Reserve was a part of Connecticut. Connecticut had made a legislative proposition for its cession to the United States, and the latter government had included it in The Territory North of the River Ohio, where it is, in this Table. The population returned at 1790 for Connecticut was wholly on the present area of the State.

(e) At 1800 and 1790 Georgia had not ceded her western lands to the United States. The tabulated areas include those lands. The population at these censuses was wholly on the present area of the State. For comparison, the following numbers may be taken for Georgia: 1800, 58,000; 162,686; 2.80; 1790, 58,000; 82,548; 1.42.

(f) At 1810, 1800, and 1790, Maine (disregarding a small northwestern parcel) was a part of Massachusetts, and at 1790 Vermont a part of New York, and Kentucky a part of Virginia. These parts of States are here tabulated separately for comparison with themselves as States, at later censuses.

(g) Since 1870 2000 square miles (P on Area Map) have been transferred from Dakota to Montana.

(h) Disregarding the parcel C_p (see Area Map), which became a part of the State in 1792.

(i) Withdrawing from Virginia the area now in West Virginia and the population on that area at each census, there results: Virginia: 1860, 38,348; 1,210,630; 31.80; 1850, 38,348; 1,119,348; 29.11; 1840, 38,312; 1,015,260; 26.50; 1830, 38,312; 1,034,481; 27.00; 1820, 38,312; 928,558; 24.24; 1810, 38,312; 860,131; 22.69; 1800, 38,312; 801,608; 20.92; 1790, 38,312; 691,737; 18.05. West Virginia: 1860, 23,000; 376,688; 16.38; 1850, 23,000; 302,313; 13.14; 1840, 23,000; 224,537; 9.76; 1830, 23,000; 176,924; 7.69; 1820, 23,000; 136,808; 5.95; 1810, 23,000; 105,469; 4.59; 1800, 23,000; 78,592; 3.42; 1790, 23,000; 55,873; 2.43.

(j) No Census taken.

(k) The Spanish Cession, not yet organized as a Territory.

(l) The upper line, in the next year (1791), became the State of Tennessee. The lower line is the remainder of this Territory south of the Ohio.

TABLE SHOWING THE PARCELS OF TERRITORY COMPOSING EACH POLITICAL DIVISION AT ANY YEAR FROM 1776 TO 1874.

NOTE.—In any year *not* heading a column of this Table or *not* mentioned in a foot-note, no areal changes occurred. In the Year columns of this Table, the Roman letters refer to the parcels of territory on the Area map (Plate XV.), and the figures in parenthesis refer to the notes under this Table. Treaties of the United States with foreign powers and the Statutes of the United States for the specified years, constitute the main authorities for the facts presented in this Table. These authorities are mainly cited on pp. 574-580 of Vol. I, of the Ninth Census (1870). In that volume are an analogous map and table. That table takes up each tract of territory at the year when it became a part of the area of the United States. Hence, maps traced from that map in accord with that table will present the territory of the United States only, at the selected date. On the contrary, this table takes up in its first Year column every piece of territory which then (1776) was, or which afterwards became a part of the area of the United States; and any map traced from the area map of this Atlas, pursuant to any column of this table, will show the territory of the United States at the date selected, and will present also, with their names, the political divisions then without, but at later dates within the present limits of the United States.

Political Divisions.	1776	1781	1784	1785	1786	1787	1790	1791	1792	1796	1798	1800	1802	1803	1804	1805	1809	1812	1816	1817	
1 Alabama, the Territory of																					A, B, C, D
2 Alabama, the State of																					
3 Alaska, the unorganized territory of	Ch (16)	<i>Idem</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
4 Arizona, the Territory of																					
5 Arkansas Territory																					
6 Arkansas, the State of																					
7 California, the State of																					
8 Colorado, the Territory of																					
9 Connecticut, the State of	M (1)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	M (2)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	M	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
10 Dakota, the Territory of																					
11 Delaware, the State of	Q	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
12 District of Columbia																					
13 East Florida, the Province of	S (3)	<i>Id.</i>	<i>Id.</i> (3)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
14 Florida, the Territory of																					
15 Florida, the State of																					
16 Georgia, the State of	U, B, C, As, At (3)	<i>Id.</i>	<i>Id.</i> (3)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	U, B, As	<i>Id.</i>	T, U	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
17 Idaho, the Territory of																					
18 Illinois, the Territory of																					
19 Illinois, the State of																					
20 Indiana, the Territory of																					
21 Indiana, the State of												(4)	<i>Id.</i> , S ^e Ar, Bs	<i>Id.</i>	<i>Id.</i> (5)	Ac, Ae, Y, Z (6)	Ac, Ae, Cg	<i>Id.</i>	Ac, Cg	<i>Id.</i>	Ab, Ac
22 Indian Country, The																					
23 Iowa, the Territory of																					
24 Iowa, the State of																					
25 Kansas, the Territory of																					
26 Kansas, the State of																					
27 Kentucky, the State of																					
28 Louisiana, the Province of	(17)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	Al	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
29 Louisiana, the District of																					
30 Louisiana, the Territory of																					
31 Louisiana, the State of																(8)	<i>Id.</i>			Am, An	<i>Id.</i>
32 Maine, the State of																					
33 Maryland, the State of	Ap, Co	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	Ap	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
34 Massachusetts, the State of	Aq, Cr, Ao, Cq (1)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i> (9)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
35 Michigan, the Territory of																					
36 Michigan, the State of																					
37 Minnesota, the Territory of																					
38 Minnesota, the State of																					
39 Mississippi Territory																					
40 Mississippi, the State of																					
41 Missouri, the Territory of																					
42 Missouri, the State of							(7)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	Cm, At, As, Au
43 Montana, the Territory of																					
44 Nebraska, the Territory of																					
45 Nebraska, the State of																					
46 Nevada, the Territory of																					
47 Nevada, the State of																					
48 New Hampshire, the State of	Bk	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
49 New Jersey, the State of	Bl	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
50 New Mexico, the Territory of																					
51 New Spain, part of	Bn, Bo (12)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
52 New York, the State of	Bn, Bo (13)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
53 North Carolina, the State of	Bp, Bq	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
54 Ohio, the Territory N. W. of the River																					
55 Ohio, the Territory South of the River																					
56 Ohio, the State of																					
57 Oregon, the Territory of																					
58 Oregon, the State of																					
59 Orleans, the Territory of																					
60 Pennsylvania, the State of	Bv	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
61 Quebec, part of the Province of	(15)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
62 Rhode Island, the State of	Bw	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
63 South Carolina, the State of	Bx, T, A, Cm	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
64 Tennessee, the State of																					
65 Texas, the Republic of																					
66 Texas, the State of																					
67 Unorganized ter. W. of Indian Country																					
68 Utah, the Territory of																					
69 Vermont, the State of																					
70 Virginia, the State of	Ce, Cn, Cf, Al (1)	<i>Id.</i>	Ce, Cn, Cf, Al	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	Ce, Cf, Al	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
71 Washington, the Territory of																					
72 West Florida, the Province of	An, Au, Di, D (3)	<i>Id.</i>	<i>Id.</i> (3)	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>	<i>Id.</i>
73 West Virginia, the State of																					
74 Wisconsin, the Territory of																					
75 Wisconsin, the State of																					
76 Wyoming, the Territory of																					

(1) And its western cession shown on the map.
 (2) And its western reserve described in *Cessions by States*.
 (3) Originally the British Provinces of East and West Florida were entirely South of the 31st parallel of North latitude and were separated by the River Appalachicola. In 1767, by an Order in Council, *At* and *C* were added to West Florida. In 1783, [the reference figure for this date is placed above in the column for 1784, for economy of space,] all of East Florida, and the part of West Florida South of the 31st parallel was ceded by Great Britain to Spain, while the rest of West Florida (*At* and *C*) was ceded to the United States. Notwithstanding the Order in Council, Georgia claimed these parcels, and they are herein accorded to that State. *Di* should be on the map, to mark all of the present State of Florida west of the Appalachicola.
 (4) The part of The Territory Northwest of the River Ohio lying west of the meridian of the present eastern boundary of the State of Indiana (Ab, Ac, Ad, Ae, Cg, W, X, Y, Z).
 (5) Also the District of Louisiana—being all of *The French Cession* (see map), except the Territory of Orleans—was committed to the government of the officers of this Territory.
 (6) And the present States of Illinois and Wisconsin.
 (7) Shown on the map.
 (8) Same extent as *The Province of Louisiana* (see map) less the Territory of Orleans. (See column for 1804, *supra*).
 (9) Less its western Cession shown on the map.
 (10) Formed subject to the claims of the State of Georgia to the territory.
 (11) Comprised the Georgia Cession as shown on the map, and *Cm* and *A* of the South Carolina Cession.
 (12) Comprised the First and Second Mexican Cessions and the Texan Annexation, as shown on the map.
 (13) And its western cession described in *Cessions by States*.
 (14) After the admission of the State of Tennessee to the Union these parcels were styled in legislation "The territory of the United States south of the State of Tennessee," until *T* was ceded to Georgia, and *A* and *Cm*, with *As* and *B* received from Georgia, were placed in Mississippi Territory.
 (15) That part of the area afterwards included in "The Territory Northwest of the River Ohio," which lies North of the "Massachusetts Cession." The British Province of Quebec was established (1763) by Royal Proclamation. By Act of Parliament (1764) the whole area styled on the map "The Territory Northwest of the River Ohio" was added to the Province. The older provinces, however, despite the Act, maintained their charter areas across the southern part of this addition to Quebec, as represented on the map by their western cessions.
 (16) Russian America.
 (17) Shown on the map; originally a French province; ceded to Spain in 1763; retroceded to France in 1800; ceded to the United States in 1802.

TABLE SHOWING THE PARCELS OF TERRITORY COMPOSING EACH POLITICAL DIVISION AT ANY YEAR FROM 1776 TO 1874.—CONCLUDED.

NOTE.—In any year not heading a column of this Table or not mentioned in a foot-note, no areal changes occurred. In the Year columns of this Table, the Roman letters refer to the parcels of territory on the Area map (Plate XV.), and the figures in parenthesis refer to the notes under this Table. Treaties of the United States with foreign powers and the Statutes of the United States for the specified years, constitute the main authorities for the facts presented in this Table. These authorities are mainly cited on pp. 574–580 of Vol. I, of the Ninth Census (1870). In that volume are an analogous map and table. That table takes up each tract of territory at the year when it became a part of the area of the United States. Hence, maps traced from that map in accord with that table will present the territory of the United States only, at the selected date. On the contrary, this table takes up in its first Year column every piece of territory which then (1776) was, or which afterwards became a part of the area of the United States; and any map traced from the area map of this Atlas, pursuant to any column of this table, will show the territory of the United States at the date selected, and will present also, with their names, the political divisions then without, but at later dates within the present limits of the United States.

Political Divisions.	1818	1819	1820	1821	1822	1834	1836	1837	1838	1845	1846	1848	1849	1850	1853	1854	1858	1859	1861	1863	1864	1866	1867	1868	1873
1 Alabama, the Territory of	Id.																								
2 Alabama, the State of	A, B, C, D																								
3 Alaska, the unorganized territory of	Id.	Id.			(14)																				
4 Arizona, the Territory of																									
5 Arkansas Territory	F.																								
6 Arkansas, the State of							F.																		
7 California, the State of																									
8 Colorado, the Territory of																									
9 Connecticut, the State of	Id.																								
10 Dakota, the Territory of	Id.																								
11 Delaware, the State of	Id.																								
12 District of Columbia	Id.																								
13 East Florida, the Province of	Id.																								
14 Florida, the Territory of						S, Di (3)																			
15 Florida, the State of									S, Di (3)																
16 Georgia, the State of	Id.																								
17 Idaho, the Territory of																									
18 Illinois, the Territory of																									
19 Illinois, the State of	W																								
20 Indiana, the Territory of	Id.																								
21 Indiana, the State of	Id.																								
22 Indian Country, The						(16)		(17)																	
23 Iowa, the Territory of									Ai, Af, Ah, Ag, N																
24 Iowa, the State of																									
25 Kansas, the Territory of																									
26 Kansas, the State of																									
27 Kentucky, the State of	Id.																								
28 Louisiana, the Province of																									
29 Louisiana, the District of																									
30 Louisiana, the Territory of																									
31 Louisiana, the State of	Id.																								
32 Maine, the State of																									
33 Maryland, the State of	Id.																								
34 Massachusetts, the State of	Id.																								
35 Michigan, the Territory of	(6)																								
36 Michigan, the State of						(7)																			
37 Minnesota, the Territory of																									
38 Minnesota, the State of																									
39 Mississippi Territory																									
40 Mississippi, the State of	Id.																								
41 Missouri, the Territory of	Id.																								
42 Missouri, the State of	Id.	(1)				(2)		(16)																	
43 Montana, the Territory of																									
44 Nebraska, the Territory of																									
45 Nebraska, the State of																									
46 Nevada, the Territory of																									
47 Nevada, the State of																									
48 New Hampshire, the State of	Id.																								
49 New Jersey, the State of	Id.																								
50 New Mexico, the Territory of																									
51 New Spain, part of	Id.																								
52 New York, the State of	Id.																								
53 North Carolina, the State of	Id.																								
54 Ohio, the Territory N. W. of the River																									
55 Ohio, the Territory South of the River																									
56 Ohio, the State of	Id.							Br, Bs.																	
57 Oregon, the Territory of																									
58 Oregon, the State of																									
59 Orleans, the Territory of																									
60 Pennsylvania, the State of	Id.																								
61 Quebec, part of the Province of																									
62 Rhode Island, the State of	Id.																								
63 South Carolina, the State of	Id.																								
64 Tennessee, the State of	Id.																								
65 Texas, the Republic of							(9)																		
66 Texas, the State of										(9)															
67 Unorganized ter. W. of Indian Country																									
68 Utah, the Territory of																									
69 Vermont, the State of	Id.																								
70 Virginia, the State of	Id.																								
71 Washington, the Territory of																									
72 West Florida, the Province of	Id.																								
73 West Virginia, the State of																									
74 Wisconsin, the Territory of							(13)		X, Z, Cg.																
75 Wisconsin, the State of																									
76 Wyoming, the Territory of																									

(1) Less F.
 (2) Less Av.
 (3) The letters Di should appear on the map to designate all of the present State of Florida west of the River Appalachianicola.
 (4) And Bc, Bd, Be, and Bf in the present Territory of Wyoming.
 (5) The present Territories of Idaho and Montana and of Wyoming, excepting Cd

THE MINOR POLITICAL DIVISIONS OF THE UNITED STATES.

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THE universal application within the United States of the principle of local self-government, has given to the several States—exhibiting, as they do, wide diversity of settlement, of interests and of traditions—codes of local law, differing in greater or less degree from each other. To indicate in detail all the peculiarities of these varying codes would be a work far too large for the present limits. They may, however, be roughly classed, according to the more or less minute subdivision of the States for local purposes, under three general types or systems, which will be known throughout this discussion as the "Town" system, the "County" system, and the "Compromise" system. It is the purpose of this paper to indicate briefly the general characteristics of these types, and to present some statistics of the minor political divisions of the country gathered from the Returns of the Ninth Census. No attempt will be made to discuss the subject philosophically, or even historically, or to speculate upon the advantages or disadvantages which attend the adoption of one or the other of the systems named.

In further limitation of this enquiry, it should be understood that it will not be extended to the Territories of the United States. They will be excluded, not on account of the scantiness of their population, or the crudeness of their political organization, but because both their present boundaries and their existing governments are provisional only. They are wholly under the control of the Federal Government, their principal executive officers being appointed by the President, the Acts of their Territorial Legislatures being subject to revision by Congress, and their single delegate having, indeed, a seat in the House of Representatives and the right to participate in its deliberations, but no vote. When, however, these Territories are once admitted as States, they attain equal rank and authority with the original members of the Union, and have the same exclusive control over their territory and interior organization. Such action of the law-making power, once had under the Constitution, becomes irrevocable.

In discussing, moreover, the peculiarities of local government in the several States of the Union, a foreign reader may need to be reminded that, however much the States may differ among themselves in size or in interior political organization, their relations to the Federal Government are absolutely the same.

Of the three systems before mentioned, the two which differ most widely from each other, not only in their general characteristics, but also in their location throughout the country, are the "Town" system of New England and the "County" system of the South. Both of these were firmly rooted in their respective sections before the Declaration of Independence, and passed through the successive transfers of sovereignty growing out of the War of the Revolution, without any material change.

It must not be understood from this classification that the County does not exist in the "Town" States, their title being simply the result of the prominence given to the "town" in their interior political organization. Indeed, so strong has been the impress of English tradition throughout the United States that, with one exception only, the political division next below the State is known as the County; and this is true, not only of the original thirteen States, but also of those erected later on territory acquired by treaty or purchase, whether from England, France, or Spain. The sole exception to the rule laid down is found in Louisiana, which, under the influence of the civil law, is divided into "Parishes." As these "Parishes," however, possess powers and general characteristics substantially the same as do the Counties of other States, the difference is considered to be one of name only and will not be further observed in the progress of this inquiry.

Attention is here invited to the statistics of Counties in the United States, as set forth in the following table, compiled from the published reports of the Ninth Census:

TABLE I.

TABLE SHOWING THE NUMBER OF ORGANIZED COUNTIES WITHIN EACH STATE, RETURNED AS HAVING POPULATION, AT EACH DECENNIAL CENSUS OF THE UNITED STATES.

STATES.	1870	1860	1850	1840	1830	1820	1810	1800	1790
Alabama.....	65	52	52	49	36	24			
Arkansas.....	61	55	51	39					
California.....	50	44	27						
Connecticut.....	8	8	8	8	8	8	8	8	8
Delaware.....	3	3	3	3	3	3	3	3	3
Florida.....	39	37	28						
Georgia.....	132	132	95	93	76	47	38	24	11
Illinois.....	102	102	99	87	51	19			
Indiana.....	92	92	91	87	63	35			
Iowa.....	98	97	49						
Kansas.....	64								
Kentucky.....	115	109	100	90	83	67	54	42	
Louisiana.....	53	48	47	38	31	25			
Maine.....	16	16	13	13	10	9			
Maryland.....	22	21	20	20	19	19	19	19	19
Massachusetts.....	14	14	14	14	14	14	20	18	16
Michigan.....	71	62	43	32					
Minnesota.....	71	64							
Mississippi.....	65	60	50	56	26	17			
Missouri.....	114	113	100	62	32				
Nebraska.....	52								
Nevada.....	14								
New Hampshire.....	10	10	10	8	8	6	6	5	5
New Jersey.....	21	21	20	18	14	13	13	13	13
New York.....	60	60	59	58	56	50	43	30	15
North Carolina.....	90	86	79	68	64	62	62	60	54
Ohio.....	88	88	87	79	73	59	36		
Oregon.....	22	19							
Pennsylvania.....	66	65	63	54	51	51	42	35	22
Rhode Island.....	5	5	5	5	5	5	5	5	5
South Carolina.....	31	30	29	29	29	28	28	25	20
Tennessee.....	85	84	79	72	62	48	38	18	
Texas.....	141	133	78						
Vermont.....	14	14	14	14	13	13	12	11	
Virginia.....	99	148	137	120	106	103	97	92	80
West Virginia.....	53								
Wisconsin.....	58	58	31						
Total.....	2164	1950	1590	1216	933	725	524	408	271

In connection with the statistics of Counties thus presented, the following table is believed to be of interest. As will be seen by its title, it gives the number of Counties of each State which, in 1870, contained one-half and three-fourths, respectively, of its population. The most casual examination of this table discloses the fact that the inequalities which mark the distribution of the population among the several States of the Union,* exist also as between the several Counties of each State. Though it was not practicable to extend the computation to every Census, yet the writer has reason to believe, from some scattering tests, that such inequalities have always existed, and in substantially the same measure for each State at each Census, as at 1870.

TABLE II.

TABLE SHOWING THE NUMBER OF COUNTIES OF EACH STATE WHICH, AT THE NINTH CENSUS, CONTAINED ONE-HALF AND THREE-FOURTHS, RESPECTIVELY, OF ITS POPULATION.

STATES.	NUMBER OF COUNTIES WHICH CONTAIN		STATES.	NUMBER OF COUNTIES WHICH CONTAIN	
	One-half of the aggregate population of the State.	Three-fourths of the aggregate population of the State.		One-half of the aggregate population of the State.	Three-fourths of the aggregate population of the State.
Alabama.....	19	36	Missouri.....	24	56
Arkansas.....	19	34	Nebraska.....	6	13
California.....	7	20	Nevada.....	3	7
Connecticut.....	3	5	New Hampshire.....	4	6
Delaware.....	1	2	New Jersey.....	6	12
Florida.....	8	16	New York.....	9	26
Georgia.....	38	81	North Carolina.....	29	53
Illinois.....	25	52	Ohio.....	28	53
Indiana.....	32	55	Oregon.....	6	11
Iowa.....	24	42	Pennsylvania.....	11	28
Kansas.....	12	24	Rhode Island.....	1	2
Kentucky.....	32	64	South Carolina.....	10	19
Louisiana.....	11	27	Tennessee.....	22	43
Maine.....	5	10	Texas.....	31	57
Maryland.....	3	10	Vermont.....	5	9
Massachusetts.....	3	8	Virginia.....	26	53
Michigan.....	14	25	West Virginia.....	15	28
Minnesota.....	11	21	Wisconsin.....	13	25
Mississippi.....	19	35			
			Total.....	535	1068

I.—THE TOWN SYSTEM.

The "Town" system, pure and simple, prevails only in the six New England States.—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. The area of these States is 68,348 sq. m., their population 3,487,924. They thus contain about one-thirtieth of the area and one-eleventh of the population of the States of the Union.

Under this system, the "town," which in its area and general characteristics conforms closely to the "township" of the West,† is the important political division of the State. It is a body corporate and politic, deriving its charter from the Legislature of the State and generally entitled to an independent representation in the lower branch of that Legislature.‡ It has power to elect its own officers, to manage in its own way its own roads, schools, local police and other domestic concerns, and collects through its own officers, not only its self-imposed taxes for local purposes, but also those levied by the Legislature for the support of the State, or by the County officers for the limited objects of their expenditure. Reference to the table following shows that the average area of the New England "town"—deduction having been made for the estimated unsettled area of Maine—is 34 sq. m., the number of its inhabitants averaging at the same time 2,450, or about 72 to the sq. m. Deducting the population of cities and towns having over 10,000 inhabitants, the average population of the town is 1700—or 50 to the sq. m. In a community of such area and numbers, meetings of the legal voters to examine the accounts and official conduct of the town officers and to consider subjects of common interest are possible; and the increased strength of public sentiment serves no less than this direct supervision to induce a proper execution of public trust.

Where so much political power is vested in the town, any larger subdivision of the State must necessarily have but a limited function. The County thus becomes in New England mainly a judicial, not a political, subdivision of the State. The jurisdiction of the executive officers of the County over the towns within it extends to the laying out of new highways and is then in the nature of an appellate one only, while such duties of those officers as relate exclusively to County affairs are confined to the care and control of the County buildings.

In further illustration of the "Town" system, thus rudely sketched, it has been thought best to detail at somewhat greater length its workings as set forth in the statutes of one of the States which has adopted it, some of the particulars in which the organization of the other "Town" States differs from that thus detailed, being at the same time indicated in foot-notes. The State chosen for this purpose is MASSACHUSETTS.

* At 1870, one-half of the population of the thirty-seven States of the Union was found within eight States, three-fourths within seventeen States.

† The "town" of New England or New York must not be confounded by a Western or Southern reader with the aggregation of houses to which in those sections the name is generally applied. The whole area of the States named, exception being made of the unorganized portions of Maine, New Hampshire and Vermont, is covered by the "towns," within whose limits may be one, two, three, or even more villages.

‡ The system of "town" representation was changed in Massachusetts in 1857 for that by Representative districts.

MASSACHUSETTS.

The County.—The officers, other than judicial,* of a County of Massachusetts, are three County Commissioners and a County Treasurer, all of whom are elected from the body of the County for three years—one Commissioner being chosen annually. A full attendance at the meetings of the Board is required for the transaction of business, vacancies arising from the absence or disqualification by reason of interest of any member, being supplied by two Special Commissioners who are elected also for three years.

The Board has power to manage the County buildings (Court House, Jail, House of Correction, Fire Proof Offices, &c.), to hear on appeal complaints of the assessment of damages for property taken for any railroad or other corporation, or of the decision of the Town Assessors in undue assessments, to lay out new highways from town to town, to license inn-holders and common victuallers, and, in regard to finances, to examine the accounts of the County Treasurer, to make annually an estimate of the amount of taxes necessary to meet the County charges, and to send a copy of this estimate to the Secretary of the Commonwealth to be laid before the Legislature for examination and allowance, to apportion the County taxes among the several cities and towns, certifying the same to the several Town Assessors, and to negotiate temporary loans and contract new debts not to exceed in any one year or for any one object \$30.00 for each 1000 inhabitants.

The accounts of the Board of County Commissioners are audited by a Board of Examiners composed of the Judge of Probate, the Register of Probate, and the Clerk of the Courts for the County. The Board of Examiners also canvass the returns of an election for County Commissioners.

The Town.—The town is, however, in New England the political unit. It is a municipal corporation with full corporate rights and powers, and responsible solely to the Legislature, from which it derives its life.

The voters of the town have power in "town-meetings" to appropriate moneys for the support of public schools, and for conveying pupils to school, for the support and employment of the poor, for laying out and repairing highways, and for all other necessary town charges.

They have power also to make by-laws in regard to their prudential affairs and for maintaining the public peace—such by-laws, when approved by the Superior Court, being binding on all persons coming within the town limits, and being enforced by penalties not exceeding \$20.00 for one offence.

The more important of the town officers, all of whom are elected annually, are, a town clerk, three, five, seven or nine selectmen,† three or more assessors, and, if deemed expedient, three or more assistant assessors, three or more overseers of the poor, treasurer, one or more surveyors of highways, three or more members of school committee, and constables, who shall collect taxes unless collectors are chosen.

The powers and duties of most of the officers above named are so clearly indicated by their official titles, that it is deemed sufficient for the purposes of this paper to speak further of the selectmen only. These are required to register the voters and provide means for elections, to establish fire departments, lay out highways, determine damages sustained by repairing the same, order a watch, grant all licenses, except to inn-holders and common victuallers, and, in general, to manage all town affairs. They, as well as the other important town officers, are required to make in town-meeting full reports of their official action.

Municipal Corporations.—So much for towns. No provision is made in this State for the incorporation by general law of villages or other municipal corporations within the limits of towns. Cities are, however, as matter of fact, towns incorporated, where, by special charter, the management of municipal affairs is transferred from the town-meeting and selectmen to the Mayor and Council.‡

To indicate more clearly the method in which the local government is administered under the town system, some of the more important of its departments are outlined below.

Schools.—Every town is obliged by law to maintain for "at least six months in the year, a sufficient number of schools for the instruction of all the children who may legally attend public school therein, in orthography, reading, writing, English grammar, geography, arithmetic, history of the United States, and good behavior."

The general supervision of the public schools is entrusted to a school committee of three members, or of any number a multiple of three, who are elected for three years—one-third going out annually. This committee has power to select and contract with the teachers, to determine the text-books and arrange for furnishing them to the scholars at cost, and in general to supervise the working of the school system, making an annual report to the State Board of Education. Assistance from the educational fund of the State is granted to the town in proportion to the number of its children between five and fifteen years of age. This number is obtained annually by the assessors and reported by the school committee to the State Board of Education.

Prior to 1869, the school law of Massachusetts provided for the districting of the town for school purposes. These districts were formed by the inhabitants of the town in town-meeting, such reference being had to the convenience of the pupils that a part of one town might be included for school purposes in the same school district with an adjoining part of another town.

In that year, the district system was abolished by general law, the property and powers of the districts reverting to the several towns of which they were parts. This act was, however, so far modified in 1870 as to allow the towns by a two-thirds vote to re-establish the school districts, and about one-eighth of the towns of the State (generally the smaller ones) have availed themselves of the permission thus given. As the school-district still exists in most of the New England States, it is deemed advisable to sketch briefly its place and function in the educational system of Massachusetts.

The School District is a body corporate for school purposes only. Its legal voters determine in district meeting where the school-house shall stand, and have power to raise money for erecting and repairing it, for purchasing or hiring buildings or land for school purposes, and for purchasing libraries and school apparatus, fuel, furniture, and other necessities.

Every town, divided into districts, chooses at its annual town-meeting, or authorizes the districts to choose, each for itself, a prudential committee of one from each district, whose duty it is to keep the school-house of that district in order, to provide fuel and other necessities for its schools, and to aid the school committee of the town in the discharge of their duties; and, if so authorized by the town, select and contract with the teachers—the committee being enlarged in the latter case to three members.

The only other officer of the district is a clerk who is required to certify to the town assessor all votes of the district for raising money, &c. The assessor, treasurer, and collector of town taxes, act in respect to school taxes.

Elections and Town-Meetings.—Every town is a voting district, unless subdivided by the Legislature for election purposes. The registration of voters is made by the selectmen. The annual town-meeting, when town officers are chosen, is held in February, March, or April. This and all other town-meetings, are held in pursuance of a warrant under the hands of the selectmen, which warrant must express the time and place of meeting and the subjects to be acted on, the selectmen being required to include in it all subjects for which ten or more legal voters may make request.

At town-meetings for the election of National, State, or County officers, the selectmen preside and canvass the votes. The result is recorded by the town-clerk and copies of the record are sent, in the case of County officers to the Board of County Examiners, and of all other but town officers to the Secretary of State.

At all other town-meetings, a moderator chosen by the meeting presides; he announces the result of an election for town officers, and administers the oath of office to such of the persons elected as may be present—the absentees being duly notified of their election.

Revenue.—State taxes are levied by the assessors of the several towns upon a warrant of the State Treasurer.

County taxes are certified to the town assessors by the County Commissioners, their estimate of the amount required to meet the County charges having been first allowed by the Legislature.

The town assessors are required further to levy all town and school-district taxes duly certified to them, one-sixth of the sum raised—not, however, exceeding \$1.50 per capita—being assessed upon the polls.

The inhabitants of the town are required to bring in annually to its assessors, sworn lists of all their polls and taxable property, from which lists a fair cash valuation of all the real and personal property of the town is obtained.

Licenses to inn-holders and common victuallers are granted by the Board of County Commissioners; all other licenses by the selectmen.

Highways.—Highways from town to town are laid out by the Board of County Commissioners after notice to the selectmen of the towns interested. Town ways and private ways are laid out by the selectmen of the several towns. Appeals in the matter of damages arising from their action, or from their refusal to lay out

roads, are entertained by the Board of County Commissioners. Appropriations for laying out and repairing highways are made by the towns in town-meeting and expended under direction of the surveyor of highways. The town may be divided into highway districts, for each of which district a surveyor of highways is elected annually, who may be empowered to collect the highway taxes of his district.

Poor Support.—Poor support is furnished by the selectmen of the several towns to all needy persons having a "residence" within their limits, while paupers having no such "residence" in any town are cared for at one of the State Alms-Houses.*

Records.—Records of births, marriages, and deaths are kept by the town-clerks—certified copies of the same being furnished to the Secretary of State.

Real Estate Records are kept by a Register of Deeds, who is elected for three years in each registration district—each County forming one or more registration districts.†

II.—THE COUNTY SYSTEM.

The "County" system, which is so markedly in contrast with that just noticed, is now found in seventeen States, viz.: Alabama, Arkansas, California, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, Nebraska, Nevada, Oregon, South Carolina, Tennessee, and Texas. These "County" States have an area of 1,243,295 sq. m., with a population of 11,955,731,—about two-thirds of the area and more than one-third of the population of all the States.

Until a recent date, the County system prevailed in every State south of Pennsylvania and the Ohio River. Within the last decade, however, North Carolina, South Carolina, and Virginia have taken measures for dividing their Counties into townships and for clothing those townships with more or less of political power; although South Carolina subsequently retraced its steps and abolished the townships thus erected. In view of this recent action of Virginia, the opinions of her great statesman, Mr. Jefferson, upon the merits of the "township" system may be not irrelevant. Extracts from three of his letters are, therefore, inserted, the order of their dates being, for convenience of citation, reversed:

"Among other improvements, I hope they (a proposed constitutional convention) will adopt the subdivision of our Counties into wards. The former may be estimated at an average of twenty-four miles square; the latter should be about six miles square each, and would answer to the hundreds of your Saxon Alfred. In each of these might be, 1st, An elementary school; 2d, A company of militia, with its officers; 3d, A justice of the peace and constable; 4th, Each ward should take care of their own poor; 5th, Their own roads; 6th, Their own police; 7th, Elect within themselves one or more jurors to attend the courts of justice; and 8th, Give in at their Folk House, their votes for all functionaries reserved to their election." (Letter of June 5, 1824, to Major John Cartwright, Opera, vol. vii, p. 357.)

In a letter to Samuel Kercheval, July 12, 1816, (Opera, vol. vii, p. 13,) Mr. Jefferson, after describing at greater length such a division of the County, adds:

"These wards, called townships in New England, are the vital principle of their governments and have proved themselves the wisest invention ever devised by the wit of man for the perfect exercise of self-government and for its preservation. We should thus marshal our government into, 1, the general federal republic, for all concerns foreign and federal; 2, that of the State, for what relates to our own citizens exclusively; 3, the County republics, for the duties and concerns of the County; and 4, the ward republics, for the small and yet numerous and interesting concerns of the neighborhood; and in government, as well as in every other business of life, it is by division and subdivision of duties alone, that all matters, great and small, can be managed to perfection. And the whole is cemented by giving to every citizen, personally, a part in the administration of the public affairs."

And again, May 26, 1810, writing to Governor Tyler, Mr. Jefferson says (Opera, vol. v, p. 525):

"These little republics would be the main strength of the great one. We owe to them the vigor given to our Revolution‡ in its commencement in the Eastern States, and by them the Eastern States were enabled to repeal the embargo in opposition to the Middle, Southern and Western States, and their large and lubberly division into Counties which can never be assembled. General orders are given out from a centre to the foreman of every hundred, as to the sergeants of an army, and the whole nation is thrown into energetic action in the same direction in one instant, and as one man, and becomes absolutely irresistible."

Resuming the consideration of the County system it is to be noted that under it all the conditions of the "town" system are reversed. The names of the greater and lesser subdivisions of the State may remain unchanged, but the powers and position of these subdivisions are in no case or degree the same. The town or township is but the skeleton of the New England town, while the County is clothed with all the political power. It derives its charter from the Legislature, and is responsible to the State authorities for its share of the State taxation. Its subordinate divisions, formed—Delaware and Maryland being exceptions—by its own officers, have no political power whatever, and exist only for convenience at the general elections, or to mark the district of a justice of the peace and a constable.§ The average area of the County in the States adopting this system is 1040 sq. m., its population 11,236, the unorganized portions of these States being excluded in the computation; or, excluding also the partially organized and settled States of the Pacific slope, its area averages 734 sq. m., its population 11,515, or about 15 inhabitants to the square mile.

The radical differences between these two types may, perhaps, be emphasized by comparing the States of Rhode Island and South Carolina in respect to their interior organization. The area of Rhode Island, as given by the General Land Office, is 1306 sq. m.,

* In New Hampshire, paupers having no "residence" in any town, are cared for at the expense of the County.

† In Vermont, Rhode Island, and Connecticut, real estate records are kept by the town-clerks of the several towns.

‡ As illustrating the views of Mr. Jefferson, a glimpse of the workings of the town system during the War of the Revolution is given in the following extracts taken from the official records of a precinct of one of the towns of Massachusetts.

"At a legal meeting held June —, 1778, Voted, to choose a committee of seven to estimate the charges of the war since the seventh part of the male inhabitants from 16 years old and upwards were raised as Continental soldiers."

July 20, 1778, "Voted, that each company within the precinct shall pay their own soldiers, and that the money granted at the last meeting shall be assessed accordingly." (The precinct contained two militia companies and here seems to have been practically subdivided for the purpose of intensifying still further its public sentiment.)

"July 17, 1780, "Voted, to authorize the precinct treasurer to give security in behalf of the precinct, to the soldiers that were last raised, for the sum contracted for, as an encouragement to their engagement in the service." And in order to strengthen still further this security for the payment of the sums named, we find under date of January 17, 1781, the following: "Voted, that the soldiers who may engage in the three years service shall have liberty to take their security of individuals whom they shall choose, and that the precinct will indemnify such persons in giving them securities in behalf of the precinct."

§ In Alabama, Florida, Kentucky, Nebraska, Oregon and Texas, these divisions are known as "precincts"; in Arkansas, California, Missouri and Nevada, as "townships"; in Delaware, as "hundreds"; in Georgia, as "militia districts"; in Louisiana, as "wards"; in Maryland, as "election districts"; in Mississippi, as "supervisor's districts"; and in Tennessee, as "civil districts." For each of the civil divisions thus named, one or more justices of the peace and constables are elected or appointed, with terms varying from 2 to 4 years.

In regard to Georgia alone does a modification of the statement in the text seem to be required, the primary object of its division into militia districts being (as their name implies) to provide for the organization within the County of its companies of militia—one in each district.

* In Rhode Island there are no County officers other than judicial.

In New Hampshire and Connecticut, County taxes are laid by the County Convention, which is called by the County Commissioners and is composed of the persons elected to represent the several towns of the County in the Legislature.

In Vermont, most of the duties of the County Commissioners are performed by the Judges of the County Court.

† In Rhode Island, the duties of the selectmen are performed by the "town council," which consists of not less than three nor more than seven electors.

‡ In Vermont, villages containing more than thirty houses may be incorporated by the selectmen of the town, with municipal powers over sidewalks, nuisances, watch, strays, &c. The officers of such villages, elected annually, are a clerk, five trustees, collector, and treasurer. Fire districts, containing not more than two square miles, may be established by the selectmen, whose officers are a clerk, prudential committee of three, collector, and treasurer.

In Connecticut, boroughs and cities are incorporated by special charter, the whole area of the town not being generally included within the municipal limits.

"Gores," in Vermont, are unorganized districts in which State taxes are assessed and collected by officers appointed by the Governor, highways are under direction of the County Court, and school districts are laid off by the selectmen of adjoining towns.

"Grants" and "Locations" in New Hampshire, are unincorporated districts, which, when called on for public taxes, are vested with all the powers of towns relating to the assessment and collection of such taxes, to choice of officers and to highways.

"Plantations" in Maine, are not clothed with the full corporate powers of towns, but may elect certain officers and raise money for schools, poor-support and legal plantation expenses. (In the early colonial history of New England, this term was applied alike to an isolated settlement, to a town, whether organized or not, and, indeed, to the colony itself—of which latter use there is still a tradition in the official title "State of Rhode Island and Providence Plantations.")

"Townships" in Maine have no corporate powers, but State and County taxes on the lands lying within them are collected by the State Treasurer.

less than double the average area of the political unit under the County system, yet it has within its limits 36 towns and cities, each being an independent political organization, while South Carolina with an area of 34,000 sq. m. has only 31 organized Counties, which are in no respect the superiors of the Rhode Island towns in political power. On the other hand, the population of the Rhode Island town averages 6038, or, excluding cities, 4000 inhabitants, the area being about 36 sq. m.; that of the South Carolina County, 22,731, distributed over an average area of nearly 1100 sq. m.

Under these conditions of settlement and organization, differing widely as they do from those of New England, the methods of administration must also differ. The area of the County forbids any general gathering of its inhabitants vested with the legislative and executive functions of the "town-meeting," as well as any intimate mutual acquaintance between the inhabitants of its different sections. Of necessity, therefore, the administration of all local affairs is entrusted wholly to the County officers, and the political duty and privilege of the citizen begins and ends on election day.

The duly authorized officers of the County are thus charged with the care and control of the County property, the levy and collection of all State and County taxes, the division of the County into election districts, the laying out and repairing of roads and bridges, the care of the poor, the police of the County, and, in general, all County and local affairs.

Following the plan already adopted, further explanation of the County system is sought to be furnished by a sketch, accompanied by notes referring to other States and acknowledged to be incomplete, of the political code of

ALABAMA.

The County.—The officers of a County of Alabama who are charged with a share of the political administration are the Court of County Commissioners, assessor, treasurer, collector, superintendent of education, apportioners of roads, and overseer of roads.

The Court of County Commissioners is composed of four commissioners elected for three years from the County at large, with the Judge of Probate, elected for six years, as principal judge. This Court possesses original jurisdiction over matters pertaining to roads and bridges, and has authority to divide the County into election precincts and road districts, to direct and control the County property, to appoint certain County officers, as specified below, to correct the assessments, to levy general and special taxes, to examine, settle and allow all accounts and claims against the County, to examine the accounts of all County officers, to regulate poor support, to establish hospitals, and, in general, to transact all the business of the County.*

The assessor,† collector, and superintendent of education,‡ are elected from the body of the County, and perform the duties usually devolving upon such officers.

The treasurer,§ three apportioners of roads for each election precinct, and an overseer of roads for each road district, are appointed by the Court of County Commissioners, the former officer for three years, the latter for two only.

Municipal Corporations.—Under general law, towns containing not less than 100 nor more than 3000 inhabitants may be incorporated by the Judge of Probate, thus obtaining the powers and rights usually granted to such municipalities. Their affairs are managed by an Intendant and five councillors elected annually, the number of councillors being, in some cases, increased to nine. Taxation for municipal purposes is limited to one per-centum on the assessed valuation and a poll-tax of two dollars per capita. Road and patrol duty is not required of the inhabitants outside of the corporation limits. It may be added, however, that most of the towns of Alabama, following the custom in regard to cities, are incorporated under special charters from the Legislature, though such charters differ but little in scope and detail from that outlined in the general law.

Schools.—The school system of Alabama is conducted somewhat as follows:

The superintendent of education for the County has general supervision over all its public schools, examines the teachers and grants certificates to them, and distributes to the trustees of each school district the district's proportion of the State and County funds for school purposes.

The County school-tax is limited by general law to 10 cents on each \$100 of valuation, and is assessed and collected as are other taxes, though a higher rate may be authorized in any County by special legislation. No additional taxes are imposed by the school districts.

Congress granted the sixteenth section of every surveyed township for school purposes. Every "Congressional township" is, therefore, incorporated as a school district for the use and management of the funds arising from this grant and for other school purposes. The affairs of these school districts are managed by three trustees, elected annually, who have full power to establish schools, employ teachers, etc., etc. The trustees are required to report annually to the County superintendent of education the number of children of school age within the district—the school fund of the State and County being distributed upon the basis thus ascertained.

Elections.—The Court of County Commissioners has power to establish and change election precincts, for each one of which three inspectors of election are appointed by the Judge of Probate. The inspectors determine the qualifications of each elector as he presents his ballot, no registration of voters prior to the day of election being made. Upon the acceptance of his ballot, his name is entered on the "poll-books" by the clerks of election and a number corresponding to that there given him is marked upon the back of his ballot. Returns of the election are made by the inspectors to the Court of County Commissioners and canvassed by them.¶

Revenue.—All taxes, State and County, are levied by the Court of County Commissioners, the County tax not being permitted to exceed fifty per centum of the State tax. An annual assessment of the property of

* The official titles and methods of choosing the officers who, in the Counties of other States, correspond with the Court of County Commissioners of Alabama, differ widely.

† In Florida, Maryland, Nebraska, Nevada, and South Carolina, they are known as the "Board of County Commissioners." In Florida these Commissioners are five in number, appointed by the Governor, as are all other principal officers of the County, for two years; in Maryland the number is determined by special legislation for each County, one-half being elected biennially for four years; in Nebraska the Board consists of three members, one being chosen annually for three years; in South Carolina, of three, elected biennially; in Nevada, also of three, this number being increased to five in those Counties which have 4000 voters or over.

‡ In Arkansas, Kentucky, Oregon, Tennessee, and Texas, the powers of the County are exercised by the County Court, the members of which, when not otherwise indicated, are elected biennially from the body of the County. This County Court is composed, in Arkansas, of a Presiding Judge elected by the County, and two Justices of the Peace elected by the Justices of the Peace of the County—the latter being in turn appointed by the County Court; in Kentucky, of a Presiding and two Associate Judges; in Missouri, of three Judges; in Oregon, of the County Judge, with or without two Commissioners; in Tennessee, of the Justices of the Peace, elected for six years by the several Civil Districts of the County; in Texas, of a Chief Justice and four Commissioners, elected, one from each of the five precincts into which the County is divided.

§ In Georgia, County affairs are entrusted to the Ordinary, elected for four years, who possesses also, as do the County Courts of the States just named, powers exclusively judicial.

¶ In Delaware, the powers of the County are exercised by the Levy Court, which is composed of one or more Commissioners elected for four years from each hundred of the County.

¶ In California and Mississippi these officers are styled Supervisors, the Board in the latter State consisting of five members, in the former of three, five or seven, as the County has less than 8,000 inhabitants, between 8,000 and 20,000, or over 20,000. In both States, the members must be residents of the districts which they represent, while in Mississippi only are they elected by their respective districts. Their term of office is, in California, three years; in Mississippi, two.

¶ In Louisiana, the Board is styled the Police Jury, and is composed of members elected from the various wards of the Parish.

† I note that the duties of assessor are performed in Arkansas by the Sheriff; in Delaware, Nebraska and Tennessee, by an assessor for each hundred, precinct, or civil district; in Georgia, by a tax receiver; and in Maryland, by the collector.

‡ Taxes are collected in Arkansas, Missouri (if there is no collector), Oregon and Texas, by the Sheriff; in Nebraska, Nevada and South Carolina, by the treasurer.

§ In Georgia, a County Board of Education consisting of five members is elected by the Grand Jury, the secretary of this Board chosen from its members being *ex-officio* Superintendent of Education.

¶ The treasurer is appointed in Delaware by the Levy Court; in Florida and South Carolina by the Governor; and in Maryland, generally by the Board of County Commissioners. In most of the other States he is elected by the people.

¶ This system of conducting elections obtains in Georgia and, unless recently changed, in Arkansas and Florida also. In Kentucky, Maryland, Nebraska (except in cities having over 15,000 inhabitants), Oregon, South Carolina, Tennessee, and probably Texas, the ballots are not numbered, but in other respects the system does not differ materially from that of Alabama.

¶ In Delaware, Louisiana, Missouri and Nevada, the voters are registered prior to an election, by officers appointed as follows: In Delaware, by the Clerk of the Peace for the County; in Louisiana, by three Commissioners of Election for each ward of the Parish, who, as also the State Registrar, are appointed by the Governor; in Mississippi, by a Board of Registration (three members) for each County, who are appointed by the Sheriff, the Chancery Clerk, and the President of the Board of Supervisors; in Missouri, by an "officer of registration" in each election district, who is appointed by the Superintendent of Registration for the County, the latter officer receiving his appointment from the Governor; and in Nevada by the Justices of the Peace in each township.

¶ I note that in Delaware, the Inspectors of election for each hundred, and in Maryland, the Judges of Election for each election district, form a Board of Canvassers for the County. In South Carolina, the Governor appoints three Commissioners of Election for each County, who form the County Board of Canvassers, and appoint three Managers of Election for each precinct.

¶ In Nebraska, three Judges and two Clerks of Election are elected for each precinct.

the County is made by the County assessor, and corrected by him under the direction of the County Commissioners.

Licenses are granted by the Judge of Probate.

There is no restriction in the Revised Laws of the State upon the power of the Counties to borrow money or loan their credit to corporations.

Highways.—New roads are established by the Court of County Commissioners. On receipt of an application for the laying out of a new road, the Court appoints seven disinterested persons to examine and mark out the road, and assess damages, and takes action upon their report. Election precincts, for each of which the Court appoints three apportioners of roads, and road districts, an overseer of roads being appointed for each,* are laid out and altered by the County Commissioners.

The apportioners of roads detail to each overseer of roads the persons and hands liable to road duty in his district and inspect the roads of their election precinct, reporting to the Court of County Commissioners on their condition. The overseer of roads superintends the actual working of the roads of his district.

Poor Support.—Poor support is furnished at the expense of the County by the Court of County Commissioners, who have power to provide poor-houses and hospitals.†

Real Estate Records are kept in the office of the Judge of Probate.‡

III.—THE COMPROMISE SYSTEM.

There yet remains to be noted, however, what I have ventured to call the "Compromise" system, which, having its home in States lying between those already named, is itself the result of a fusion of the systems which prevail on either side of it. This third general type has been adopted in the organization of the States of the Northwest, and now prevails in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia, West Virginia, and Wisconsin. These fourteen States contain 672,824 sq. m., and 22,671,986 inhabitants, their area being about one-third of that of the States of the Union, their population nearly two-thirds. The average number of inhabitants to the square mile is nearly 34.

The States above named may be again subdivided with reference to the manner of electing their County officers into the "New York" system and the "Pennsylvania" system, the former prevailing in Illinois,§ Michigan, New Jersey, New York, Virginia, West Virginia, and Wisconsin; the latter in the other States of this group. The difference between these two systems is one of form and name rather than of substance. In New York, the powers of the County are exercised by a Board of Supervisors, in which Board the towns of the County are represented as equal political communities. In Pennsylvania, on the other hand, the affairs of the County are managed by a Board of three Commissioners elected from the body of the County. In New York, also, the Supervisor who represents the town in the County Board has other town duties and is thus an officer both of the town and the County, while the County Commissioner in Pennsylvania has no township duties whatever.

In the "Compromise" system, as seen in the largest and most important States of the Union, the political power, which in New England is lodged with the town and at the South with the County, is divided between the two organizations. The County is the creation of the State Legislature and the political unit. It is, however, subdivided into towns, or townships, which possess considerable political rights, and thus becomes a miniature of a State as subdivided for local purposes into its Counties. The townships are laid out by the County officers—in New Jersey only, by the Legislature of the State—and have power to elect their own officers, to lay out and repair their highways, to determine in township-meeting the amount of taxes to be raised for school and other local purposes and submit an estimate of the same to the County authorities for approval, and, in general, to act upon all local matters in much the same way as the New England town, subject, however, to the *supervisory* control of the County.

The County thus becomes a more important factor in the administration of local affairs than in New England. Its executive officers are required to discharge all duties properly connected with the County administration, and, in addition, to audit the accounts of township officers and accounts and claims against the township and direct the raising of funds for their payment, to approve of votes of the township for borrowing money or incurring any extraordinary expenditure, and to levy on the property of the township such taxes for township purposes as may be duly certified to them by the township officers.

So nearly do the two subdivisions of the "Compromise" system, which have been previously noticed, resemble each other in the distribution of power between the County and its constituent parts, that it is believed that the workings of the system will be sufficiently indicated by reference to the code of one State only—that of

NEW YORK.

The County.—The County is in New York, as elsewhere, a body politic with the usual corporate powers, which can be exercised by the Board of Supervisors|| only, or in pursuance of a resolution adopted by them. Its officers, in addition to the Board of Supervisors, are a Treasurer, a Clerk, and a School Commissioner,—the two former being chosen for two years, the last for three years.¶

The duties of the Board of Supervisors in regard to town affairs will be indicated hereafter. In County matters they have power to locate, erect and care for the County buildings (court-house, jail, and clerk's office), to borrow money for building purposes for a term not exceeding ten years, and to lay a tax not exceeding \$5,000 in any one year, to appoint special commissioners to lay out highways which they deem important, in cases where the town commissioners of highways refuse to act, to lay and apportion among the several towns taxes for building and repairing bridges and highways where in their judgment the whole or part of such taxes should not be borne by the town in which the highway or bridge lies, to examine and allow accounts against the County** and lay taxes for their payment.

The duties of the other political officers of the County can be inferred from their official titles.

* In Maryland, a Supervisor of Roads is elected biennially, in each election district; in Nebraska he is elected annually in each road district; but, in general, the subordinate road officers are appointed in the manner indicated in the text.

† In Delaware, the Levy Court appoints three Trustees of the Poor for each hundred; in Maryland the County Court appoints Trustees of the Poor for the County; and in Tennessee the same authority appoints three Poor House Commissioners.

‡ In California, Missouri and Nevada, transfers of real estate are recorded by a Recorder of Deeds; in Tennessee, by a Register; but in most of the "County" States, by the County Clerk.

§ Twenty-six Counties of Illinois, with an average area and population but little more than half those of other Counties of the State, and lying in its southern part, still retain the County system, and are not, therefore, divided into townships.

¶ In New Jersey, the Board corresponding to this is known as the "Board of Chosen Freeholders," each township electing annually two members.

¶ In Indiana, Iowa, Kansas, Minnesota, Ohio and Pennsylvania, the duties of the Board of Supervisors are entrusted to three "County Commissioners," one of whom is, in most of the States named, elected annually for three years, the term of office being limited in Kansas only to one year. In Minnesota, Counties having over 800 voters, elect five Commissioners; in Iowa, where the "Pennsylvania" system has been recently substituted for that of New York, the number of Commissioners may be increased to five or seven—the largest number being that generally adopted; while in Kansas, Counties having over 30,000 inhabitants (one in number at 1870) elect biennially a Commissioner from each representative district.

¶ In North Carolina, the Board consists of five Commissioners elected for two years.

¶ The County in Indiana, Iowa, Minnesota and Ohio, elects an auditor for two years.

** In Pennsylvania, a Board of three County Auditors is charged with the examination of the accounts of all County officers.

The Town.—The town has power to lay out roads within its own limits,* to determine the amount of taxes to be levied for town purposes, to manage its own schools, and, in general, to conduct all town affairs with much the same freedom as the town of New England. Its action is, however, subject to revision by the Board of Supervisors for the County in several important particulars. Thus the Board of Supervisors must approve of all votes of the town for borrowing money, and has authority to audit the accounts of town officers, and accounts and claims against the town, and to direct the raising of money for their payment, to equalize the assessments of the several towns in the County, to levy all taxes—State, County, and town—properly certified to them, and to issue their warrant to the town collector for the collection and distribution of the same among the several funds for which they were raised. Indeed, as has already been indicated, the Board of Supervisors has power, by a two-thirds vote, to erect a new town, or alter the bounds of a town already existing—a power which with the "town" system is vested in the Legislature.†

The principal officers of the town, elected annually, are a supervisor,‡ town-clerk, assessor, collector, and commissioner of highways. The number of assessors is three, their term of office being three years. If the town so decides, they may elect three commissioners of highways, whose term is, in such case also, three years.

Municipal Corporations.—Provision is made by general law for the incorporation as a village on application to the Court of General Sessions of any town containing not less than four hundred inhabitants and three hundred inhabitants to each square mile, or of any part of a town or towns not within the limits of an incorporated city or village, containing not less three hundred inhabitants to each square mile of territory.

The village officers are a president, three trustees, three assessors, collector, treasurer, clerk, and not more than five fire-wardens. The trustees are *ex officio* commissioners of highways, though without jurisdiction over the establishment, alteration or discontinuance of roads, and have power also to care for the village property, to audit accounts and claims against the village, to grant licenses, to make all necessary by-laws, etc., etc.

The village thus incorporated may make all necessary municipal regulations for the public peace and health, and is a separate highway and fire-district. It does not, however, have any separate representation in the Board of Supervisors, nor is it independent of its town for purposes of elections or taxation.

Cities are incorporated by special legislative enactments, and are entitled to such representation in the Board as is granted by their charters. They are independent of the townships in which they are located.§

This sketch of the "compromise system" will be closed with a brief *resumé* of the method of administration in those departments only in which the powers of the New England town are divided between the town and the County, those powers having been detailed somewhat at length when speaking of the "town" system.

In New York, *elections* are supervised and *highways* are established, repaired and discontinued by town officers and under substantially the same regulations as in Massachusetts.

Schools.—The schools in the various towns of the County are under the superintendence of a School Commissioner, who is elected triennially in every County which constitutes an assembly district. He has the power, vested in the school committee of the New England town, to enquire into the management of the schools of his County and the methods of instruction, to examine teachers and grant certificates to them, to advise and counsel with the officers of the several districts, and acting alone or jointly with the Supervisor or Town Clerk to divide the towns into school districts, whose officers chosen annually are a clerk, one or three trustees, a collector and librarian, and whose powers correspond closely in all respects with those of school districts in New England.

Revenue.—All taxes, except those laid by school districts for school purposes, are levied by the Board of Supervisors for the County—State taxes upon warrant of the proper State official, County taxes not exceeding \$5,000 per annum, as they themselves may determine, and town taxes as certified by the supervisor of the town.

The assessment of property is made in each town and ward of a city by its assessors, who may, if they see fit, divide the town into districts, and who meet as a Board of Equalization after they have completed their assessments. The assessment roll thus revised is transmitted to the Board of Supervisors, who equalize the assessed valuation between the several towns and cities of the County—the aggregate assessed valuation of the County as returned by the assessors being, however, not reduced—and levy on each piece of property the taxes as just indicated.¶ A copy of the list thus completed is forwarded to the Comptroller of the State, and to the supervisor and collector of the town, together with a warrant directing the latter officer to collect the sums named and pay over to the proper town officer the amounts collected for schools, for highways, for poor support, and for town expenses, the balance being paid to the County Treasurer.

Poor Support.—Paupers having a residence in any town are supported by it; other paupers by the County. It is, however, within the power of the Board of Supervisors of any County to abolish the distinction between "town" and "County" poor, thus making all paupers a charge on the County.¶¶

Real Estate Records.—These are kept by the County Clerk.**

In concluding this sketch of the minor political divisions of the United States, which is put forward as a contribution, merely, to a subject rarely discussed, the writer ventures to present in the following Tables, numbered III and IV, some statistics in regard to such divisions existing at 1870. Table III is devoted to the Counties of the several States; Table IV, to the minor divisions of those Counties, however characterized. In the computation of the average area of the County, as shown in Table III, care has been taken to exclude such portions of any State as, from sparseness of settlement or other cause, were outside of the limits of organized Counties. In the similar computations for Table IV, it was found that the returns of minor political divisions were in some States so imperfect as to require estimates for one or more Counties, and in others, notably of the County system, so irregular as to defy estimate and calculation alike. These latter States—Alabama, California, Florida, Nebraska, Nevada, and Oregon—are, therefore, omitted from the table. The figures given for Mississippi and Texas were not obtained, as were the others, from the Census returns, but by a calculation based on the law of those States, which requires each County to be divided into five districts or "beats" for the election of members of the County boards of administration. By reason of the exclusions thus rendered necessary, Table IV accounts for but 36,114,247 inhabitants of the 38,115,641 living in the States of the Union at 1870.

It should be added further, that in determining the number of political divisions, incorporated cities have been included only when they were returned as independent, *territorially*, of the townships or other divisions of the Counties in which they are situated.

* In *New Jersey* new roads are laid out under the supervision of the Court of Common Pleas; in *Pennsylvania*, by a similar court which, when engaged upon County business, is known as the "Court of Quarter Sessions."

† This power is, in *Pennsylvania*, entrusted to the "Court of Quarter Sessions"; in *Virginia*, to the "County Court"; in *New Jersey*, to the Legislature of the State. It can be exercised by the Board of Supervisors in *West Virginia*, only with the consent of the people interested.

‡ In *Wisconsin*, a Board of three Supervisors is elected, the chairman of which represents the township in the County Board. In *New Jersey*, two Chosen Freeholders are elected by each town to represent it in the County Board of that name. In *Illinois*, towns having more than eight hundred voters elect, in addition to the supervisor, an assistant supervisor, who, also, is entitled to a seat in the County Board.

§ In *Ohio*, and most of the States adopting the Pennsylvania system, three trustees are annually chosen to manage the affairs of the town, this number being in *Kansas* reduced to one, and the official title being changed in *Minnesota* and *Pennsylvania* to Supervisors. The township in *Minnesota* elects three supervisors; in *Pennsylvania*, one or two. In *North Carolina*, the township clerk and two justices of the peace, elected biennially, are *ex officio* trustees of the township.

¶ In *Pennsylvania*, boroughs having over three hundred inhabitants may be incorporated by the Court of Quarter Sessions with the concurrence of the Grand Jury. When thus incorporated, they are independent of the township in the assessment of County rates and levies. The borough officers are, a burgess, town council of six members, two overseers, town constable, one judge and two inspectors of election, one assessor and two assistant assessors, borough auditor and six school directors.

¶¶ In *Ohio*, the Municipal Act of 1869 provides for the uniform incorporation under its provisions of municipalities, as follows: of incorporated villages for special purposes, of incorporated villages, of cities of the second class, and of cities of the first class. Cities of the first class must contain 20,000 inhabitants or over, those of the second class, between 5,000 and 20,000, incorporated villages, between 500 and 5,000, and incorporated villages for special purposes, not less than 50 legal voters. In cities and incorporated villages, municipal authority is vested in a Mayor and Council elected for two years, the Council to consist of two members for each ward or at least for six members for the municipality—one-half being chosen annually. In incorporated villages for special purposes, the municipal affairs are managed by three trustees, one being chosen annually for three years. Provision is also made for the advancement, on petition to the County Commissioners, of these corporations in grade as they reach the limits fixed; as also for the discontinuance of the organization of any township whose territory is fully covered by an incorporated village or city.

¶ I note that the levy of taxes is made in *Ohio* and several other States by the County Auditor; in *New Jersey*, by the town assessor. In *Pennsylvania* and *Virginia*, County taxes are levied and collected by the County officers, and township taxes by the township officers.

Speaking broadly, it may be said further, that in the States adopting the Pennsylvania system, all taxes—State, County and township—or all except township taxes, are collected by County officers.

* I note that in *Indiana*, *Kansas*, *North Carolina*, *Virginia*, and *West Virginia*, all paupers are relieved at the expense of the County. In *Pennsylvania*, poor support is under the charge of the County Director of the Poor; in *Virginia*, of a Superintendent of the Poor.

** In *Indiana* and *Ohio*, papers relating to real estate are recorded by a "Recorder"; in *Kansas*, *Michigan*, *Minnesota*, *North Carolina*, and *Wisconsin*, by a Register of Deeds.

TABLE III.

TABLE SHOWING THE NUMBER, AVERAGE AREA, AND AVERAGE POPULATION OF THE ORGANIZED COUNTIES OF THE UNITED STATES, RETURNED AS HAVING POPULATION AT THE NINTH CENSUS. [Area in square miles.]

THE "TOWN" SYSTEM.	Total number.	Average area.	Average population.	THE "COUNTY" SYSTEM.	Total number.	Average area.	Average population.
Connecticut	8	594	67,182	South Carolina	31	1,097	22,761
Maine	16	2,062	39,182	Tennessee	85	536	14,806
Massachusetts	14	557	104,096	Texas	141	1,128	5,805
New Hampshire	10	928	31,830	The System	1,064	1,040	11,236
Rhode Island	5	261	43,471	The System, excluding Pacific States	978	734	11,515
Vermont	14	729	23,611				
The System	67	1,020	52,060				
				THE "COMPROMISE" SYSTEM.			
Alabama	65	780	15,338	Illinois	102	543	24,969
Arkansas	61	856	7,942	Indiana	92	367	18,268
California	50	3,780	11,205	Iowa	98	562	12,184
Delaware	3	707	41,672	Kansas	64	739	5,694
Florida	39	1,519	4,814	Michigan	71	731	16,677
Georgia	132	439	8,971	Minnesota	71	960	6,193
Kentucky	115	328	11,487	New Jersey	21	396	43,147
Louisiana	53	780	13,715	New York (1)	60	783	73,046
Maryland	22	506	35,495	North Carolina	90	563	11,901
Mississippi	65	725	12,737	Ohio	88	454	30,287
Missouri	114	573	15,100	Pennsylvania (2)	66	697	53,363
Nebraska	52	1,040	2,365	Virginia	99	387	12,375
Nevada	14	7,437	3,035	West Virginia	53	434	8,340
Oregon	22	4,331	4,133	Wisconsin	58	930	18,184
				The System	1,033	600	21,948

RECAPITULATION.

	Total number.	Average area.	Average population.
THE "TOWN" SYSTEM	67	1,020	52,060
THE "COUNTY" SYSTEM	1,064	1,040	11,236
THE "COMPROMISE" SYSTEM	1,033	600	21,948
THE UNITED STATES	2,164	829	17,613
THE UNITED STATES, EXCLUDING THE PACIFIC STATES	2,078	677	18,009

(1) Excluding the City and County of New York, the average population is 58,313. (2) Excluding the City and County of Philadelphia, the average population is 43,812.

TABLE IV.

TABLE SHOWING THE NUMBER AND AVERAGE AREA OF THE TOWNS, TOWNSHIPS, OR OTHER POLITICAL DIVISIONS OF THE COUNTIES OF THE UNITED STATES, SO FAR AS THE SAME CAN BE ASCERTAINED FROM THE RETURNS OF THE NINTH CENSUS, TOGETHER WITH THEIR AVERAGE POPULATION, AND ALSO THEIR AVERAGE POPULATION AFTER CITIES AND TOWNS HAVING OVER 10,000 INHABITANTS HAVE BEEN EXCLUDED.

THE "TOWN" SYSTEM.	Total number.	Average area.	Average population.	Average population, excluding cities and towns having over 10,000 inhabitants.	THE "COUNTY" SYSTEM.	Total number.	Average area.	Average population.	Average population, excluding cities and towns having over 10,000 inhabitants.
Connecticut	164	29	3,277	2,377	Tennessee	1,282	36	982	931
Maine (1) (2)	412	36	1,522	1,356	Texas	705	226	1,161	1,124
Massachusetts	338	23	4,318	2,348	The System	6,961	79	1,301	1,255
New Hampshire (2)	231	39	1,378	1,193					
Rhode Island	36	36	6,038	3,015	THE "COMPROMISE" SYSTEM.				
Vermont (2)	243	42	1,360	1,301	Illinois (7)	1,545	36	1,644	1,387
The System	1,424	34	2,450	1,700	Indiana	993	45	1,693	1,548
					Iowa (8)	1,187	45	1,006	932
THE "COUNTY" SYSTEM.					Kansas (9)	353	104	1,032	982
Arkansas	659	79	735	717	Michigan (8)	859	60	1,379	1,233
Delaware	31	68	4,033	3,139	Minnesota (10)	662	79	664	616
Georgia (3)	1,122	52	1,055	996	New Jersey	228	37	3,974	2,663
Kentucky	845	45	1,563	1,370	New York	942	50	4,653	2,642
Louisiana (4)	444	93	1,637	1,248	North Carolina	809	63	1,324	1,308
Maryland	193	52	4,046	2,675	Ohio	1,357	29	1,964	1,620
Mississippi	325	145	2,547	2,500	Pennsylvania	1,452	32	2,426	1,727
Missouri (5)	940	70	1,831	1,436	Virginia (8)	435	88	2,817	2,586
South Carolina (6)	415	82	1,700	1,582	West Virginia	313	73	1,412	1,355
					Wisconsin	780	69	1,352	1,228
					The System	11,915	59	1,923	1,504

RECAPITULATION.

	Total number.	Average area.	Average population.	Average population, excluding cities and towns having over 10,000 inhabitants.
THE "TOWN" SYSTEM	1,424	34	2,450	1,700
THE "COUNTY" SYSTEM	6,961	79	1,301	1,255
THE "COMPROMISE" SYSTEM	11,915	59	1,923	1,504
	20,300	69	1,695	1,433

(1) The average area is estimated. (2) Only organized towns included in computations. (3) Militia Districts of twenty Counties estimated. (4) Wards of four parishes estimated. (5) Townships of one County estimated. (6) Townships of three Counties estimated. Since 1870, all townships in this State have been abolished. (7) Townships of the twenty-six unorganized Counties estimated from the returns of precincts or land survey townships of those Counties. (8) Townships of two Counties estimated. (9) Townships of twelve Counties estimated. (10) Townships of nineteen Counties estimated.

THE PROGRESS OF THE NATION—1790—1870.

[PLATES XV—XIX.]

BY THE COMPILER OF THE ATLAS.

THE series of maps numbered 15 to 19 inclusive, is intended to exhibit the growth of the United States in population, from the date of the first census, 1790, through eight decades, to 1870. The method pursued in the compilation of these maps is in general that which has been adopted in the preparation of the geographical illustrations of the statistics of the ninth census. The county has ordinarily been taken as the unit of treatment. Its population at the period to which the individual map has reference, having been ascertained, and deduction having been made of the population of any city of 8,000 inhabitants or more found within it, in order that the population of such city might be represented separately from the other population of the county, the number of inhabitants was divided by the number of square miles in the county, the quotient representing the average density of settlement. Where, however, any county was of unusual extent, or there was reason known to the compiler for suspecting that various portions of it might be found in very different stages of settlement, the county was no longer taken entire, but the investigation was carried down to sections of the county and even to its several townships. The number of counties thus broken up for the purposes of this compilation, would naturally vary much. At some censuses, they would amount to several hundreds; at others, to scarcely as many score. The average density of each county or part of a county, by turns, having been thus ascertained, all were grouped according to five degrees of density, as exhibited in the scales accompanying the maps. The plan of grouping has been to make as large groups as could be done without merging any appreciable proportion of counties in groups of a markedly different grade. Thus, if a single county of small extent belonging to Group III. should appear surrounded by numerous counties of Group IV. or of Group II., it would not be preserved distinct, but would take the shading of its general section. If, however, a county of Group IV. or V. should appear among counties of Group I. or II. the distinction would be regarded as of sufficient importance to be maintained. Again, a county whose average brought it within Group IV. might come between III.'s and V.'s, appearing thus to belong to a group distinct from both. Yet the resolution of the county into its constituent townships might develop the fact that those parts of the county which bordered on the III.'s were themselves of that grade, while the parts bordering on the V.'s were of that degree of density. In such a case, the division of the county by a central line, and the throwing of the parts, on the one side and on the other, into the adjacent groups, would not only dispense with the necessity of preserving a troublesomely small group upon the map, but would even better represent the facts of the case. Again, a tier of counties along a river might yield a quotient showing an average population of but thirty to the square mile, and thus in Group III. while examination of the townships would show that for a few miles from the river the population was not less than one hundred to the square mile, and thus in Group V. while the portions of the county away from the river would sink back into Group II. or I.

The above illustrations will perhaps sufficiently convey the idea which has governed in the grouping of the smaller territorial divisions, for the purposes of these maps. The compiler has gone as low down as the county, or even as the township, not with a view to separately representing each such individual subdivision, but for the sake of more exactly determining the true line of demarcation between considerable groups, and of resolving such false appearances as those indicated in the latter two illustrations given above.

The difficulties experienced in carrying out this plan arose, first, from the failure of the publications of the earlier censuses, in no small proportion of cases, to give the facts of population for any smaller divisions than the county; and secondly, from the absence of good maps, representing the States in sufficient detail, at several of the periods taken for this treatment. I will not weary the reader with a description of the various means to which recourse was had in the course of this compilation, to obviate these difficulties; suffice it to say that in the main, the difficulties were overcome to an extent which allowed the delineation of groups of population to be as minute as the scale of the maps would admit. Had the maps been taken all of the same size, the increasing weight of these difficulties, as we go back in our national history, would have made the earlier ones less and less precise in their determinations of population. But as the scale of the maps for 1840 and 1830 is smaller than for 1870-50, and that for 1820-1790 much smaller still, most, if not all, the errors of delineation, slight even on the scale used for 1870-50, practically disappear.

Such being the system and scope of the illustrations under consideration, I propose to discuss the statistics of population, from 1790 to 1870, geographically and by methods somewhat novel. The discussion will have constant reference to the maps bearing plate

Nos. XV-XIX. As these maps do not profess to exhibit settlements which do not reach an average of two inhabitants to the square mile, for a tract large enough to be shown to the eye on the scale used in the smallest—those for 1790-1820, it follows that the outside lines of color indicate the limits of a population of two or more to the square mile. The petty population that lies beyond is made up of the solitary ranchman, the trapper and the fisherman, the small mining party, and the lumbering camp at the sources of streams that find their later way into more populous regions.

Let us consider the results of some measurements and computations as to the extent of these outside lines of color, and of the spaces which they enclose.

Measuring upon the larger map (scale 1 : 4000,000) from which the engraved maps have been reduced, I find the length of the unbroken line which starts on Passamaquoddy Bay in Maine, upon the map of 1790, and runs around the continuously populated region, in and out as the facts of settlement require, until it issues on the Atlantic just above the Florida boundary, to be 3,200 miles. In this measurement, no account is made of slight tremulous irregularities, as, for example, those which are due to the ordinary meanderings of a river forming the boundary of a group of population; but I have carefully traced all the ins and outs of this "line of population" which seem to indicate a distinct change of direction in the settlement of the country, for any cause, whether in progression or in retrogression.

What, now, is the area embraced between the coast and the line thus described? This, again, it has been sought to determine as closely as it could be done on a map of the scale used in the compilation, and also as the nature of the subject would allow. Such a determination must of necessity be merely approximate, inasmuch as the statements of the General Land Office, our highest official authority on this subject, in regard to the areas of the several States and Territories, are seldom the result of completed surveys. I have, moreover, taken these areas generally somewhat below the Land Office figures, in allowance for considerable bodies of water found within the limits of the States. No attempt has been made to deal with this matter with mathematical nicety. Errors to the extent of one or two per cent, in the case of any State, have been seen to be unavoidable in the nature of the subject, though it is not doubted that such errors will to a considerable extent neutralize each other, in the result for the whole United States. At the same time, while making no claims to minute accuracy, I shall preserve the results just as I reach them in my computations, giving the square miles down to hundreds, tens, and even units, not that it is to be supposed that the results are exact to anything like that degree, but at once for the greater convenience of discussion, and to allow each of my readers to make his own allowances for probable error.

The settled area of 1790, then, as indicated by the line traced, I find to be 226,085 square miles. The entire body of continuously settled territory, thus composed, lies between 31° and 45° N. Lat. and between 67° and 83° W. Long.

Outside, however, of this body of continuous settlement, there were, at 1790, in addition to a score of small and remote posts and settlements, such as Detroit, Vincennes, Kaskaskia, Prairie du Chien, Mackinac, Green Bay, Sault St. Marie, etc., and in addition to the humble beginnings of Elmira and Binghamton in New York, which then lay outside the line traced on the map, three considerable masses of population, one in Western Virginia, one in Kentucky, and the third in Tennessee, which require to be taken into account in computing the settled area. That in Western Virginia lay upon the Ohio and Kanawha rivers, and comprised about 750 square miles. That in Kentucky lay across the Licking, Kentucky, Salt and Green rivers, and comprised about 10,900 square miles. That in Tennessee lay along the Cumberland river, and embraced about 1,200 square miles. If we add 1,000 square miles for all the other patches of settlement outside the "line of population," we shall have the settled area of 1790, 239,935 square miles, the aggregate population being 3,929,214, and the average density of settlement 16.4 inhabitants to the square mile.

At the second census, 1800, the "line of population" had been rectified so that, though it embraced 282,208 square miles, it described a course, when measured as was that of 1790, of but 2,800 linear miles. The advance of the frontier line in every direction, at this census, is too plainly shown upon the map to require to be pointed out in detail. From the region thus defined, however, there must be deducted an unsettled tract in New York State containing not less than 10,300 square miles, embracing the counties of Hamilton, Essex and Warren, and large portions of Fulton, Herkimer, Lewis, St. Lawrence, Franklin and Clinton, being the general region of the Adirondack Mountains. So that

the actual area of settlement within the line of population is to be taken as 271,908 square miles. All this lay between $30^{\circ}45'$ and $45^{\circ}15'$ N. Lat. and between 67° and 88° W. Long.

Outside this line of continuous settlement, we have the Kentucky and Tennessee groups, now grown together across the common boundary of those States, and extended northward to cover the south bank of the Ohio for several hundred miles, and even to cross the river at numerous points in Indiana and Ohio. The Kanawha settlements have somewhat extended since 1790; while distinct strips of settlement appear along the Mississippi River, within the present State of that name, also on the same river at and below St. Louis; on the Mobile River, in the present State of Alabama; and at numerous points in the northwest. The aggregate extent of the Kentucky and Tennessee groups, together with these isolated settlements, I compute to be 33,800 square miles, making the total area of settlement at 1800, 305,708 square miles, the aggregate population being 5,308,483, and the average density of settlement, 17.3.

At 1810, the Kentucky and Tennessee groups of population, with the settlements upon the river in Ohio and upon the Tennessee River in North Alabama, were all embraced within the line of continuous settlement: but the Mississippi groups, northwest and southwest, were still separated from the "continent" of population by broad spaces vacant of settlement. The frontier line I find to have been then 2,900 miles long, and to have included between itself and the Atlantic 408,895 square miles of territory. But from this must be deducted the area of three large tracts, around which, but not over which, population had flowed, and which were hence included by the frontier, though not settled. These were the tract about the Adirondack region in New York, now considerably reduced in dimensions; another in northwest Pennsylvania and southwest New York, mainly within the former State, and the third in West Virginia extending even a little way into Kentucky. These tracts comprised 26,050 square miles, making the actual area of settlement included within the frontier, 382,845 square miles. All this lay between $29^{\circ}30'$ and $45^{\circ}15'$ N. Lat. and 67° and $88^{\circ}30'$ W. Long.

Without the frontier thus traced, we have, in addition to a number of outposts and scattered settlements, four considerable bodies of settlement; one in Michigan reaching around from the river Raisin to lake St. Clair; one along the Mississippi, extending from New Madrid to Alton and St. Charles; one on the Mobile, now extending to 32° N. Lat. and reaching over into the present State of Mississippi; and lastly, an extensive group along the lower Mississippi and its branches, representing the Jefferson purchase, in which the small group which we noticed in 1800, east of the river and north of the 31st parallel, has been merged. The aggregate extent of these and of the numerous small patches of population scattered over the west and south, may be taken at 25,100 square miles, making the total area of settlement at 1810, 407,945 square miles, the aggregate population being 7,239,881, and the average density of settlement, 17.7.

At 1820, a new and striking feature is introduced into the course of our frontier line, which was perhaps getting to be rather humdrum in its steady movement northward and westward. Now we see the Louisiana group of population, not only running far up the Red and the Washita rivers to the west, but pushing eastward even to the Eastern boundary of Mississippi, while the great Kentucky and Tennessee group, so long poised above the 35th parallel, now pours a broad though irregular stream of population down across the whole length of Alabama, and makes connection with the Louisiana group across the Mobile and Pascagoula rivers, a connection never to be broken.

As a result, the frontier line now rests, when it has run its course, upon the Gulf of Mexico, instead of returning to the Atlantic; while this southwest connection has embraced within the frontier one other great vacant tract, soon, however, to be devoured by population. This interior unsettled tract I may call the Central Southern, consisting as it does of the extreme southeast corner of Tennessee, the extreme southwest corner of North Carolina, the eastern half of Alabama, and the western and southern portions (far more than the half) of Georgia. Most of this is occupied by Indians, for whose removal negotiations are already in progress. Florida, too, is at this date (1820) a blank upon a map of the population of the United States. The treaty which gives her to us is signed; but the delivery has not yet taken place. Turning to the northwest we find the Detroit and St. Clair settlements now for the first time embraced within the line of continuous settlement, while to the west population has pushed out along the Missouri River to the great salt springs.

Measuring the frontier of 1820, with all its ins and outs, from the St. Croix to the Gulf, we find our line, though it has no longer to return across the country to the Atlantic, to have extended to 4,100 miles, embracing an area, after deduction made, not only of the three interior vacant tracts in New York, Pennsylvania and Virginia previously described (all of which have been greatly encroached upon by population during the decade), but of the Central Southern tract just mentioned, of actual settlement, determined as heretofore, of 504,517 square miles, all lying between $29^{\circ}30'$ and $45^{\circ}30'$ N. Lat. and between 67° and $93^{\circ}45'$ W. Long.

Outside the "line of population" we have small bodies of population on the Arkansas, White and Washita rivers in Arkansas, as well as some patches in the northwest. Computing these at 4,200 square miles in the aggregate, we have a total settled area of 508,717 square miles at 1820, the aggregate population being 9,633,822, and the average density of settlement 18.9 to the square mile.

The isolated patches of population at 1820 in Arkansas have at 1830 made connection with each other and with the Tennessee group, on the northeast, giving birth to a figure of extraordinary proportions, not unlike a marine monster formerly of fable, but now of

science; and as our plan requires us to measure the creature, not only from its head to its tail, but also according to the showman's rule, back again on the under side, from its tail to its head, if indeed such a monster can be said to have either head or tail, we have the frontier line enormously increased, namely to 5,300 miles. Florida now appears for the first time as contributing to the population of the United States. To the west, population has thrown itself forward along the Missouri River in a narrow belt of perhaps forty miles average width, till it rests on the western boundary of the State of Missouri. The aggregate area embraced between the Ocean (with the Gulf) and the frontier line as described on the map of 1830, is 725,406 square miles. Of this, however, not less than 97,389 square miles are comprised within the several interior vacant tracts (including the unsettled portions of Florida), leaving but 628,017 square miles as the settled area within the "line of population," all lying between $29^{\circ}15'$ and $46^{\circ}15'$ N. Lat. and between 67° and 95° W. Long.

Outside the body of continuous settlement, are found, at 1830, no longer large groups, like those of Kentucky and Tennessee at 1790 and 1800, of Louisiana at 1810, and of Arkansas at 1820, but a number of small patches of population in Ohio, Indiana, Illinois, Michigan and Wisconsin, aggregating perhaps 4,700 square miles, making the total settled area of 1830, 632,717 square miles, the aggregate population being 12,866,020, and the average density of settlement 20.3 to the square mile.

At 1840, the frontier line crosses Maine, Michigan and Wisconsin, notably higher up; takes in the southeast corner of Iowa, and, from the 40th parallel southward to the 31st, covers substantially the entire western boundary of Missouri, Arkansas, and Louisiana. The line thus traced is but 3,300 miles long. This astonishing shortening of the "line of population" is due to the rectification of the frontier, northwest, west, and southwest. The area included is 900,658 square miles, all between 29° and $46^{\circ}30'$ N. Lat. and 67° and $95^{\circ}30'$ W. Long.; the vacant tracts to be deducted, 95,516, and the settled tracts outside, 2,150; making the entire settled area of 1840, 807,292 square miles, the aggregate population being 17,069,453, and the average density of settlement 21.1 to the square mile.

At 1850, the frontier line crosses Michigan and Wisconsin higher up, takes in nearly all the eastern and southern half of Iowa, and passing down the western boundary of Missouri, Arkansas and Louisiana, much as at 1840, though somewhat more closely, it runs out into the newly acquired territory and newly admitted State on the southwest, Texas, reaching a point three degrees further west than the extreme frontier on the Missouri, and issuing finally on the Gulf of Mexico below the River Nueces, having described a course of 4,500 miles.

The aggregate area included thus is 1,005,213 square miles, from which deduction has to be made for vacant spaces (only one, that, namely, in the Adirondack region of New York, remaining out of the three described at 1810,) to the extent of 64,339 square miles, and to which addition must be made, on account of numerous settled tracts scattered outside the line of population, east of the 100th meridian, from Pembina to the Rio Grande, of 4,775 square miles.

But it is no longer by a line drawn around from the St. Croix to the Gulf of Mexico, that we embrace all the population of the United States, except only a few outlying posts and small scattered settlements. Already from the Pacific we may run a line around perhaps 80,000 miners and adventurers, the pioneers of more than one populous State soon to be formed. I will not interrupt the continuity of this paper by attempting to trace the course of this line, either at 1850, or at any subsequent census; but will content myself with indicating the addition to be made, on this account, to the populated area of the United States. In 1850, the Pacific settlements may, though of necessity very rudely, be computed at 33,600 square miles, making the total area of settlement at that date 979,249 square miles, the aggregate population 23,191,876, and the average density of settlement 23.7 to the square mile.

At 1860, the frontier line includes a narrow strip of population along the entire northern and eastern boundary of Maine; embraces substantially all of Michigan as high as $43^{\circ}30'$, and of Wisconsin as high as $44^{\circ}30'$; takes in the southeast quarter of Minnesota, and only excludes now the extreme northwest corner of Iowa. At the mouth of the Sioux River, it takes the first step of its great forward movement towards "The Plains," and, crossing the Missouri here, it annexes to the body of continuous settlement fully 20,000 square miles in Nebraska and Kansas. Respecting the faith of the Government pledged to the Indian tribes, it still confines itself to the western boundary of Arkansas, and then, running out along the Red River across nearly four degrees of longitude, it stretches with a bold, free course across the vast plains of Texas, almost touching in its furthest sweep the 100th meridian. The line thus described measures 5,300 miles, and embraces 1,126,518 square miles, lying between $28^{\circ}30'$ and $47^{\circ}30'$ N. Lat. and between 67° and $99^{\circ}30'$ W. Long. From this, deduction is to be made, on account of vacant spaces, of 39,139 square miles. The outlying settlements east of the 100th meridian, are now more numerous than for many decades previous, including a strip extending far up the Rio Grande, and embrace 7,475 square miles; while the Pacific settlements, now comprising one sovereign State of the Union, are nearly three times as extensive as at 1850, embracing 99,900 square miles, making the total area of settlement at 1860, 1,194,754 square miles, the aggregate population being 31,443,321, and the average density of settlement 26.5 to the square mile.

At 1870, we learn the last the census has yet to tell us of the Progress of the Nation. The imperial sweep of the "line of population" now embraces 1,178,068 square miles, all between $27^{\circ}15'$ and $47^{\circ}30'$ N. Lat. and between 67° and $99^{\circ}45'$ W. Long., from which, however, deduction has to be made of 37,739 square miles on account of interior spaces vacant of population. To what remains we must add 11,810 on account of settled tracts

east of the 100th meridian, and 120,100 on account of the Great Pacific settlements, making the area settled at 1870, according to the scale taken, viz., two inhabitants or more to the square mile, not less than 1,272,239 square miles, the aggregate population being 38,558,371, the average density of settlement being 30.2 to the square mile.

Tables I and II present the above recited facts in due order of succession, and in immediate relation to each other.

TABLE No. I.

DATE.	EXTENT OF FRONTIER. LINEAR MILES.		EXTENT OF CONTINUOUS SETTLEMENT.	
	Returning to the Atlantic.	Resting on the Gulf of Mexico.	N. Lat.	W. Long.
1790	3200		31° —45°	67°—83°
1800	2800		30° 45'—45° 15'	67°—88°
1810	2900		29° 30'—45° 15'	67°—88° 30'
1820		4100	29° 30'—45° 30'	67°—93° 45'
1830		5300	29° 15'—46° 15'	67°—95°
1840		3300	29° —46° 30'	67°—95° 30'
1850		4500	28° 30'—46° 30'	67°—99°
1860		5300	28° 30'—47° 30'	67°—99° 30'
1870		5700	27° 15'—47° 30'	67°—99° 45'

TABLE No. II.

DATE.	AREA, IN SQUARE MILES.				POPULATION.	Average Density of Settlement. Persons to a sq. mile.	
	Area embraced within the frontier.	Vacant tracts within the frontier.	SETTLED TRACTS WITHOUT FRONTIER.				Total Area of Settlement.
			East of 100th Merid.	West of 100th Merid.			
1790	226,085		13,850		239,935	3,929,214	16.4
1800	282,208	10,300	33,800		305,708	5,308,483	17.3
1810	408,895	26,050	25,100		407,945	7,239,881	17.7
1820	562,591	58,074	4,200		508,717	9,633,822	18.9
1830	725,406	97,389	4,700		632,717	12,866,020	20.3
1840	900,658	95,516	2,150		807,292	17,069,453	21.1
1850	1,005,213	64,339	4,775	33,600	979,249	23,191,876	23.7
1860	1,126,518	39,139	7,475	99,900	1,194,754	31,443,321	26.5
1870	1,178,068	37,739	11,810	120,100	1,272,239	38,558,371	30.2

Having thus gone through the successive censuses, tracing the course of the outside line of population, and estimating the settled area enclosed between this line and the ocean, let us now go back to 1790, and follow out the movement of population along the several degrees of latitude, to note the relative rapidity and steadiness of advance within each belt of territory. Owing to the difficulty of locating with precision the numerous small patches of population in the Pacific States and Territories, these computations are restricted to the country east of the 100th meridian.

But before the results of such computations can be satisfactorily stated, an explanation must be given of the method followed.

First: The successive parallels are taken as the central lines of zones half a degree wide; and where any parallel passes through vacant spaces, any body of population lying within a quarter degree, upon either side thereof, is referred thereto, after being reduced to the width of a half degree in latitude. Where a solid body of population lies close up against a parallel on one side, however, no reduction is made on account of the absence of population on the other side. The only important exception to the rule is in the case of the 34th parallel, where, after crossing the 94th meridian, it runs through the southern portion of the "Indian Territory," shortly above the northern line of Texas. As the absence of population as known to the census (Indians in tribal relations not being recognized by the census law) from the line of this parallel, in this part of its course, is the result of express exclusion by treaty stipulations, the population just below is not referred to it.

Second: The starting point on the coast is taken, not from the extreme end of any cape or promontory upon which the parallel may chance to emerge from the Atlantic, but from the average projection of the coast line in the general neighborhood of the parallel. In the case of Long Island, the eastern half was taken to fill up the western end of the Sound, and the 41st parallel was assumed for the purposes of these computations to begin with the 73° W. Long.

Third: The northern lakes and all considerable bays were "jumped," as also the British possessions when crossed by the parallels under measurement.

Fourth: All spaces vacant of population were skipped, the same rule being adopted for measuring and referring to parallels, spaces which are not directly upon any parallel, as in the case of the populated areas lying above or below a parallel when passing through vacant spaces.

The measurements as to all extensive bodies of continuous settlement have been made with as much exactness as the scale of the map (1: 4,000,000) would allow. Where, however, only one or two small parcels of population appear upon any parallel, as on the 31st for 1790 and 1800, the 28th at 1840, the 27th at 1860 and 1870, these have been taken roundly, without much care, as it is not possible to determine with precision the periphery of such isolated settlements. The measurements, therefore, have a far higher relative accuracy for the more central parallels than for those at the extreme north or south.

The result of the application of these rules to our measurements is to give the populated areas along each parallel, either in one continuous body, or in several groups, as population is broken by foreign territory, by lakes or bays, or by large vacant spaces. Consolidating all such, however, and reducing all the populated distances on each parallel to a continuous line, we have the following as the area of settlement along the successive parallels, at each census from 1790 to 1870.

TABLE III.

Degree of N. Latitude.	1790	1800	1810	1820	1830	1840	1850	1860	1870
47	0	0	0	0	0	0	79	131	209
46	0	0	0	0	15	20	50	125	230
45	30	317	392	392	392	421	437	521	858
44	226	252	279	279	299	308	404	731	777
43	339	355	425	425	485	792	816	1001	1137
42	234	375	568	581	691	963	984	1143	1248
41	238	396	471	548	663	1013	1107	1277	1325
40	358	371	584	613	912	1134	1140	1220	1252
39	270	456	565	888	1038	1043	1043	1168	1224
38	425	560	707	831	871	1020	1032	1141	1193
37	344	606	706	746	797	902	1018	1018	1134
36	462	533	682	751	878	1034	1057	1057	1057
35	384	395	391	575	961	976	1030	1030	1030
34	302	327	362	616	707	916	938	938	938
33	175	192	230	328	554	815	989	1105	1055
32	30	114	227	597	742	763	929	1023	1008
31	10	25	240	357	634	678	860	983	991
30	0	0	150	180	323	373	725	785	785
29	0	0	0	0	0	30	255	372	372
28	0	0	0	9	0	20	80	102	140
27	0	0	0	0	0	0	0	25	25
26	0	0	0	0	0	0	0	65	65

It will be noted that in the case of two parallels, the 32d and 33d, population has fallen off since 1860. This occurs in the more sparsely settled regions of Texas, where the degree of density is the slightest of all shown, and where, consequently, retrogression would imply the least actual diminution of population. How much of this result is due to the actual effects of the war; how much to changes of population following the extension of the railroad system, and how much to a closer definition of the range of population at 1870, I can not with satisfaction determine.

We have thus far treated of a population of two or more to the square mile, without distinction of the higher degrees of settlement. Let us now proceed to discuss the distribution of the total area of settlement, at each census, as shown by Table II, according to the several degrees of density exhibited by the maps.

These degrees are as follows:

- I. A population of from 2 to 6 to the square mile.
- II. A population of from 6 to 18 to the square mile.
- III. A population of from 18 to 45 to the square mile.
- IV. A population of from 45 to 90 to the square mile.
- V. A population of 90 or more to the square mile.

Of these groups, as I will call them, the first three generally indicate a predominantly agricultural condition. Speaking broadly, agriculture in the United States is not carried to such a point as to afford employment and support to a population in excess of 45 to a square mile; and consequently, the fourth and fifth groups never appear with us, except as trade and manufactures arise, and the classes rendering personal and professional services are multiplied. Of the agricultural groups, the first represents a very sparse population such as in our western country might be sustained by grazing industry, without any cultivation of the soil; and accordingly we find this group, at the present time, mainly along the frontier in Iowa, Minnesota, Nebraska, Kansas, Arkansas and Texas. The poorest tillage regions also sink into this group, and hence we find not inconsiderable portions of some of the older States in this class. In 1790, however, No. I was the largest single group in Maine, New York, Pennsylvania, South Carolina and in what is now the State of West Virginia. The second group—6 to 18 inhabitants to the square mile—indicates almost universally the existence of defined farms or plantations, and the systematic cultivation of the ground, but this, either in an early stage of settlement or upon more or less rugged soil. Thus we find this group still large in many of the western and southwestern States and in the mountainous regions of the Atlantic slope. At 1790, however, this group far exceeded in area Nos. III, IV, and V combined. The third group—18 to 45 to the square mile—almost universally indicates a highly successful agriculture. Here and there the presence of petty mechanical industries raises a difficult farming or planting region into this group; but in general, where manufactures exist at all, they induce a population of 45 or more to the square mile. We should therefore expect to find, as we do find, No. III the predominant group in Alabama, Delaware, Georgia, Illinois, Iowa, Kentucky, Maryland, Michigan, Mississippi, Missouri, North Carolina, South Carolina, Tennessee and Virginia. Of the New England States, Maine, New Hampshire and Vermont also have large tracts in this degree of settlement. In 1790, No. III was the largest single group in Delaware, Maryland, Massachusetts, New Hampshire, New Jersey and Virginia (exclusive of West Virginia).

The fourth group almost universally indicates the existence of commercial and manu-

facturing industry and the multiplication of personal and professional services. New York, New Jersey, Pennsylvania, Ohio and Indiana are the States in which this group is found in excess of any other; in the latter State, however, this excess is but slight. Of these States, in none was this group in excess in 1790. Two of these, Ohio and Indiana, can scarcely be said to have been settled at all (Marietta, Ohio, having been founded in 1788, while in Indiana there were but two or three small settlements, the remains of French occupation). In New York and Pennsylvania, at that date, Group I was predominant.

The fifth group represents a very advanced condition of industry. At the first census, only a few counties, and even at the ninth census, less than 20,000 square miles, were found populated to this extent. In the lower three New England States—Massachusetts, Rhode Island, and Connecticut—alone, is this found in excess of every other group. In each of these, it is also in excess of all other groups, though not largely. This degree of settlement is only reached where manufacturing and trading villages are numerous. In the present condition of the United States, however, there appears to be a stronger tendency for tracts in Group IV to pass into Group V than for tracts in Group III to pass into Group IV; and it would not be unreasonable to anticipate that the census of 1880 will exhibit a larger proportional gain in the group we are now considering, than in any other.

Having thus sought to give a general, though necessarily a somewhat vague, impression of the significance of these group-numbers in such an analysis of our population, I ask the attention of my readers to the following table, which exhibits, for each census, the distribution of the total area of settlement among the several classes indicated:

TABLE IV.

IN SQUARE MILES.

DATE.	Total Area of Settlement: 2 or more to the square mile.	DENSITY OF SETTLEMENT, BY CLASSES.				
		I 2-6 to the square mile.	II 6-18 to the square mile.	III 18-45 to the square mile.	IV 45-90 to the square mile.	V 90 and over to the square mile.
1790	239,935	83,436	83,346	59,282	13,051	820
1800	305,708	81,010	123,267	82,504	17,734	1,193
1810	407,945	116,629	154,419	108,155	27,499	1,243
1820	508,717	140,827	177,153	150,390	39,004	1,343
1830	632,717	151,460	225,894	186,503	65,446	3,414
1840	807,292	183,607	291,819	241,587	84,451	5,828
1850	979,249	233,697	294,698	338,796	100,794	11,264
1860	1,194,754	260,866	353,341	431,601	134,722	14,224
1870	1,272,239	245,897	363,475	470,529	174,036	18,302

It will be noted that notwithstanding the constant passing of the lower groups into the higher, through the intensification of settlement, the lower groups are still so rapidly recruited by the annexation of fresh territory, in the westward extension of the frontier-line of population, as not only to maintain, but to increase them from census to census, without an exception, until at 1870 a slight falling off is disclosed in No. I. It should also be noted that the increase of No. II during the decade previous was comparatively slight. The reader may or may not deem these last results sufficiently significant to intimate a movement in the same direction during the current ten years.

The following table exhibits proportions existing between the several quantities in Table IV, namely, the increase, per cent, in the total area of settlement, from census to census, and the number of square miles, in each 1,000 settled at each census, occupied by a population of each specified degree of density.

TABLE IV.—A.

DATE.	Increase, per cent, in total area of settlement.	PROPORTION OF EACH GROUP OF POPULATION TO TOTAL AREA OF SETTLEMENT.					
		TOTAL	I	II	III	IV	V
1790		1000	348	348	247	54	3
1800	27.4	1000	265	403	270	58	4
1810	33.4	1000	286	379	265	67	3
1820	24.7	1000	277	348	296	76	3
1830	24.4	1000	239	357	295	103	6
1840	27.6	1000	228	361	299	105	7
1850	21.3	1000	239	301	346	103	11
1860	22.	1000	218	296	361	113	12
1870	6.5	1000	193	286	369	137	15

But we may carry our analysis down further, with results still more instructive. Those who have read the description given above of the progress of the "line of population" from census to census, will have observed that the States and Territories may naturally be grouped into three classes, with reference to the order in time of their settlement.

The first consists of the original Thirteen States, with those formed from them, viz., Vermont, Maine, and West Virginia.

The second consists of Kentucky and Tennessee, on the west, Ohio, Indiana, Illinois and Michigan on the northwest, Missouri, Arkansas, Louisiana, Mississippi and Alabama on the southwest, and Florida on the south. All these were largely represented in the tables showing the area of settlement at 1840. The third class consists of Wisconsin, Iowa, and Minnesota, Nebraska and Kansas, Texas, the present Territories, and the Pacific

States. None of these began to assume importance in the account of settled area prior to 1850.

The following tables—IV, B, C, and D, exhibit the same facts as are given in Table IV above, but separately for each of the groups of States just enumerated. The petty patches of population found within the third group prior to 1840, are disregarded.

TABLE IV.

B.—FIRST GROUP OF STATES.

DATE.	Total Area of Settlement, &c.	DENSITY OF SETTLEMENT, BY CLASSES.				
		I	II	III	IV	V
1790	224,685	72,386	79,146	59,282	13,051	820
1800	266,208	63,260	105,017	79,504	17,234	1,193
1810	297,668	56,979	115,462	97,385	26,599	1,243
1820	312,173	48,690	110,146	115,540	36,454	1,343
1830	348,902	45,245	115,255	130,642	54,346	3,414
1840	353,137	33,340	112,865	140,753	60,351	5,828
1850	359,692	28,213	89,941	164,050	66,224	11,264
1860	361,141	20,060	74,392	178,483	73,982	14,224
1870	358,546	17,000	66,449	177,723	79,072	18,302

C.—SECOND GROUP OF STATES.

DATE.	Total Area of Settlement, &c.	DENSITY OF SETTLEMENT, BY CLASSES.				
		I	II	III	IV	V
1790	15,250	11,050	4,200			
1800	39,500	17,750	18,250	3,000	500	
1810	110,277	59,650	38,957	10,770	900	
1820	196,144	91,737	67,007	34,850	2,550	
1830	282,815	105,215	110,639	55,861	11,100	
1840	438,355	138,467	174,954	100,834	24,100	
1850	493,757	114,459	184,607	160,646	34,045	
1860	519,957	62,450	182,689	220,698	54,120	
1870	527,627	48,637	167,576	228,450	82,964	

D.—THIRD GROUP OF STATES.

DATE.	Total Area of Settlement, &c.	DENSITY OF SETTLEMENT, BY CLASSES.				
		I	II	III	IV	V
1840	15,800	11,800	4,000			
1850	125,800	91,025	20,150	14,100	525	
1860	313,656	178,356	96,260	32,420	6,620	
1870	386,066	180,260	129,450	64,356	12,000	

The most casual examination of these tables will show at once that the relations of the groups to the several epochs of our national development, have importantly changed from what appeared in Table IV. In the first group of States, from 1790 to 1830 inclusive, the increase in the settled area was marked at every decade. After that, the increase was down to 1860, scarcely more than nominal, the tracts desirable for settlement having, it may fairly be presumed, substantially all been taken up. But while the increase in the total area of settlement went on till 1830, Group I never increased at all, the higher groups not only absorbing all the current growth of settlement but steadily encroaching upon No. I, which has been reduced from 72,386 in 1790 to 17,000 in 1870, nearly all which remains being in the mountainous regions of West Virginia and Georgia. The increase in Group II stopped at 1810, when it reached its maximum at 115,462 square miles. It has since declined to 66,449, more than half this amount being in Georgia and North Carolina. This group appears, however, in Maine, New Hampshire and Vermont, in Pennsylvania, Virginia and West Virginia.

In Group III, the increase went on uninterruptedly until 1860. Between 1860 and 1870 there was a slight falling off. In Groups IV and V the increase has proceeded steadily from the first enumeration under the Constitution to the present time, and will doubtless continue, at the expense of the lower groups.

Attention will naturally be attracted to the falling off in the total area of settlement between 1860 and 1870. This occurred almost entirely in the State of Maine, where a low birth-rate (see Chart XL, and the figures for Maine on Charts XXVIII and XXXIX), the direct losses of the war, the superior attractions of prairie agriculture to eastern farmers, and of city life to the youth of the country, together with the prostration of one of the most important of the industries of the State, ship-building, have combined to reduce the population, always sparse, of extensive tracts along the northern frontier of settlement below 2 to the square mile, and thus to exclude these tracts from our table.

In the second group of States, the total area of settlement has continued to increase without interruption to the present date; Group I increased till 1840, since which time it has fallen off from its maximum of 138,467 to 48,637 square miles; Group II increased until 1850, since which time it has decreased, though not heavily; Groups III and IV have increased without interruption since 1790—Group V has never been formed in this body of States—that is, population has nowhere been found to the degree of ninety and more

to the square mile, for any tract sufficiently large to be shown to the eye on maps of the scale used. In the third group of States, the progress has thus far been uninterrupted, both in the total area of settlement, and in each of the (four) constituent groups of population, though it will be observed that the increase in Group I between 1860 and 1870 was almost at a minimum. Group V does not appear in this section of our table.

In the foregoing Tables, IV, B, C, D, we have the total settled area of each of three specified GROUPS OF STATES at each census, 1790 to 1870. The following table presents the population of each of these groups, at the dates taken, with the average density of settlement in each (cities here included):

TABLE IV.—E.

DATE.	FIRST GROUP.		SECOND GROUP.		THIRD GROUP.	
	Population.	Average density. Persons to a square mile.	Population.	Average density. Persons to a square mile.	Population.	Average density. Persons to a square mile.
1790	3,819,846	17	109,368	7.2		
1800	4,922,070	18.5	386,413	9.8		
1810	6,161,566	20.6	1,078,315	9.8		
1820	7,417,432	23.8	2,216,390	11.3		
1830	9,153,403	26.2	3,707,299	13.1		
1840	10,631,904	30.1	6,357,392	14.5	74,057	4.7
1850	13,218,496	36.7	9,078,288	18.4	895,092	7.1
1860	15,818,547	43.8	12,637,882	24.3	2,986,892	9.5
1870	17,964,592	50.1	15,594,721	29.5	4,999,058	12.9

CITIES.

It will be remembered that all cities of 8,000 inhabitants and over were excluded before determining the population-groups in which the several counties should be placed. We have, therefore, yet to speak of the urban population of the United States, in progress from 1790 to 1870.

Several difficulties, not a little annoying, arise during the reduction of these results to a form for comparison. For instance, what constitutes a city? In some States, the laws relating to the incorporation of villages and boroughs are so liberal, and the people are so well disposed towards this form of civil organization, that there is no danger of any considerable town failing to be distinguished from the mass of settlement. The liability to mistake is here rather in the chance that a "city" of 8,000 inhabitants may not imply a strictly urban population of those numbers, the municipal limits being sometimes so extended as to include considerable rural districts. But in New England and some of the Middle States, the township system is so highly organized and so generally accepted in popular estimation as sufficient for all the purposes of local administration, that townships may be found of nine, ten, twelve and even fifteen thousand inhabitants, without any interior municipal organization. It is evident that many of these are, in all but name, cities, often more importantly so than some which, from the formation of the national government, have boasted their Mayors, Aldermen and Sheriffs; and to omit these from the tale of cities in an account of the population of the United States, would clearly be an error. In cases of this kind, discretion has been exercised, and after what seemed a reasonable deduction, if any were necessary, for the rural parts of the township, the balance has been treated as a city population.

Again, at several natural centres, are, or in the past have been, groups of cities, one commonly much larger than any other, perhaps than all the others, which, while legally distinct, might be regarded as constituting a true unit of residence and industry. Shall these be taken separately in our account? or aggregated, in disregard of merely political divisions? It is more difficult to decide this question in undertaking an historical review like ours, than if we were making up an independent statement for a single period, inasmuch as these relations frequently change: two, three or even four cities at one census appearing ten years later as one, the growth of city population diminishing the number of cities. Nor is it always clear, what is to be regarded as a unit of residence and industry. While it is generally true that the small cities which surround a great one, owe their importance and even their existence to it, and, therefore, that in annexing them, it is simply claiming its own, there are instances of cities being closely coterminous, yet each having a clear *raison d'être* of its own, while in more than one case the limits of a modern city embrace the sites of at least two originally distinct and important centres of population and trade. The question is quite too large to be discussed here. These points are mentioned merely to show that no plan of treatment is without its own difficulties. For several reasons I have decided to follow the record, and at each census to count that as a distinct city which was so recognized at the time. The only exception is in the case of Philadelphia, where I follow Mr. De Bow, superintendent of the seventh census, in including the population of the suburbs, Kensington, Northern Liberties, Moyamensing, &c. &c., instead of treating these as distinct municipalities.

It will need, therefore, to be borne in mind that, while the determination of new centres of residence and industry, in the unceasing growth of population, has constantly tended to increase the number of cities known to the census, there has been a movement, far less considerable and very irregular, in the other direction, namely, to a reduction in the number of cities, through annexation and consolidation.

I will only add that in a very few cases, the most notable being that of Salem at 1790, I have included towns which only just failed of reaching the limit of population assigned.

The following table exhibits the number of cities of 8,000 or more inhabitants at each census of the United States:

TABLE V.

DATE.	CITIES BY CLASSES, ACCORDING TO SIZE.								TOTAL.
	8,000 to 12,000	12,000 to 20,000	20,000 to 40,000	40,000 to 75,000	75,000 to 125,000	125,000 to 250,000	250,000 to 500,000	500,000 and over.	
1790	1	3	1	1					6
1800	1		3	2					6
1810	4	2	3		2				11
1820	3	4	2	2	2				13
1830	12	7	3	1	1	2			26
1840	17	11	10	1	3	1	1		44
1850	36	20	14	7	3	3	1	1	85
1860	62	34	23	12	2	5	1	2	141
1870	92	63	39	14	8	3	5	2	226

The following Table exhibits the total population of the cities which appear in Table V. in comparison with the aggregate population at each census of the United States:

TABLE V.—A.

DATE.	Population of United States.	Population of Cities.	Inhabitants of cities in each 100 of the total population.
1790	3,929,214	131,472	3.4
1800	5,308,483	210,873	3.9
1810	7,239,881	356,920	4.9
1820	9,633,822	475,135	4.9
1830	12,866,020	864,509	6.7
1840	17,069,453	1,453,994	8.5
1850	23,191,876	2,897,586	12.5
1860	31,443,321	5,072,256	16.1
1870	38,558,371	8,071,875	20.9

Speaking roundly, it may be said that in 1790, one-thirtieth of the population was found in cities; in 1800 one-twenty-fifth; in 1810 and also in 1820, one-twentieth; in 1830, one-sixteenth; in 1840 one-twelfth; in 1850, one-eighth; in 1860 one-sixth; in 1870 more than one-fifth.

Two things need to be said in explanation of the relations of the tables above to the maps which show the density of population. The first is that the populations of two or more cities situated close to each other, have often been combined, and the aggregate thus obtained will be found represented on the maps by a circle of proportionate size. The scale of the maps has made it necessary to do this, instead of representing each city separately. The second is that the deduction of the population of cities sometimes brings a county into a lower population-group than at a preceding census, notwithstanding an actual increase of population, in both its rural and its urban parts. Thus, we may suppose a county with an area of 400 square miles, to have had at 1860 a population of 20,000, its shire town having 6,500 inhabitants. This county would, therefore, if treated as a whole, fall into Group IV, viz., 45-90 to the square mile. At 1870, however, we will further suppose the population to have increased to 24,000, of whom 8,500 are now found in the shire town, which thereupon becomes a city within our definition, and is excluded from the mass of population. The county thus sinks into Group III, viz., 18-45 to the square mile. Such cases are of course few in number, and the presence of the small circle in solid color which denotes a city on these maps will always suffice, on a careful examination, to correct the first impression of an absolute loss of population in the county.

CENTRE OF POPULATION.

The "centre of population" is a theme upon which there has been much speculation among writers for the public press in the United States; and the subject is deemed to have enough at once of curious and of serious interest, to justify the introduction of this feature into the maps which exhibit the Progress of the Nation.

Several different things may be covered by the phrase, "centre of population;" but what is commonly intended is the point at which equilibrium would be reached, were the country taken as a plane surface, itself without weight, but capable of sustaining weight, and loaded with its inhabitants, in number and position such as they are found at the period under consideration, each individual being assumed to be of the same gravity as every other, and consequently to exert pressure on the pivotal point, directly proportioned to his distance therefrom. It is in this sense that the phrase has been used upon the maps which show the density of population, in progress from 1790-1870.

In the determination of these successive points, the method taken was as follows: The population of each county, or smaller subdivision of territory where counties were exceptionally large or very irregularly populated, was assumed to be concentrated at its geographical centre. The parallel of the 24° N. Lat. and the meridian 67th West of Green-

wich were then chosen as convenient lines—being south and east respectively of all the population of the United States—to which to refer the position of the local centres thus taken. The distances of these centres north of the former line and west of the latter, were next ascertained. Distances westward were measured on parallels of latitude, and in determining them, the centres of all counties lying between the same two successive degrees of latitude were referred to the parallel of the intermediate half-degree. The population of each county, or smaller sub-division used, was thereupon multiplied successively into the corresponding distances thus obtained, and the aggregate of all products of population into distances northward was divided by the aggregate population of the country to determine the latitude of the centre of population, and the aggregate of all products of population into distances westward was divided by the same aggregate population to determine the longitude of the centre of population.

The centres of population, as located upon the maps, were obtained by the process described, except those for the sixth and seventh censuses (1840 and 1850) which were taken from a table and map prepared by Prof. J. E. Hilgard of the United States Coast Survey, and published in Scribner's Magazine in the year 1872, covering the period 1840-70. Impressed by the coincidence between Prof. Hilgard's figures for 1860 and 1870 and those obtained by my own far more laborious process, I determined to adopt, with due acknowledgment, his figures for 1840 and 1850, thus saving the expense of an independent computation. The following are Prof. Hilgard's results for 1860 and 1870, compared with those obtained by the treatment of the same quantities, as above described:

Prof. Hilgard, 1870—39° 15' N. Lat.: 83° 39' W. Long.
 39° 12' N. Lat.: 83° 35'.7 W. Long.
 Prof. Hilgard, 1860—39° 03' N. Lat.: 82° 50' W. Long.
 39° 00'.4 N. Lat.: 82° 48'.8 W. Long.

When it is considered that Prof. Hilgard treated the States as entire bodies, after deduction of some leading cities, and obtained his local centres, not as the result of measurements and computations, but by the exercise of a trained judgment, merely, no one who is familiar with the intrinsic difficulties of such work, and with the great and often unaccountable diversities of settlement prevailing throughout the United States, can fail to admire the scope and grasp of thought and the intimate acquaintance with the history and present condition of our population, which were exhibited in so justly seizing the local centres of population for more than forty States and Territories. I do not regret the more minute and precise but more laborious and expensive determination of the centres of population at the remaining censuses; but I certainly should not have undertaken it had Prof. Hilgard already covered the ground.

With so much of explanation, let us trace upon our maps the progress, from decade to decade, of this most significant point.

At 1790, we find by our process the centre of population at 39° 16'.5 N. Lat. and 76° 11'.2 W. Long., which, from a comparison of the best maps available, would seem to be about twenty-three miles east of Baltimore. During the decade 1790-1800, it appears to have moved almost due west to a point about eighteen miles west of the same city, being in Lat. 39° 16', and Long. 76° 56'.5. From 1800 to 1810 it moved westward and slightly southward to a point about forty miles N. W. by W. from Washington, being in Lat. 39° 11'.5 and Long. 77° 37'.2. From 1810 to 1820, it moved westward and again slightly southward to a point about sixteen miles north of Woodstock, Va., being in Lat. 39° 05'.7, and Long. 78° 33'. From 1820 to 1830, it moved still westward and southward to a point about nineteen miles W. S. W. of Moorefield, in the present State of West Virginia, being in Lat. 38° 57'.9 and Long. 79° 16'.9. From 1830 to 1840 it moved still westward but slightly changed direction northward, reaching a point sixteen miles south of Clarksburg, being in Lat. 39° 02' and Long. 80° 18'. From 1840 to 1850 it moved westward and slightly southward again, reaching a point about twenty-three miles southeast of Parkersburg, being in Lat. 38° 59' and Long. 81° 19'. From 1850 to 1860 it moved westward and slightly northward, reaching a point twenty miles south of Chillicothe, Ohio; being in Lat. 39° 00'.4 and Long. 82° 48'.8. From 1860 to 1870 it moved westward and still more sharply northward, reaching a point about forty-eight miles east by north of Cincinnati.

The closeness with which the centre of population through such rapid westward movements as have been recorded, has clung to the parallel of the 39th degree, cannot fail to be noticed. The most northern point reached was at the start in 1790; the most southern in 1830, the preceding decade having witnessed a rapid development of population in the southwest in Alabama, Arkansas, Mississippi and Louisiana, and the accession of Florida to the Union. The extreme variation in latitude has been less than nineteen minutes; while the eighty years of record have accomplished a movement in longitude of nearly seven degrees and a half. Assuming the westward movement to have been uniformly along the parallel of the 39th degree, the westward movement for each decade has been as follows: 1790 to 1800, forty-one miles; 1800 to 1810, thirty-six miles; 1810 to 1820, fifty miles; 1820-30, thirty-nine miles; 1830 to 1840, fifty-five miles; 1840 to 1850, fifty-five miles; 1850 to 1860, eighty-one miles; from 1860 to 1870, forty-two miles. The sudden access between 1850 and 1860 was due to the transfer of a considerable body of population from the Atlantic to the Pacific coast, twelve individuals in San Francisco exerting as much

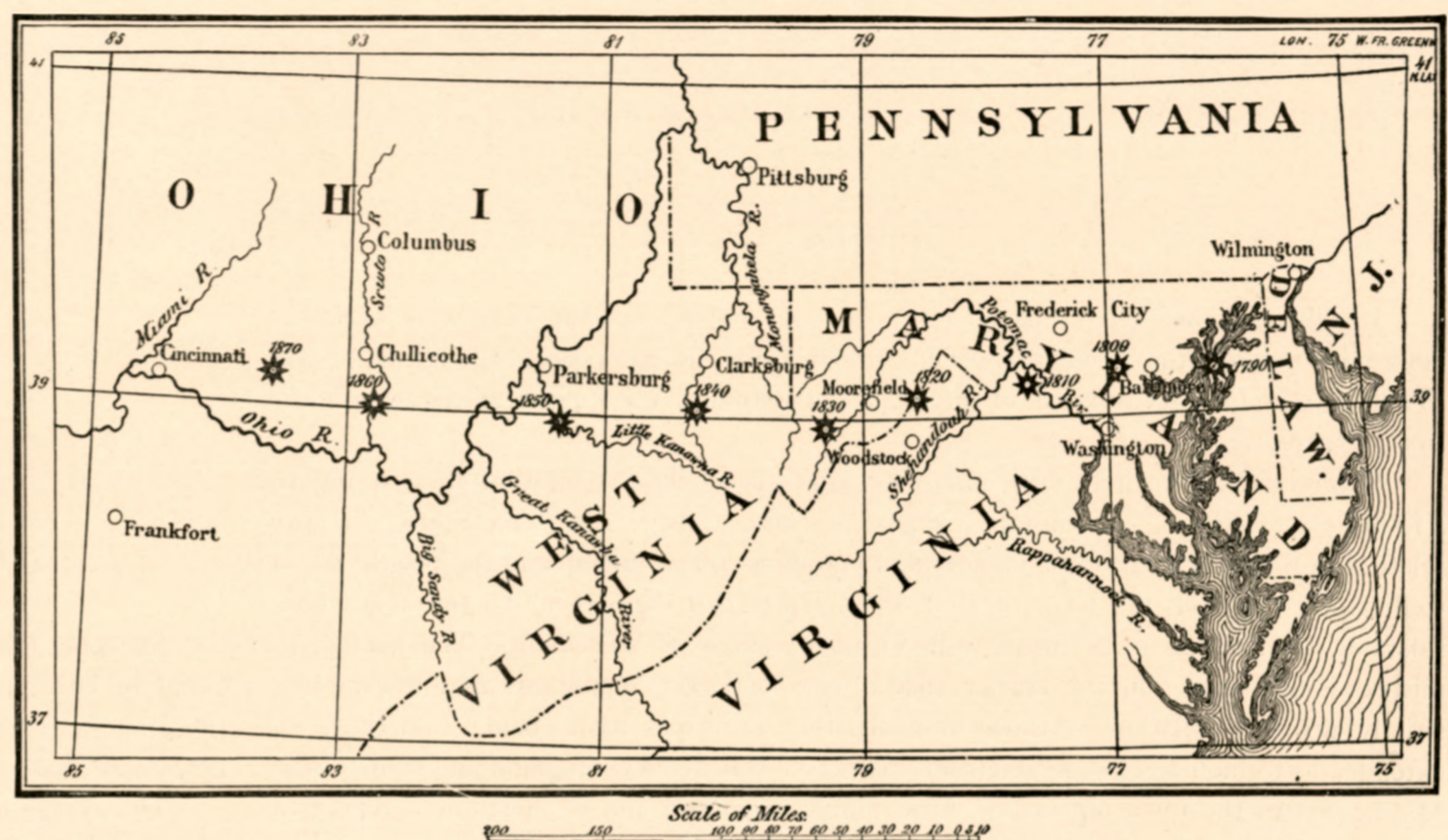
pressure at the pivotal point—say, the crossing of the 83d meridian and the 39th parallel—as forty individuals in Boston.

The following table exhibits in immediate connection the facts detailed above:

TABLE.

DATE.	POSITION OF CENTRE OF POPULATION.			Westward movement during preceding decade.
	N. Lat.	W. Long.	Approximate location by important towns.	
1790	39° 16'.5	76° 11'.2	23 miles E. of Baltimore.	
1800	39° 16'.1	76° 56'.5	18 miles W. of Baltimore.	41 miles.
1810	39° 11'.5	77° 37'.2	40 miles N. W. by W. of Washington.	36 miles.
1820	39° 05'.7	78° 33'	16 miles N. of Woodstock.	50 miles.
1830	38° 57'.9	79° 16'.9	19 miles W. S. W. of Moorefield.	39 miles.
1840	39° 02'	80° 18'	16 miles S. of Clarksburg.	55 miles.
1850	38° 59'	81° 19'	23 miles S. E. of Parkersburg.	55 miles.
1860	39° 00'.4	82° 48'.8	20 miles S. of Chillicothe.	81 miles.
1870	39° 12'	83° 35'.7	48 miles E. by N. of Cincinnati.	42 miles.
			Total	399

The following map exhibits to the eye the westward movement of the centre of population from 1790 to 1870 which has been described in words and figures above:



POPULATION AND RIVER SYSTEMS.

I will close this long review of the geographical relations of our population, by exhibiting in tabular form, for convenient comparison, the statistics of population at 1870, which appear upon General Von Steinwahr's Map (Plates I and II of this Atlas) of the River Systems of the United States.

By that map, the territory of the United States comprises four great river systems, the Atlantic, the Northern Lake, the Mississippi, and the Pacific systems.

The Atlantic system is arbitrarily divided into a northern and a southern section, by a line drawn from a point on the coast just above Baltimore, across Maryland and the extreme southwestern counties of Pennsylvania, to the Alleghenies. This division is made with reference to a marked change in the conditions of settlement and of industry, which is noted as occurring in the general neighborhood of the line thus drawn.

The Northern Lake system is, for somewhat similar reasons, divided arbitrarily into an eastern and a western section, by the prolongation northward of the boundary between Indiana and Illinois.

The divisions effected in the other systems, for the purposes of this representation, are mainly natural.

The Mississippi system is divided into the Basin of the Mississippi, which is again divided as Upper and Lower, by a line drawn between Alton and Cairo; the Basins of the Ohio, the Missouri, the Red, the Arkansas and the Rio Grande (the portions of the latter outside the territory of the United States being excluded from the computation as respects both area and population); the Basin which I will call the Alabama Basin, though including large portions of Mississippi on the west, and of Georgia and Florida on the east, embracing the Pearl, Mobile, Chattahoochee, Appalachian and Sawanee Rivers and their tributaries; and, last, the Basin of Central Texas, embracing all the rivers between the Rio Grande and the Bayou Teche.

The Pacific system is divided as follows: the Basin of the Columbia; the Basin northwest of the Columbia which I will call the Puget Sound Basin; the Basin of the Sacramento and San Joaquin; the Basin of the Klamath and the Coast Ranges; the Basins of the Colorado and of the Salinas, and the Basin of Southwestern California embracing the streams from the Santa Maria to the Mexican boundary.

Table VII exhibits the populations of the several basins enumerated, as nearly as the

same can be ascertained, with the approximate area of each as obtained by measurements with the planimeter conducted by my able assistant, Mr. Joseph J. Skinner, C. E.

TABLE VII.

	Population.	Area, square miles.	Inhabitants to a square mile.
ATLANTIC SYSTEM.			
Northern	9,983,412	135,417	73.7
Southern	4,224,041	169,121	25.
Total	14,207,453	304,538	46.6
NORTHERN LAKE SYSTEM.			
Eastern	3,575,721	82,007	43.6
Western	823,883	102,332	8.
Total	4,399,604	184,339	23.7
MISSISSIPPI SYSTEM.			
Basin of the Upper Mississippi	4,179,407	179,635	23.3
Basin of the Lower Mississippi	1,795,294	65,646	27.3
Basin of the Ohio	7,806,453	207,111	37.7
Basin of the Missouri	1,524,171	527,690	2.9
Basin of the Red	468,298	92,721	5.1
Basin of the Rio Grande	117,522	101,334	1.1
Basin of the Arkansas	517,923	184,742	2.8
The Alabama Basin	1,978,742	145,990	13.6
The Texas Basin	723,994	178,434	4.6
Total	19,111,804	1,683,303	11.3
PACIFIC SYSTEM.			
Basin of the Columbia	106,718	219,706	.5
Basin of the Colorado	16,144	264,386	.06
Basin of the Sacramento and San Joaquin	455,972	66,927	6.8
Basin of the Salinas	23,419	9,753	2.4
The Puget Sound Basin	13,216	20,046	.6
Basin of the Klamath and the Coast Ranges	55,867	45,960	1.2
The Basin of S. W. California	35,404	17,262	2.
The Great Interior Basin	132,770	210,274	.6
Total	839,510	854,314	.98
RECAPITULATION.			
Atlantic System	14,207,453	304,538	46.6
Northern Lake System	4,399,604	185,339	23.7
Mississippi System	19,111,804	1,683,303	11.3
Pacific System	839,510	854,314	.98
Total	38,558,371	3,026,494	12.7

POPULATION OF THE UNITED STATES EACH YEAR FROM 1780 TO 1880, WITH PROCESS OF ESTIMATE AND INTERPOLATION.

BY E. B. ELLIOTT, U. S. BUREAU OF STATISTICS.

The first census of the United States was taken in 1790, and a census has been taken decennially ever since. It is sometimes important to know approximately the probable number of the population at years intermediate between those when the enumerations were made, and also, for certain purposes, at each year of the decade just preceding the taking of the first census in 1790, and of the current decade, that from 1870 to 1880. By examining the numbers of population reported in the census for each of the years 1790, 1800, 1810 and 1820, the second differences of the series are found not to differ greatly from each other; and if we suppose the increase of the population between 1780 and 1790 to have followed the same law as in the thirty years from 1790 to 1820 we may readily work back to the term of the series for 1780. We also observe that the second differences derived from the enumerated numbers for the years 1830, 1840, 1850 and 1860 are nearly identical with each other, although larger than the second differences just mentioned for the earlier years. On the assumption that the series for the years from 1860 to 1880, had there been no civil war or other important disturbance, would have followed the same law of progression as between 1830 and 1860, we may readily find the terms of the estimated series for 1870 and 1880.

TABLE SHOWING THE NUMBERS OF THE POPULATION AT EACH UNITED STATES CENSUS FROM THE YEAR 1790 TO 1860, BOTH INCLUSIVE; TOGETHER WITH ESTIMATED POPULATION FOR THE YEAR 1780, DERIVED FROM THE NUMBERS ENUMERATED FOR THE YEARS 1790, 1800, 1810 AND 1820; ALSO ESTIMATED POPULATION FOR THE YEARS 1870 AND 1880 ON THE ASSUMPTION THAT THE CIVIL WAR HAD NOT TAKEN PLACE, DERIVED FROM THE ENUMERATED NUMBERS OF THE YEARS 1830, 1840, 1850 AND 1860.

Years.	Population.	First Differences.	Second Differences.
1780	[3,069,597]		
1790	3,929,214	[859,617]	
1800	5,308,483	1,379,269	[519,652]
1810	7,239,881	1,931,398	552,129
1820	9,658,453	2,418,572	487,174
1830	12,866,020	3,207,567	788,995
1840	17,069,453	4,203,433	995,866
1850	23,191,876	6,122,423	1,918,990
1860	31,443,321	8,251,445	2,129,022
1870	[41,718,772]	[10,275,451]	[2,024,006]
1880	[54,018,229]	[12,299,457]	[2,024,006]

In the above table the numbers in brackets are estimated. The other numbers are the immediate results of the decennial enumerations. In the column of second differences the number in brackets at the top, viz. 519,652, is the mean of the two numbers in the same column which immediately follow, viz. 552,129 and 487,174. In the column of first differences the number at the top, viz. 859,617, is derived from the number immediately following (1,379,269) by subtracting therefrom the newly estimated second difference (519,652). The number at the top of the column headed population (3,069,597) is derived from the number immediately below (3,929,214), by subtracting therefrom the newly estimated first difference (859,617). The estimated numbers of the population in this table for the years 1870 and 1880, viz. 41,718,772 and 54,018,229, are derived from the four preceding values by observing, as already mentioned, that the second differences of these four numbers (1,918,990 and 2,129,022) are very nearly identical, and assuming their mean (2,024,006) as the constant second difference in continuing the table. The number thus estimated for the year 1870, viz. 41,718,772, when compared with the result of the official enumeration, viz. 38,558,371, shows the estimate, on the assumption that no war had occurred, to be in excess of the result of official enumeration for that year by 3,160,401. If we assume the calculated number for the year 1880 (54,018,229) to be in excess of the probable number for that year by the same amount, our estimate for the year 1880 will be 50,857,828, or, disregarding numbers less than 1,000, we shall have in round numbers for the estimated population of that year, 50,858,000, which is the number assumed in the accompanying tables.

We have now a series of numbers, observed or estimated, at intervals of ten years, from the year 1780 to the year 1880, both inclusive. It is desired to interpolate numbers for each year intermediate between these given decennial numbers. This has been readily accomplished on the assumption that the numbers for the years intermediate between any two consecutive decennial numbers progressed in conformity to a law of constant second differences, derived in general from comparison of four consecutive decennial terms.

TABLE SHOWING THE NUMBERS OF THE POPULATION ENUMERATED AT EACH DECENNIAL CENSUS OF THE UNITED STATES FROM THE YEAR 1790 TO THE YEAR 1870, BOTH INCLUSIVE, TOGETHER WITH ESTIMATED NUMBERS OF THE POPULATION FOR THE YEARS 1780 AND 1880.

Years.	Population.	First Differences.	Second Differences.	Mean of Consecutive Second Differences.
1780	3,070,000			
1790	3,929,214	859,214		
1800	5,308,483	1,379,269	520,055	520,055
1810	7,239,881	1,931,398	552,129	536,092
1820	9,658,453	2,418,572	487,174	519,652
1830	12,866,020	3,207,567	788,995	638,084
1840	17,069,453	4,203,433	995,866	892,430
1850	23,191,876	6,122,423	1,918,990	1,457,428
1860	31,443,321	8,251,445	2,129,022	2,024,006
1870	38,558,371	7,115,050	— 1,136,395	496,314
1880	50,858,000	12,299,629	5,184,579	2,024,092
				5,184,579

In all these successive computations respecting the population of the United States, Alaska has been excluded inasmuch as no census has ever been taken under national authority in that remote district.

Indians in tribal relations are not recognized by the census law of 1850, and are, therefore, not reckoned in the account of population. The principal reservations and ranges of the several tribes are, however, shown upon the map for 1870—Plates XVIII and XIX.

The following named gentlemen have assisted in the computations required for this memoir:—H. R. Elliot, A.B.; H. A. Hazen, A.B.; J. O. Maxon, Ph.B., and C. B. Dudley, Ph.D.

The delineation of the groups of population has been mainly the work of my principal assistant, S. A. Galpin, LL.B.

Prof. John E. Clark has kindly assisted me in the resolution of several difficulties encountered in the course of this compilation.

In connection with the foregoing discussion, the compiler has great pleasure in introducing the following paper by E. B. Elliott, Esq., Chief Clerk of the United States Bureau of Statistics, read before the American Association for the Advancement of Science, at its meeting at Hartford in August 1874, and kindly revised by Mr. Elliott for the purposes of the present publication.

In interpolating the numbers for the several years in any decennial group, the one-hundredth part of the corresponding mean of the second differences as derived from the data at decennial intervals (see last column of the immediately preceding table), was taken as the constant second difference of the new annual series (see last column of the following table); and the one-tenth part of the corresponding first difference of the numbers at the decennial periods, less four and one-half times the second difference just described for the annual interpolation was taken to represent the first difference in effecting the interpolation (see the next to the last column of the following table.) These first and second differences, properly combined with the numbers of population at the decennial periods readily gave the several annual series desired.

TABLE SHOWING FOR DECENNIAL GROUPS OF YEARS, FROM 1780 TO 1880 INCLUSIVE, THE POPULATION AT THE COMMENCING YEAR OF EACH GROUP; ALSO THE CORRESPONDING COMPUTED FIRST DIFFERENCE AND SECOND DIFFERENCE OF THE SERIES OF YEARLY NUMBERS COMPRISING SUCH GROUPS.

Decennial Periods.	Population at the commencement of the several decennial periods.	First differences of the annual numbers to be interpolated in each of the several decennial periods specified.	Second differences of the annual numbers to be interpolated in each of the several decennial periods specified.
1780 to 1790	3,070,000	62,518.925	5,200.55
1790 to 1800	3,929,214	113,802.76	5,360.92
1800 to 1810	5,308,483	169,755.46	5,196.52
1810 to 1820	7,239,881	213,143.42	6,380.84
1820 to 1830	9,658,453	280,597.35	8,924.30
1830 to 1840	12,866,020	354,759.04	14,574.28
1840 to 1850	17,069,453	521,162.03	20,240.06
1850 to 1860	23,191,876	802,810.37	4,963.14
1860 to 1870	31,443,321	620,420.86	20,240.92
1870 to 1880	38,558,371	996,656.845	51,845.79

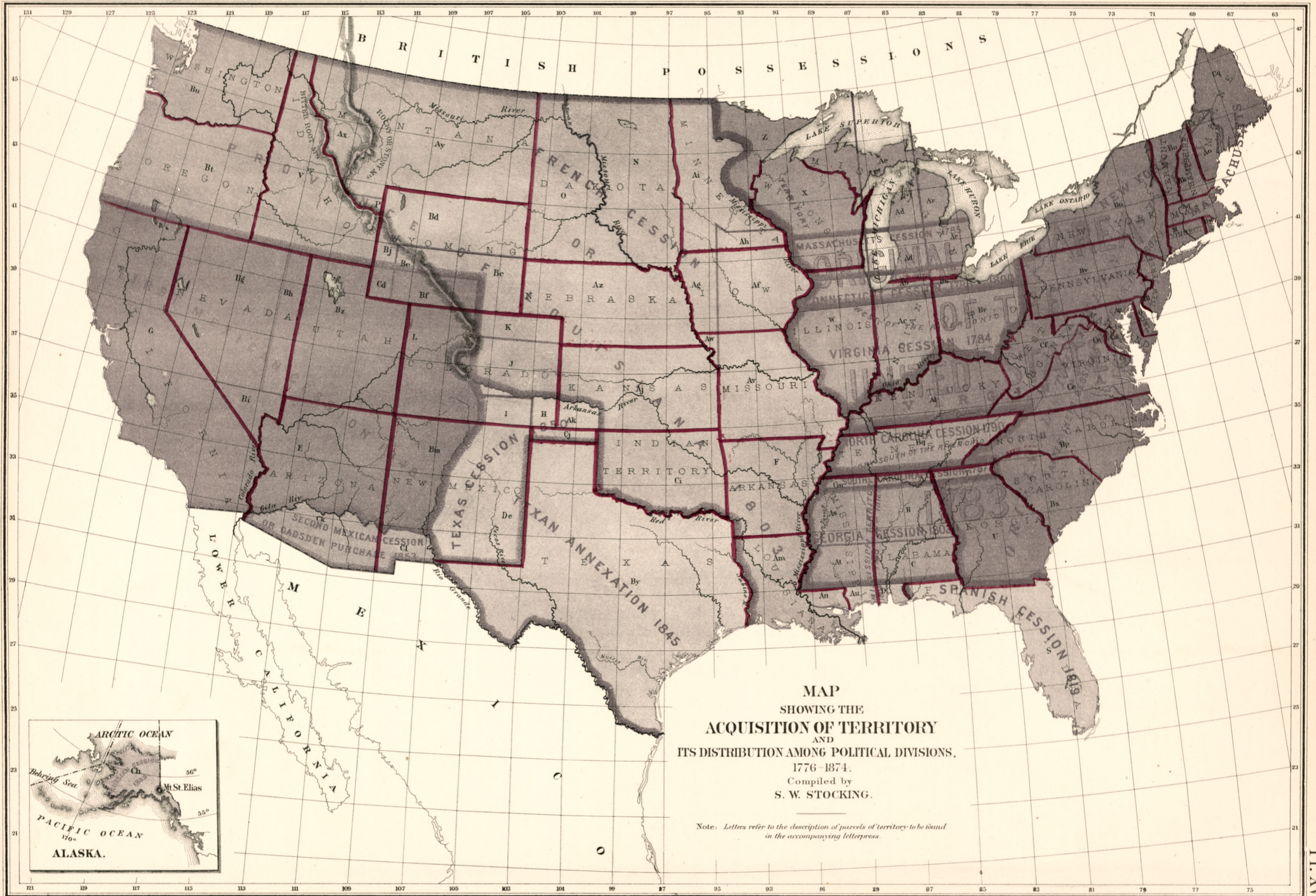
From the numbers in this table the interpolated numbers, in the following table of population by years, were readily obtained; the number in the column of second differences corresponding to any decennial period in the above table being added successively to the corresponding number in the column of first differences in the same table; and this number, with the resulting numbers, in turn added successively to the corresponding number in the column immediately preceding, headed population.

TABLE SHOWING THE POPULATION OF THE UNITED STATES FOR EACH YEAR FROM 1780 TO 1880, THE NUMBERS NOT THE RESULTS OF OFFICIAL ENUMERATION BEING DERIVED FROM THE NUMBERS ENUMERATED AT THE SEVERAL DECENNIAL CENSUSES.

It will be seen that the numbers within the several decennial periods progress by constant second differences.

Years.	Population.	Years.	Population.
1780	3,070,000 (estimated.)	1783	3,273,000 (estimated.)
1781	3,133,000 "	1784	3,351,000 "
1782	3,200,000 "	1785	3,435,000 "

Years.	Population.	Years.	Population.
1786	3,523,000 (estimated.)	1834	14,373,000 (estimated.)
1787	3,617,000 "	1835	14,786,000 "
1788	3,716,000 "	1836	15,213,000 "
1789	3,820,000 "	1837	15,655,000 "
1790	3,929,214 (enumerated.)	1838	16,112,000 "
1791	4,043,000 (estimated.)	1839	16,584,000 "
1792	4,162,000 "	1840	17,069,453 (enumerated.)
1793	4,287,000 "	1841	17,591,000 (estimated.)
1794	4,417,000 "	1842	18,132,000 "
1795	4,552,000 "	1843	18,694,000 "
1796	4,692,000 "	1844	19,276,000 "
1797	4,838,000 "	1845	19,878,000 "
1798	4,990,000 "	1846	20,500,000 "
1799	5,146,000 "	1847	21,143,000 "
1800	5,308,483 (enumerated.)	1848	21,805,000 "
1801	5,478,000 (estimated.)	1849	22,489,000 "
1802	5,653,000 "	1850	23,191,876 (enumerated.)
1803	5,833,000 "	1851	23,995,000 (estimated.)
1804	6,019,000 "	1852	24,802,000 "
1805	6,209,000 "	1853	25,615,000 "
1806	6,405,000 "	1854	26,433,000 "
1807	6,606,000 "	1855	27,256,000 "
1808	6,812,000 "	1856	28,083,000 "
1809	7,023,000 "	1857	28,916,000 "
1810	7,239,881 (enumerated.)	1858	29,753,000 "
1811	7,453,000 (estimated.)	1859	30,596,000 "
1812	7,673,000 "	1860	31,443,321 (enumerated.)
1813	7,898,000 "	1861	32,064,000 (estimated.)
1814	8,131,000 "	1862	32,704,000 "
1815	8,369,000 "	1863	33,365,000 "
1816	8,614,000 "	1864	34,046,000 "
1817	8,866,000 "	1865	34,748,000 "
1818	9,124,000 "	1866	35,469,000 "
1819	9,388,000 "	1867	36,211,000 "
1820	9,658,453 (enumerated.)	1868	36,973,000 "
1821	9,939,000 (estimated.)	1869	37,756,000 "
1822	10,229,000 "	1870	38,558,371 (enumerated.)
1823	10,527,000 "	1871	39,555,000 (estimated.)
1824	10,834,000 "	1872	40,604,000 "
1825	11,151,000 "	1873	41,704,000 "
1826	11,476,000 "	1874	42,856,000 "
1827	11,810,000 "	1875	44,060,000 "
1828	12,153,000 "	1876	45,316,000 "
1829	12,505,000 "	1877	46,624,000 "
1830	12,866,020 (enumerated.)	1878	47,983,000 "
1831	13,221,000 (estimated.)	1879	49,395,000 "
1832	13,590,000 "	1880	50,858,000 "
1833	13,974,000 "		



MAP
 SHOWING THE
 ACQUISITION OF TERRITORY
 AND
 ITS DISTRIBUTION AMONG POLITICAL DIVISIONS,
 1776-1874.
 Compiled by
 S. W. STOCKING.

Note: Letters refer to the description of parcels of territory to be found in the accompanying letterpress.

MAPS

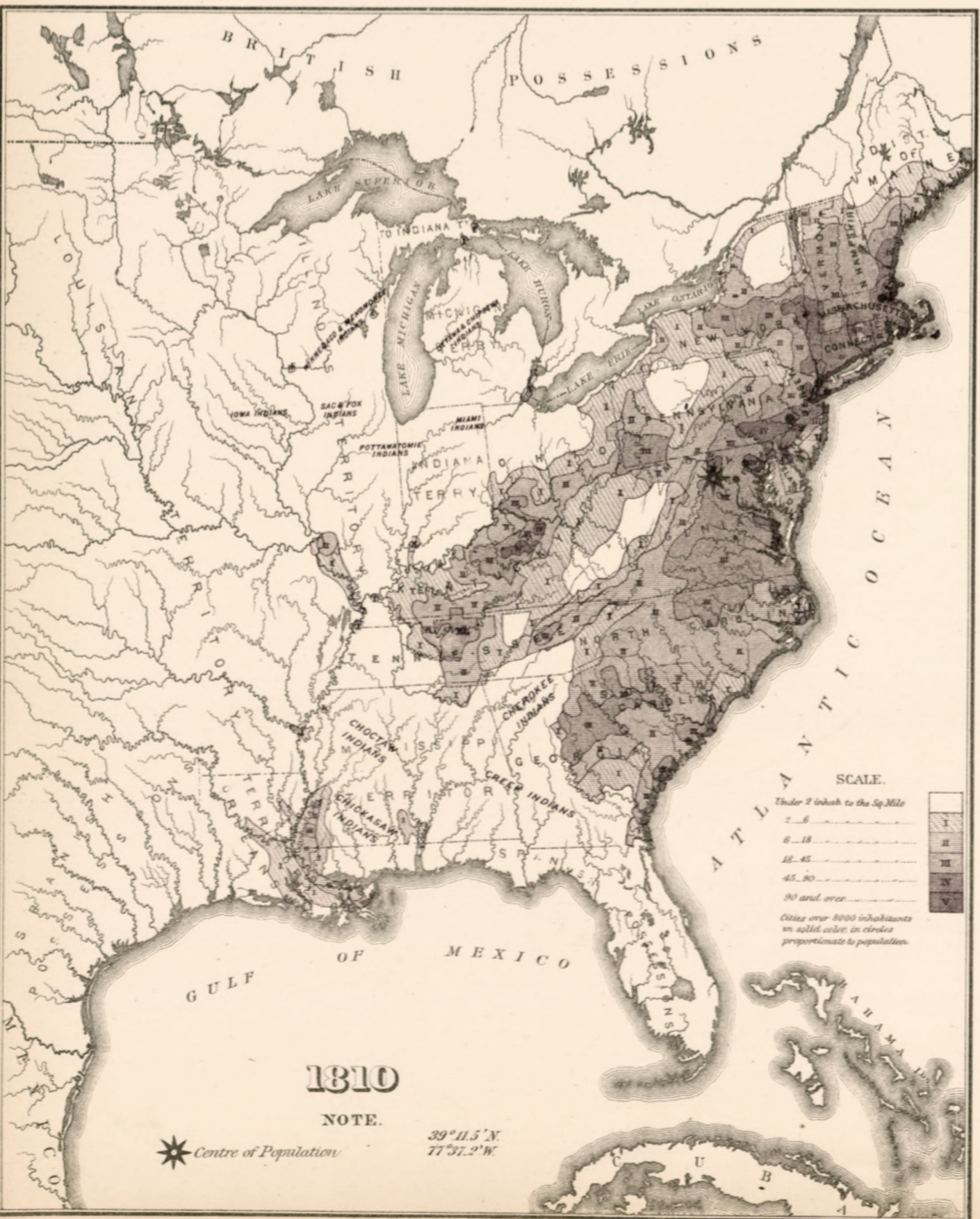
SHOWING, IN FIVE DEGREES OF DENSITY, THE DISTRIBUTION, WITHIN THE TERRITORY EAST OF THE 100TH MERIDIAN, OF THE

POPULATION OF THE UNITED STATES

(excluding Indians not Taxed.)

Compiled from the Returns of Population at the First, Second, Third and Fourth Census OF THE UNITED STATES, 1790-1800-1810-1820,

by FRANCIS A. WALKER.







MAP
 SHOWING IN FIVE DEGREES OF DENSITY, THE DISTRIBUTION,
 WITHIN THE TERRITORY, EAST OF THE 100th MERIDIAN,
 OF THE
POPULATION OF THE UNITED STATES
 (excluding Indians not taxed).
 Compiled from the Returns of Population at the Seventh Census
 BY
FRANCIS AWALKER.

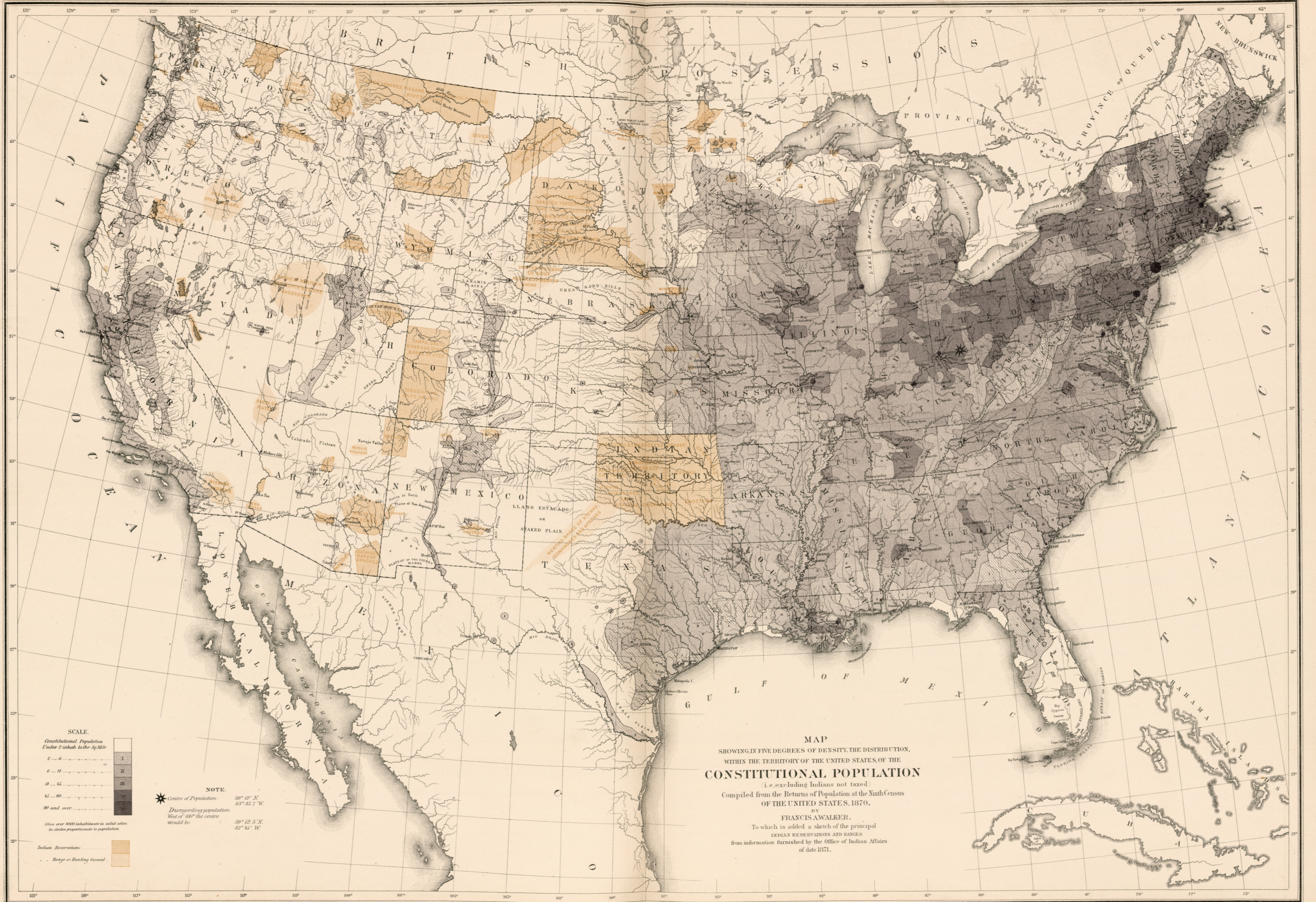
NOTE.
 * Centre of Population 32° 50' N.
 81° 19' W.
 Determined by PROF. J.E. HILGARD, U.S. Coast Survey.

SCALE.

Under 2 inhab. to the Sq. Mile	I
2 - 6	II
6 - 18	III
18 - 45	IV
45 - 90	V
90 and over	

*Places over 8000 inhabitants in solid color,
 in circles proportionate to population.*





SCALE.
 Constitutional Population
 Under 2 inhab. to the Sq. Mile

2 — 6
 6 — 12
 12 — 42
 42 — 90
 90 and over

Over 8000 inhabitants in solid color,
 in circles proportionate to population.

Indian Reservations
 Range or Hunting Ground

NOTE.
 * Centre of Population
 Disregarding population
 West of 100° the centre
 would be

39° 12' N.
 83° 35.7' W.
 39° 12.5' N.
 82° 44' W.

MAP
 SHOWING IN FIVE DEGREES OF DENSITY, THE DISTRIBUTION,
 WITHIN THE TERRITORY OF THE UNITED STATES, OF THE
CONSTITUTIONAL POPULATION
 (i.e. excluding Indians not taxed)
 Compiled from the Returns of Population at the Ninth Census
 OF THE UNITED STATES, 1870.
 BY
 FRANCIS AWALKER.
 To which is added a sketch of the principal
 INDIAN RESERVATIONS AND RANGES
 from information furnished by the Office of Indian Affairs
 of date 1871.

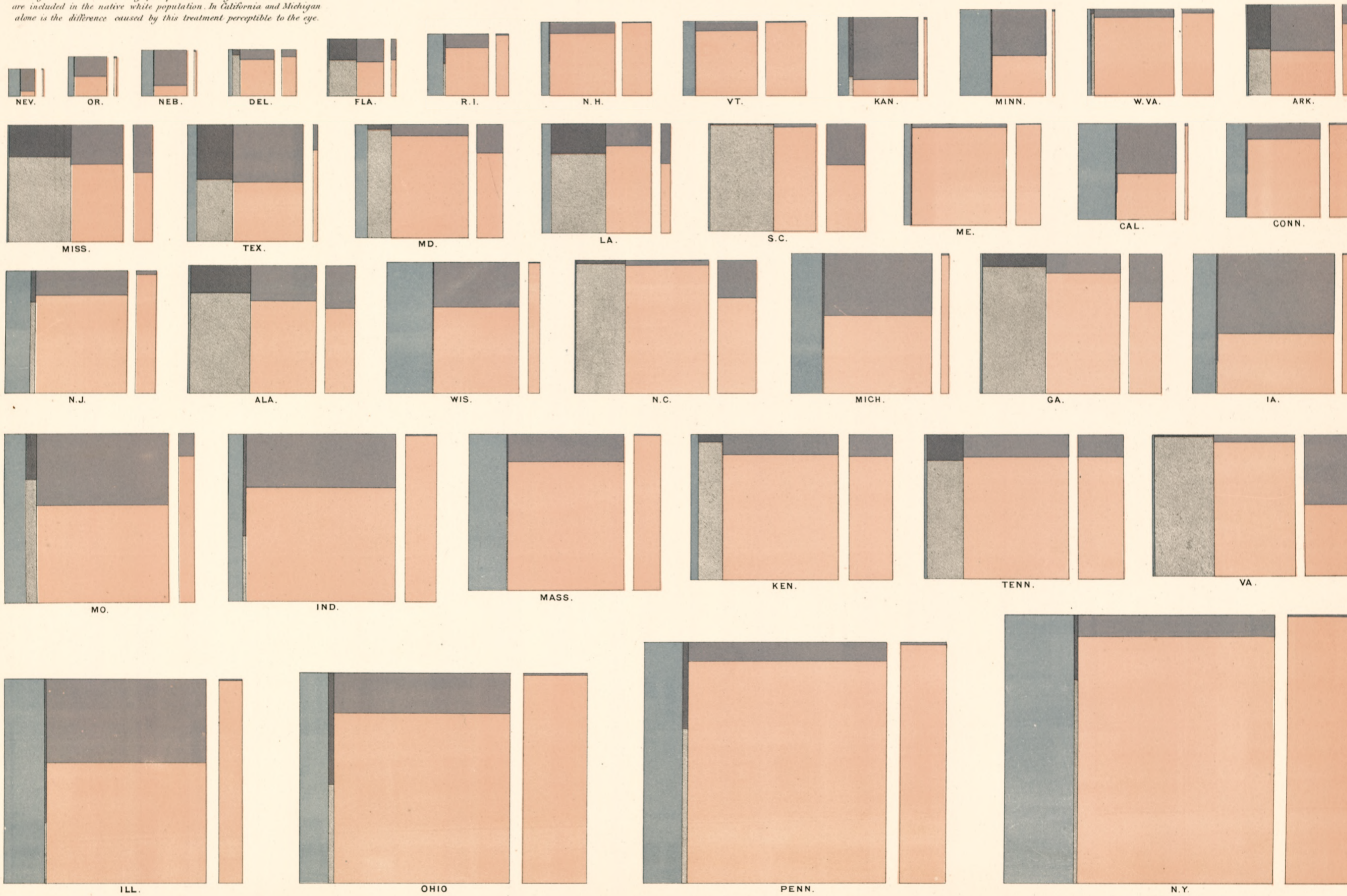
Explanation. The squares are proportional to the population of the States respectively represented (350,000 inhabitants to the sq. in.) Each square is divided by vertical lines into three rectangles, the left representing the foreign, the middle the native colored, and the right the native white population. Each of the last two rectangles is divided by a horizontal line to exhibit the proportion of each class of the population represented born respectively within and without the State itself. The lower portions of those rectangles thus divided represent the number native to the State, the upper portions represent the number born in other States and Territories of the Union. Each square has a rectangle of equal height upon its right, which exhibits, in proportion, the number of persons born in the State who have become residents of other States. This rectangle is divided by a horizontal line, the upper portion representing colored, the lower, white. Caution: Care will in a few cases require to be taken in the use of these figures, where the number of foreign or of colored inhabitants, in the State under representation, is so small as to reduce the enclosed rectangle to a width scarcely perceptible to the eye. Civilized Indians are included in the native white population. In California and Michigan alone is the difference caused by this treatment perceptible to the eye.

CHART
SHOWING THE
PRINCIPAL CONSTITUENT ELEMENTS
OF THE
POPULATION OF EACH STATE,
AS FOREIGN, NATIVE COLORED, AND NATIVE WHITE,
AND AS BORN WITHIN OR WITHOUT
THE STATE OF RESIDENCE.

Compiled from the Returns of Population at the Ninth Census 1870.

BY
FRANCIS A WALKER.

Persons born out of the United States
Native Colored born in the State
" " " out of the State
Native White born in the State
" " " out of the State
Living in other States. { White.
 { Colored.





MAP
 SHOWING, IN FIVE DEGREES OF DENSITY, THE DISTRIBUTION OF THE
COLORED POPULATION
 WITHIN THE TERRITORY OF THE UNITED STATES EAST OF THE 100th MERIDIAN.
 Compiled from the Returns of Population at the Ninth Census
 OF THE UNITED STATES, 1870.
 BY
 FRANCIS AWALKER.

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue 2-18, 45, 45, express the number of inhabitants
 to the Square Mile found within each group
 The Shaded Lines in Blue indicate the outside limit of a population
 of 2 or more to the Square Mile. The shading points towards the
 regions which have a population of less than 2 to the Square Mile.
 Note: The occasional abrupt intervals between the shaded portions
 and the line of population, are doubtless due in many cases to errors
 in the Census returns, incident to the sparseness of settlement.

SCALE.

Under 1 to the Square Mile

1-4	I
4-8	II
8-15	III
15-25	IV
25 and over	V



MAP
SHOWING THE PROPORTION OF THE
COLORED
TO THE AGGREGATE POPULATION.
Compiled from the Returns of Population at the Ninth Census
OF THE UNITED STATES, 1870.
BY
FRANCIS AWALKER.

SCALE

Under 1 per cent	I
1-7	II
7-17	III
17-35	IV
35-60	V
60 and over	

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue 2 18 43 45 express the number of inhabitants
 to the Square Mile found within each group
 The Shaded Lines in Blue indicate the outside limit of a population
 of 2 or more to the Square Mile. The shading points towards the
 regions which have a population of less than 2 to the Square Mile.
 Note: The occasional abrupt intervals between the shaded portions
 and the line of no population, are doubtless due in many cases to errors
 in the Census returns incident to the sparseness of settlement.



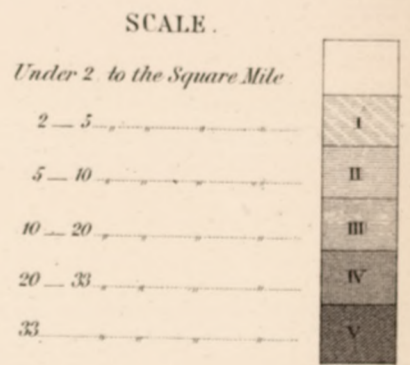
MAP
 SHOWING IN FIVE DEGREES OF DENSITY, THE DISTRIBUTION,
 WITHIN THE TERRITORY OF THE UNITED STATES EAST OF THE 100th MERIDIAN,
 OF THAT PORTION OF THE POPULATION WHICH IS, IN WHOLE, OR IN PART, OF
FOREIGN PARENTAGE.

(embracing i.e. all persons having father, or mother, or both, foreign.)
 Compiled from the Returns of Population at the Ninth Census
 OF THE UNITED STATES, 1870.

BY
FRANCIS AWALKER.

Note: It should be observed that, as a rule persons found within the United States of foreign birth, were born of parents also foreign, and hence are included in the numbers taken for the computations for this map.

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue 2-45 45 45 express the number of inhabitants to the Square Mile, found within each group
 The Shaded Lines in Blue indicate the outside limit of a population of 2 or more to the Square Mile. The shading points towards the regions which have a population of less than 2 to the Square Mile.
Note: The occasional abrupt intervals between the shaded portions and the line of no population, are doubtless due in many cases to errors in the Census returns incident to the sparseness of settlement.





MAP
 SHOWING THE PROPORTION TO THE AGGREGATE POPULATION,
 OF PERSONS HAVING ONE OR BOTH
PARENTS OF FOREIGN BIRTH.
 Compiled from the Returns of Population at the Ninth Census
 OF THE UNITED STATES 1870.
 BY
 FRANCIS AWALKER.

Note: It should be observed that as a rule persons found within the United States of foreign birth, were born of parents also foreign, and hence are included in the numbers taken for the computations for this map.

Explanations.
 The Blue lines indicate the boundaries of Groups of Population
 The Figures in Blue 2 18 45 45 express the number of inhabitants
 to the Square Mile found within each group
 The Shaded Lines in Blue indicate the outside limit of a population
 of 2 or more to the Square Mile. The shading points towards the
 regions which have a population of less than 2 to the Square Mile.
*Note: The occasional abrupt intervals between the shaded portions
 and the line of no population are doubtless due in many cases to errors
 in the Census returns incident to the sparseness of settlement.*

SCALE

Under 1 per cent

1-5	I
5-10	II
10-20	III
20-33	IV
33-60	V
60 and over	VI



MAP
 SHOWING IN FIVE DEGREES OF DENSITY THE DISTRIBUTION OF THE
FOREIGN POPULATION
 WITHIN THE TERRITORY OF THE UNITED STATES EAST OF THE 100th MERIDIAN.
 Compiled from the Returns of Population at the Ninth Census
 OF THE UNITED STATES 1870.
 BY
 FRANCIS A WALKER.

SCALE.

Under 1 to the Square Mile

1 - 4	I
4 - 8	II
8 - 15	III
15 - 25	IV
25 and over	V

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue "2 18 45 45" express the number of inhabitants
 to the Square Mile found within each group.
 The Shaded Lines in Blue indicate the outside limit of a population
 of 2 or more to the Square Mile. The shading points towards the
 regions which have a population of less than 2 to the Square Mile.
 Note: The occasional abrupt intervals between the shaded portions
 and the line of no population, are doubtless due in many cases to errors
 in the Census returns, incident to the sparseness of settlement.



MAP
 SHOWING THE PROPORTION OF THE
FOREIGN
TO THE AGGREGATE POPULATION.
 Compiled from the Returns of Population at the Ninth Census
 OF THE UNITED STATES 1870.
 BY
 FRANCIS A. WALKER.

SCALE

Under 1 per cent

1.5	I
5.10	II
10.20	III
20.34	IV
34	V

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue 2 18 45 45 express the number of inhabitants
 to the Square Mile found within each group.
 The Shaded Lines in Blue indicate the outside limit of a population
 of 2 or more to the Square Mile. The shaded points towards the
 regions which have a population of less than 2 to the Square Mile.
 Note: The occasional abrupt intervals between the shaded portions
 and the line of no population, are doubtless due in many cases to errors
 in the Census returns incident to the sparseness of settlement.

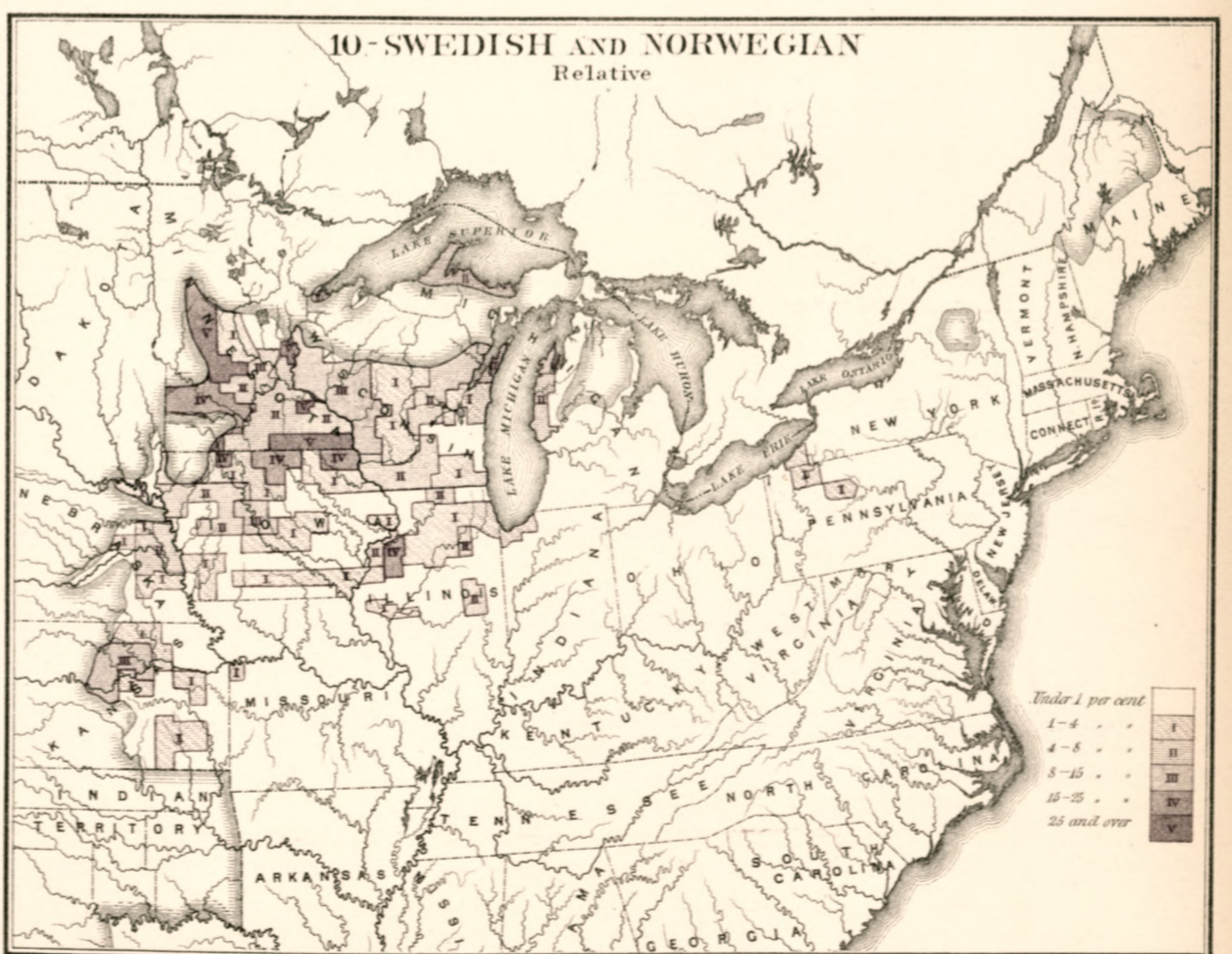
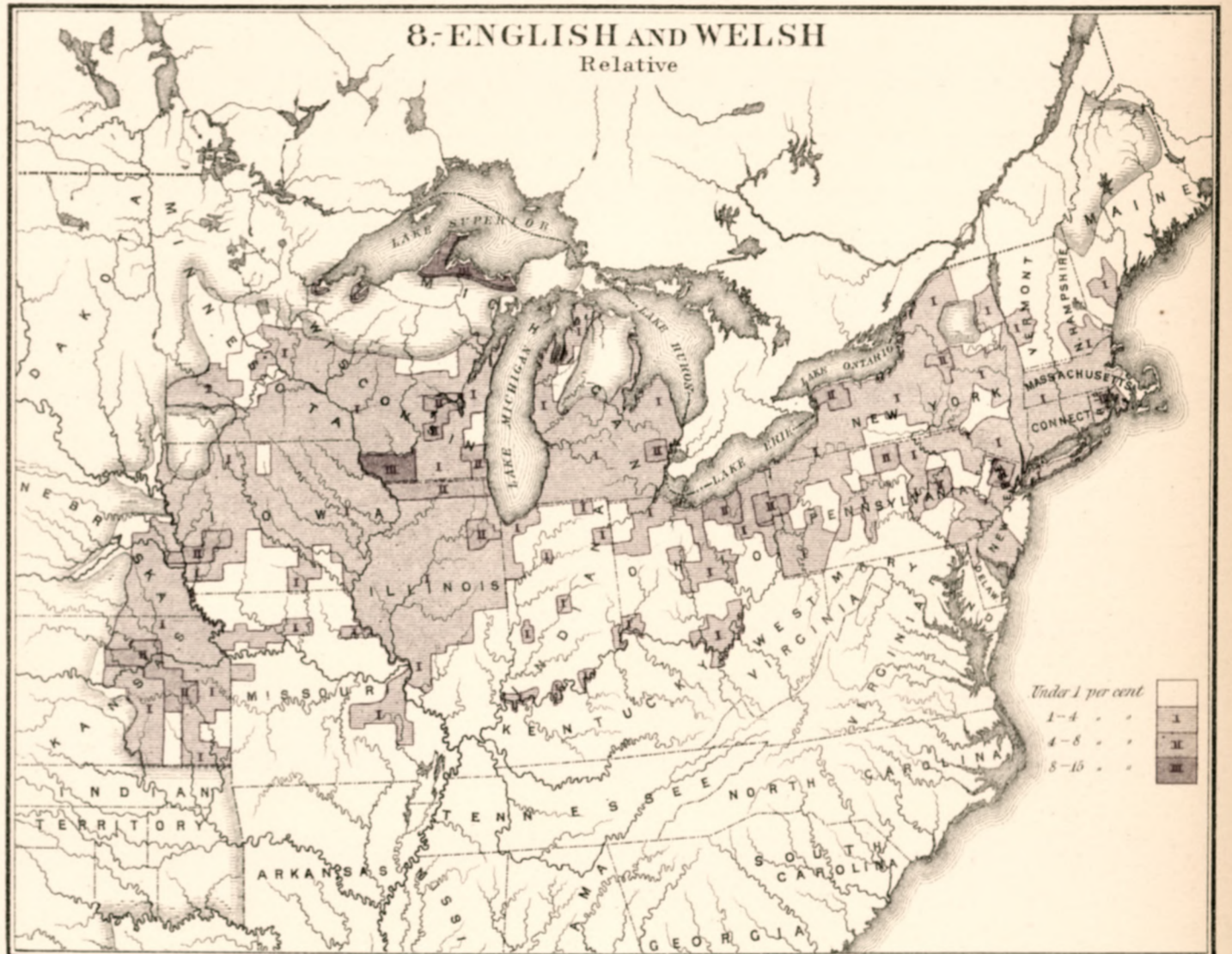
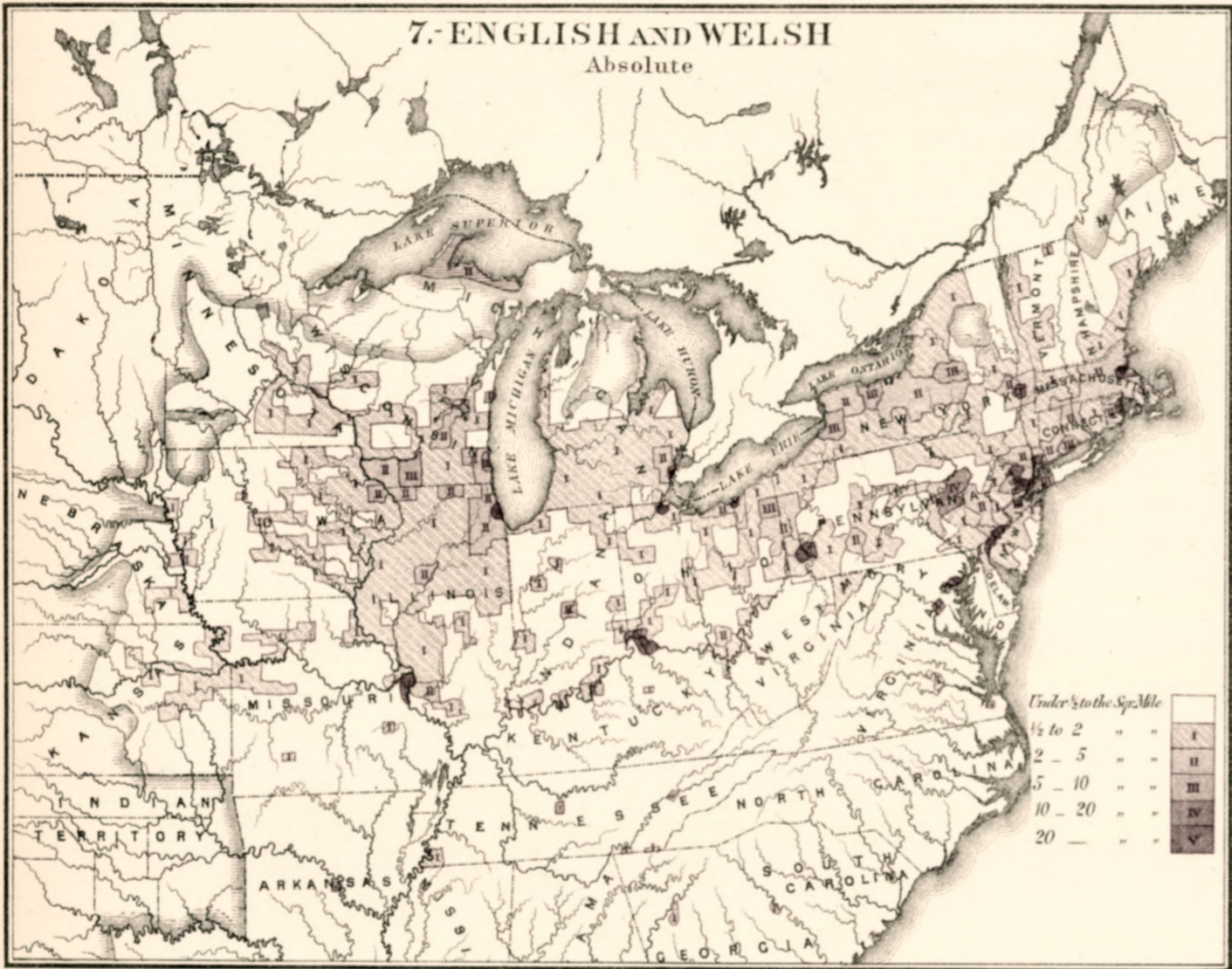
MAPS
 SHOWING THE DISTRIBUTION WITHIN THE TERRITORY OF THE UNITED STATES EAST OF THE 100TH MERIDIAN, OF CERTAIN
FOREIGN ELEMENTS OF THE POPULATION.

I. ACCORDING TO THEIR NUMBER TO THE SQUARE MILE (ABSOLUTE).
 II. ACCORDING TO THEIR PROPORTION TO THE AGGREGATE POPULATION (RELATIVE)

Compiled from the Returns of Population at the Ninth Census 1870,
 by
FRANCIS A WALKER.



Note: The Shaded Lines in Black indicate the outside limit of a population of 2 or more to the square mile. The shading points towards the regions which have a population of less than 2 to the square mile.



Note: The Shaded Lines in Black indicate the outside limit of a population of 2 or more to the square mile. The shading points towards the regions which have a population of less than 2 to the square mile.



MAP
SHOWING THE
ILLITERACY OF THE AGGREGATE POPULATION.

Compiled from the Returns of Population at the Ninth Census
OF THE UNITED STATES 1870.

BY
FRANCIS AWALKER.

*Note: In the construction of this Map the total No. of persons
10 years of age and upwards is compared with the No. of such
persons who cannot read.*

Explanations.

The Blue Lines indicate the boundaries of groups of Population
The Figures in Blue 2 18 45 45 express the number of inhabitants
to the Square Mile found within each group
The Shaded Lines in Blue indicate the outside limit of a population
of 2 or more to the Square Mile. The shading points towards the
regions which have a population of less than 2 to the Square Mile
*Note: The occasional abrupt intervals between the shaded portions
and the line of no population, are doubtless due in many cases to errors
in the Census returns, incident to the sparseness of settlement.*

SCALE

Under 5 Per cent
From 5-12
12-20
20-40
40-60
60 and over.....

I
II
III
IV
V



MAP
SHOWING THE
ILLITERACY
OF THE
ADULT WHITE MALE POPULATION.

Compiled from the Returns of Population at the Ninth Census
OF THE UNITED STATES 1870.
BY
FRANCIS A WALKER.

*Note: In the construction of this Map the whole N^o of
White Males 21 years of age and upwards is compared
with the N^o of such persons who cannot write.*

Explanations.
The Blue Lines indicate the boundaries of Groups of Population
The Figures in Blue 2 4 6 10 45 45 express the number of inhabitants
to the Square Mile found within each group
The Shaded Lines in Blue indicate the outside limit of a population
of 2 or more to the Square Mile. The shading points towards the
regions which have a population of less than 2 to the Square Mile.
*Note: The occasional abrupt intervals between the shaded portions
and the line of no population are doubtless due in many cases to errors
in the Census returns, incident to the sparseness of settlement.*

SCALE

Under 5 Per cent.	I
From 5.12	II
12.20	III
20.40	IV
40.60	V
60 and over	

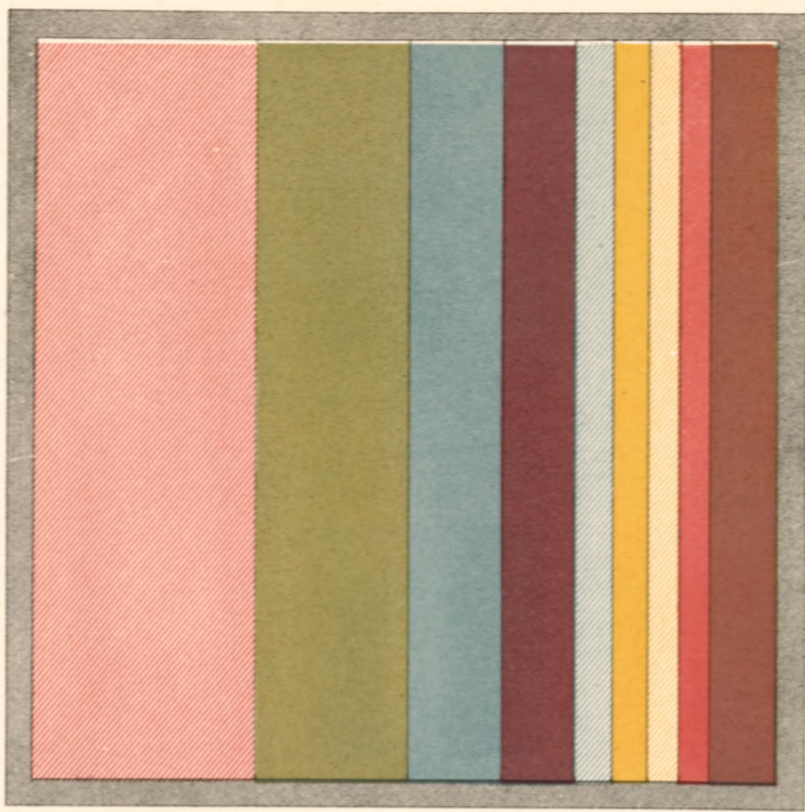
CHART SHOWING THE RATIO OF CHURCH ACCOMMODATION

TO THE TOTAL POPULATION OVER 10 YEARS OF AGE
WITH THE PROPORTION OF SUCH CHURCH ACCOMMODATION FURNISHED BY EACH OF
THE LARGEST FOUR DENOMINATIONS WITHIN EACH STATE AND BY EACH OF
THE LARGEST EIGHT DENOMINATIONS WITHIN THE UNITED STATES.

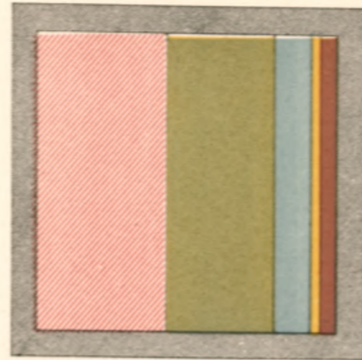
Compiled from the Social Statistics of the Ninth Census 1870

BY
FRANCIS A. WALKER.

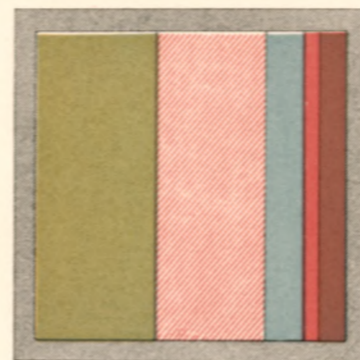
Note: The interior squares represent the proportion of the population which is provided for by the aggregate sittings in the churches of all denominations. The shaded interval between the inner and outer squares represents the population for which no church accommodation is provided. Where the aggregate church accommodation equals or exceeds the population over 10 years of age the shaded interval disappears.



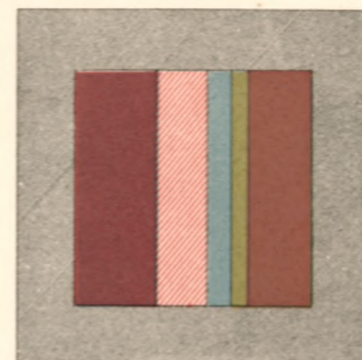
THE UNITED STATES



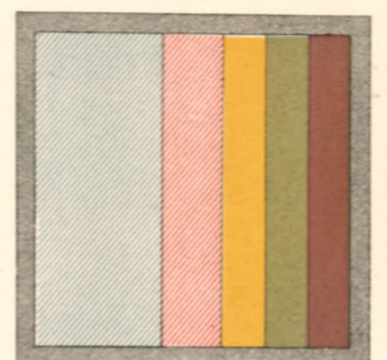
ALABAMA



ARKANSAS



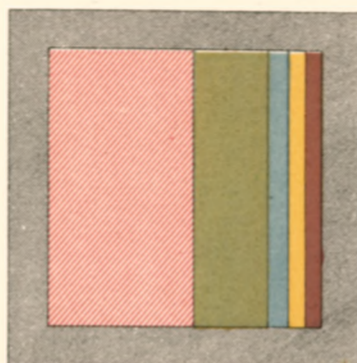
CALIFORNIA



CONNECTICUT



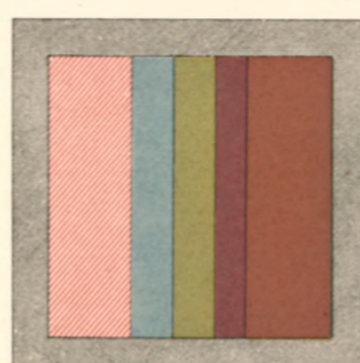
DELAWARE



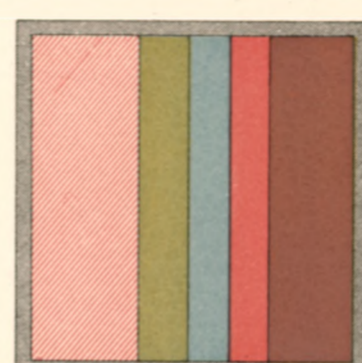
FLORIDA



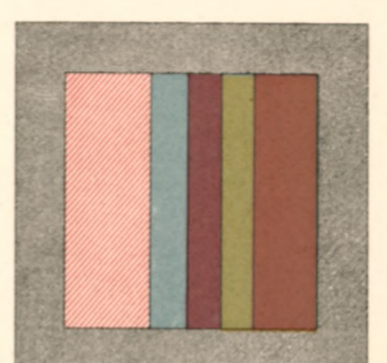
GEORGIA



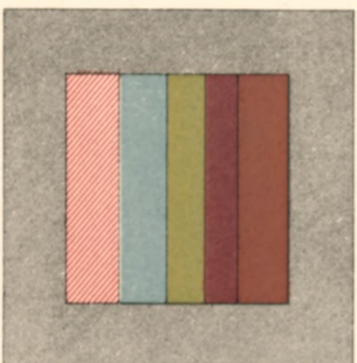
ILLINOIS



INDIANA



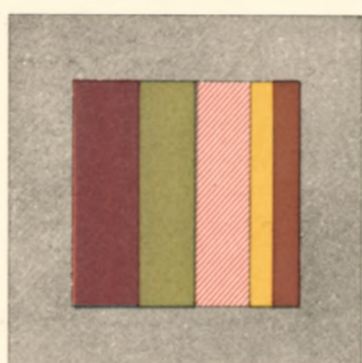
IOWA



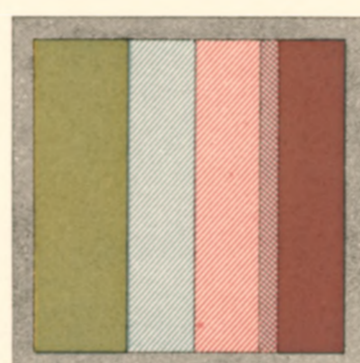
KANSAS



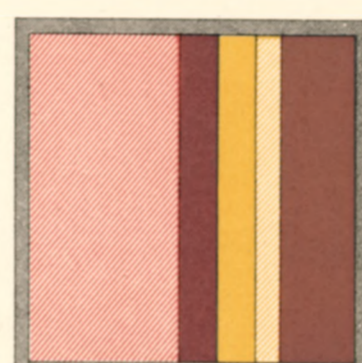
KENTUCKY



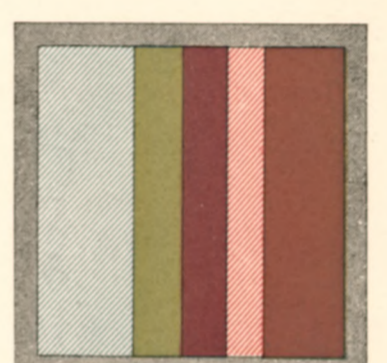
LOUISIANA



MAINE



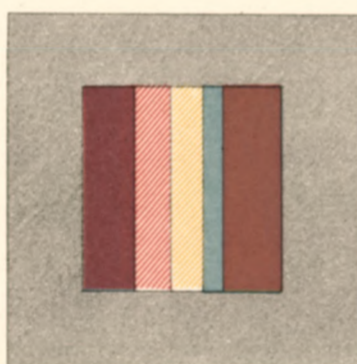
MARYLAND



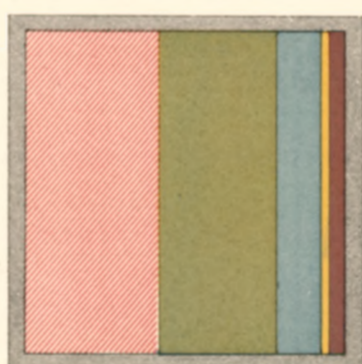
MASSACHUSETTS



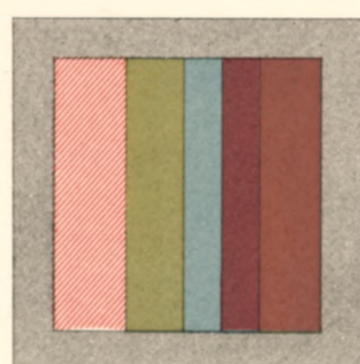
MICHIGAN



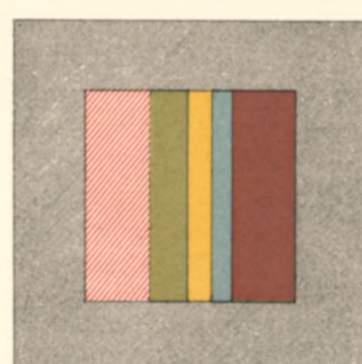
MINNESOTA



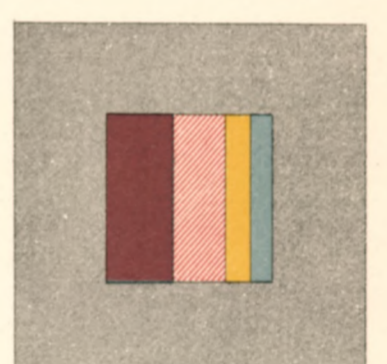
MISSISSIPPI



MISSOURI



NEBRASKA



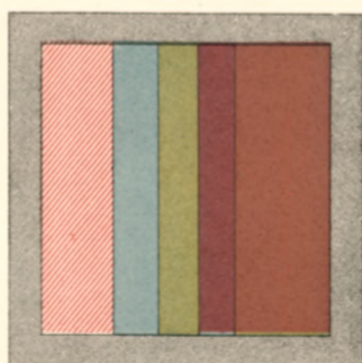
NEVADA



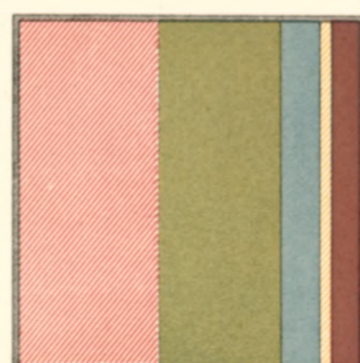
NEW HAMPSHIRE



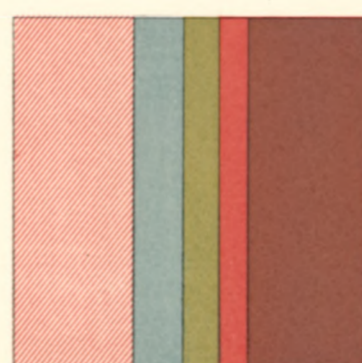
NEW JERSEY



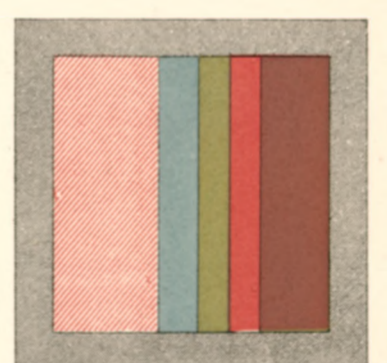
NEW YORK



NORTH CAROLINA



OHIO



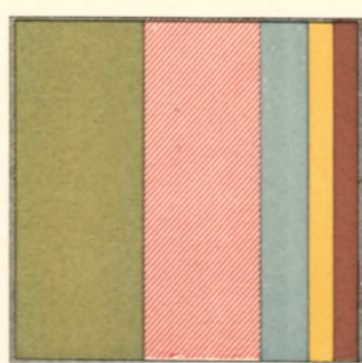
OREGON



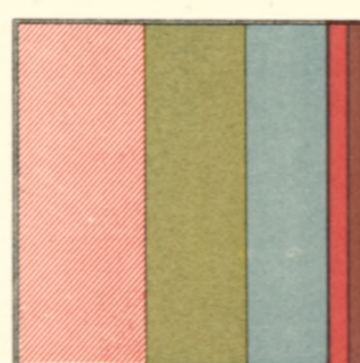
PENNSYLVANIA



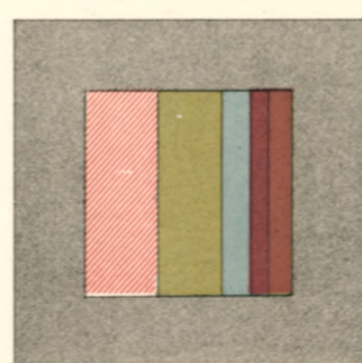
RHODE ISLAND



SOUTH CAROLINA



TENNESSEE



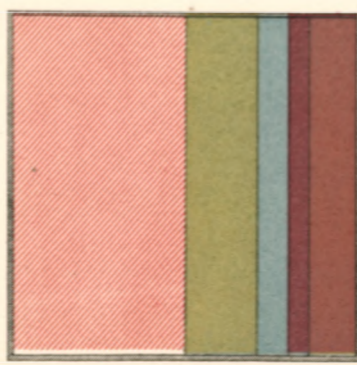
TEXAS



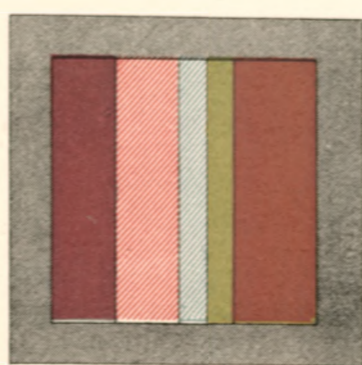
VERMONT



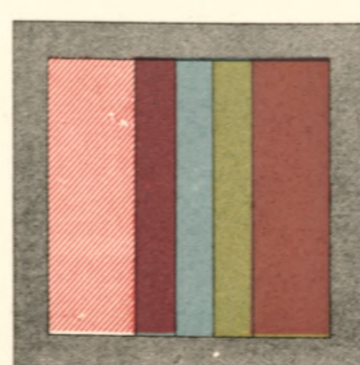
VIRGINIA



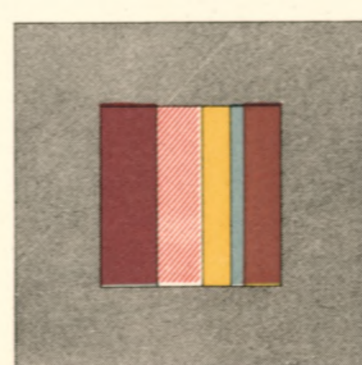
WEST VIRGINIA



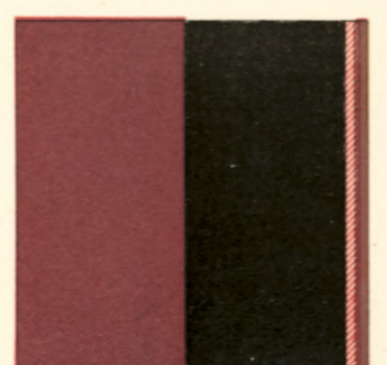
WISCONSIN



DISTRICT OF COLUMBIA



NORTH WEST TERRITORIES

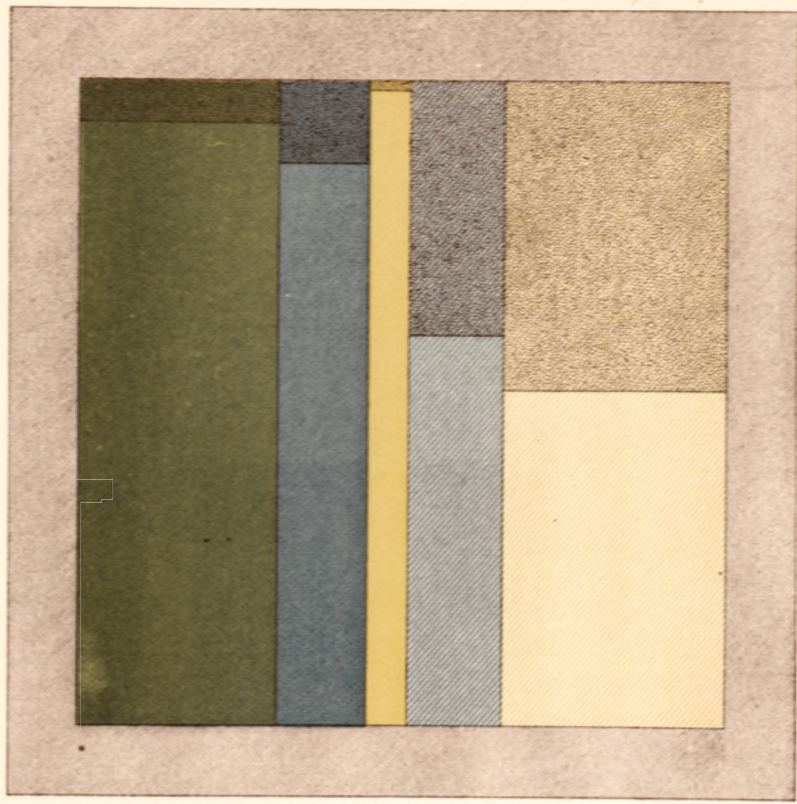


SOUTH WEST TERRITORIES

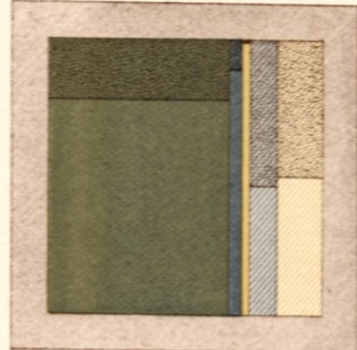
CHART
 SHOWING FOR THE UNITED STATES AND FOR EACH STATE,
 WITH DISTINCTION OF SEX, THE RATIO
 BETWEEN THE TOTAL POPULATION OVER 10 YEARS OF AGE
 AND THE NUMBER OF PERSONS REPORTED AS ENGAGED IN EACH PRINCIPAL CLASS OF
GAINFUL OCCUPATIONS
 AND ALSO AS
ATTENDING SCHOOL.
 Compiled from the Returns of Population at the Ninth Census 1870
 BY
FRANCIS A. WALKER.



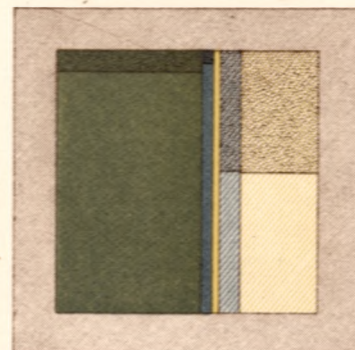
Note: The interior squares represent the proportion of the population which is accounted for as engaged in gainful occupations or as attending school. The shaded intervals between the inner and outer squares represent the proportion of the population not so accounted for.



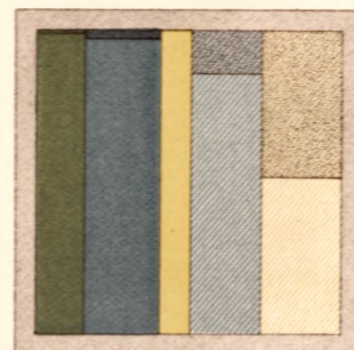
THE UNITED STATES



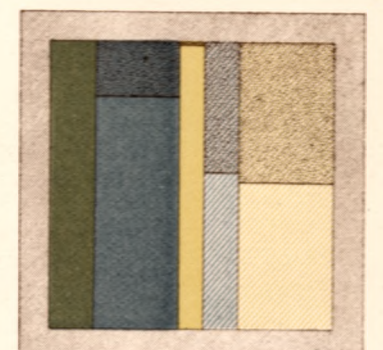
ALABAMA



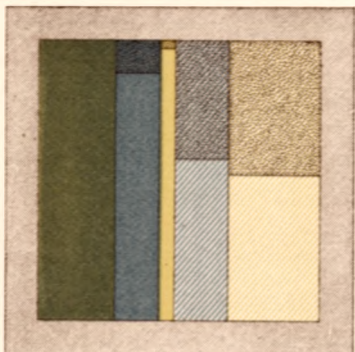
ARKANSAS



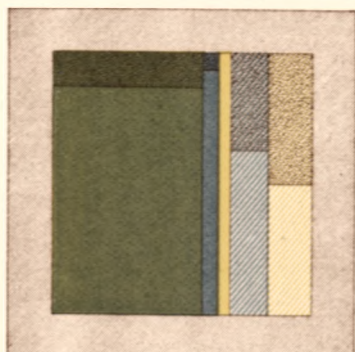
CALIFORNIA



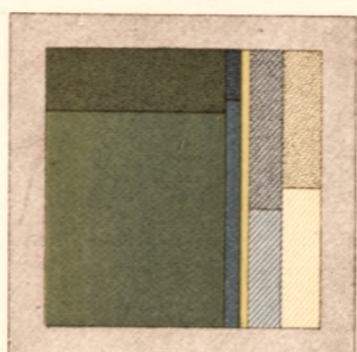
CONNECTICUT



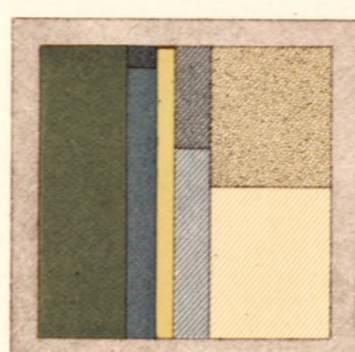
DELAWARE



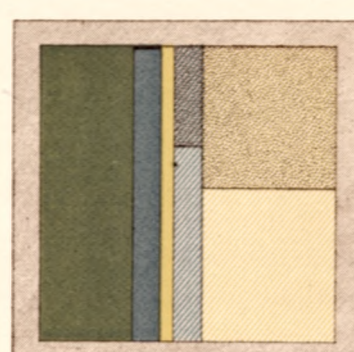
FLORIDA



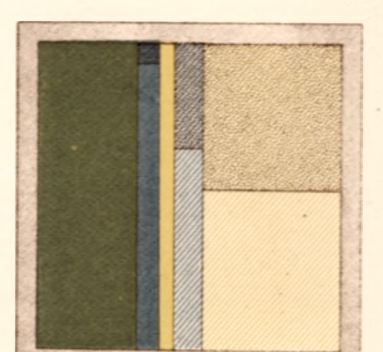
GEORGIA



ILLINOIS



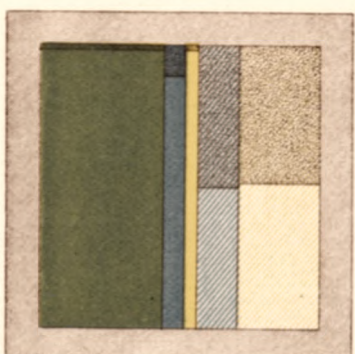
INDIANA



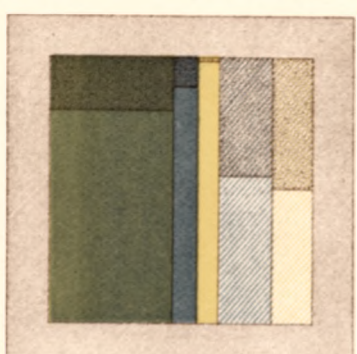
IOWA



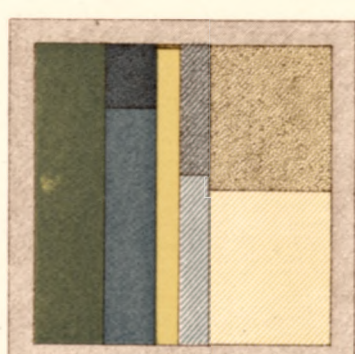
KANSAS



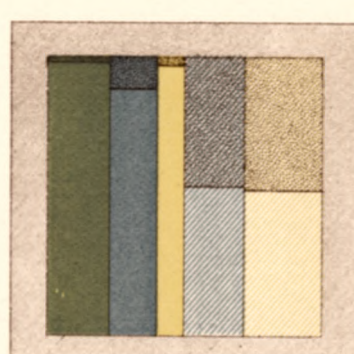
KENTUCKY



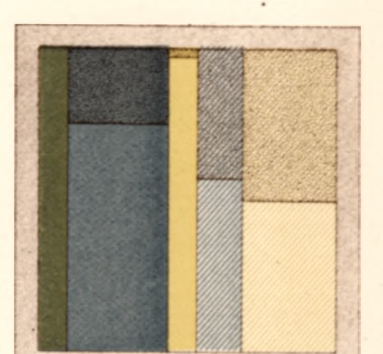
LOUISIANA



MAINE



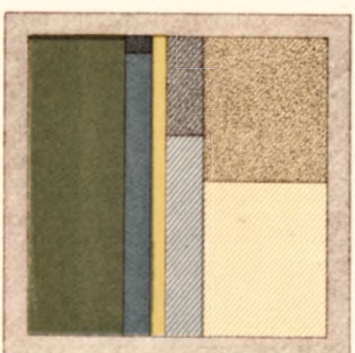
MARYLAND



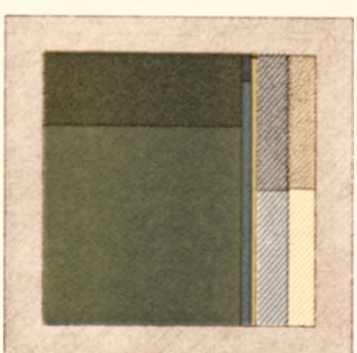
MASSACHUSETTS



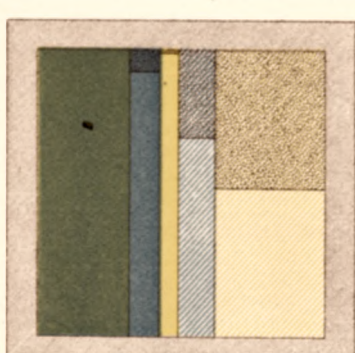
MICHIGAN



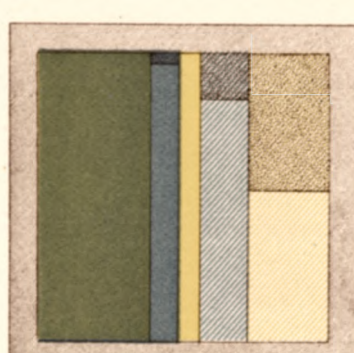
MINNESOTA



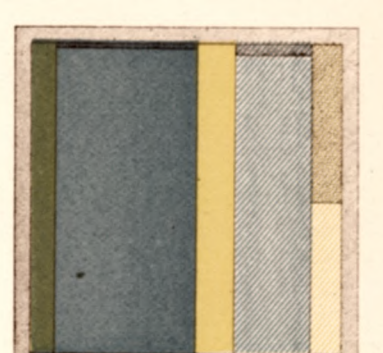
MISSISSIPPI



MISSOURI



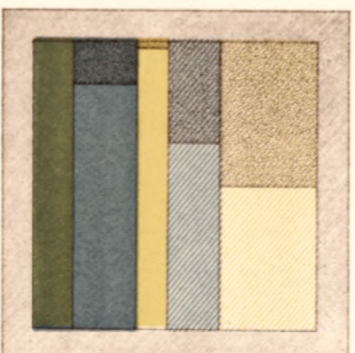
NEBRASKA



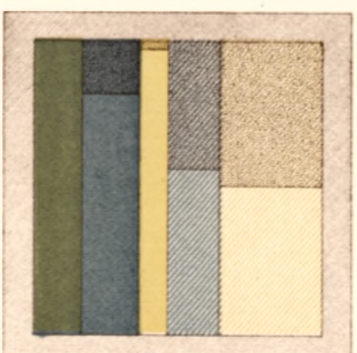
NEVADA



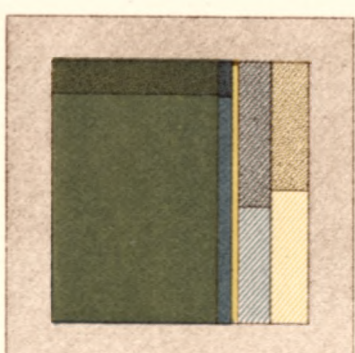
NEW HAMPSHIRE



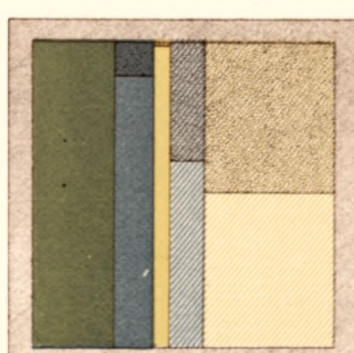
NEW JERSEY



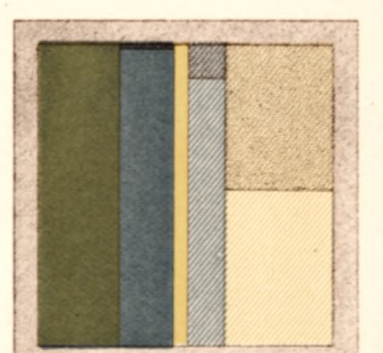
NEW YORK



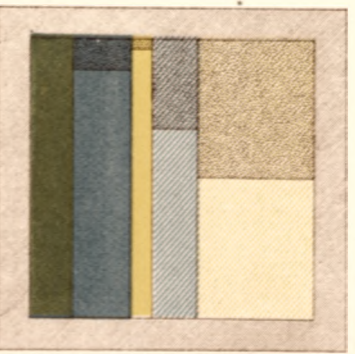
NORTH CAROLINA



OHIO



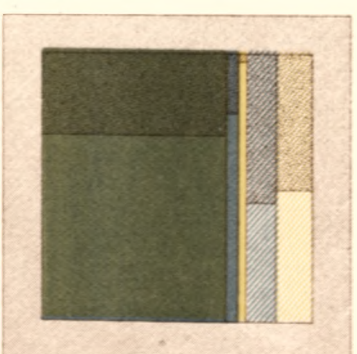
OREGON



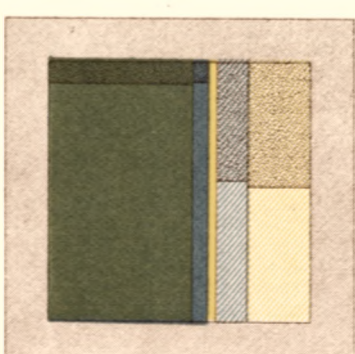
PENNSYLVANIA



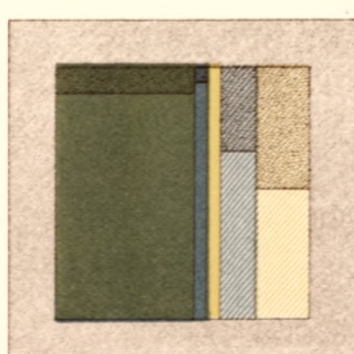
RHODE ISLAND



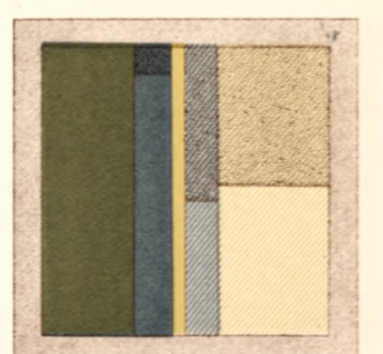
SOUTH CAROLINA



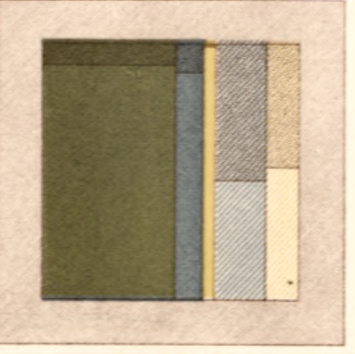
TENNESSEE



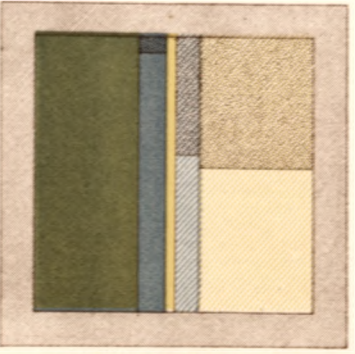
TEXAS



VERMONT



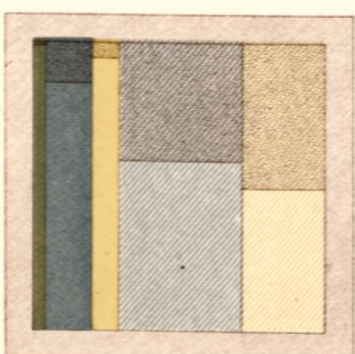
VIRGINIA



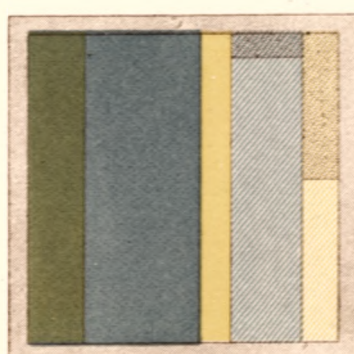
WEST VIRGINIA



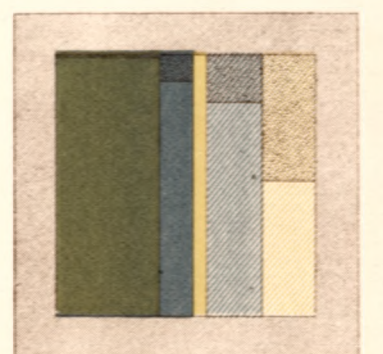
WISCONSIN



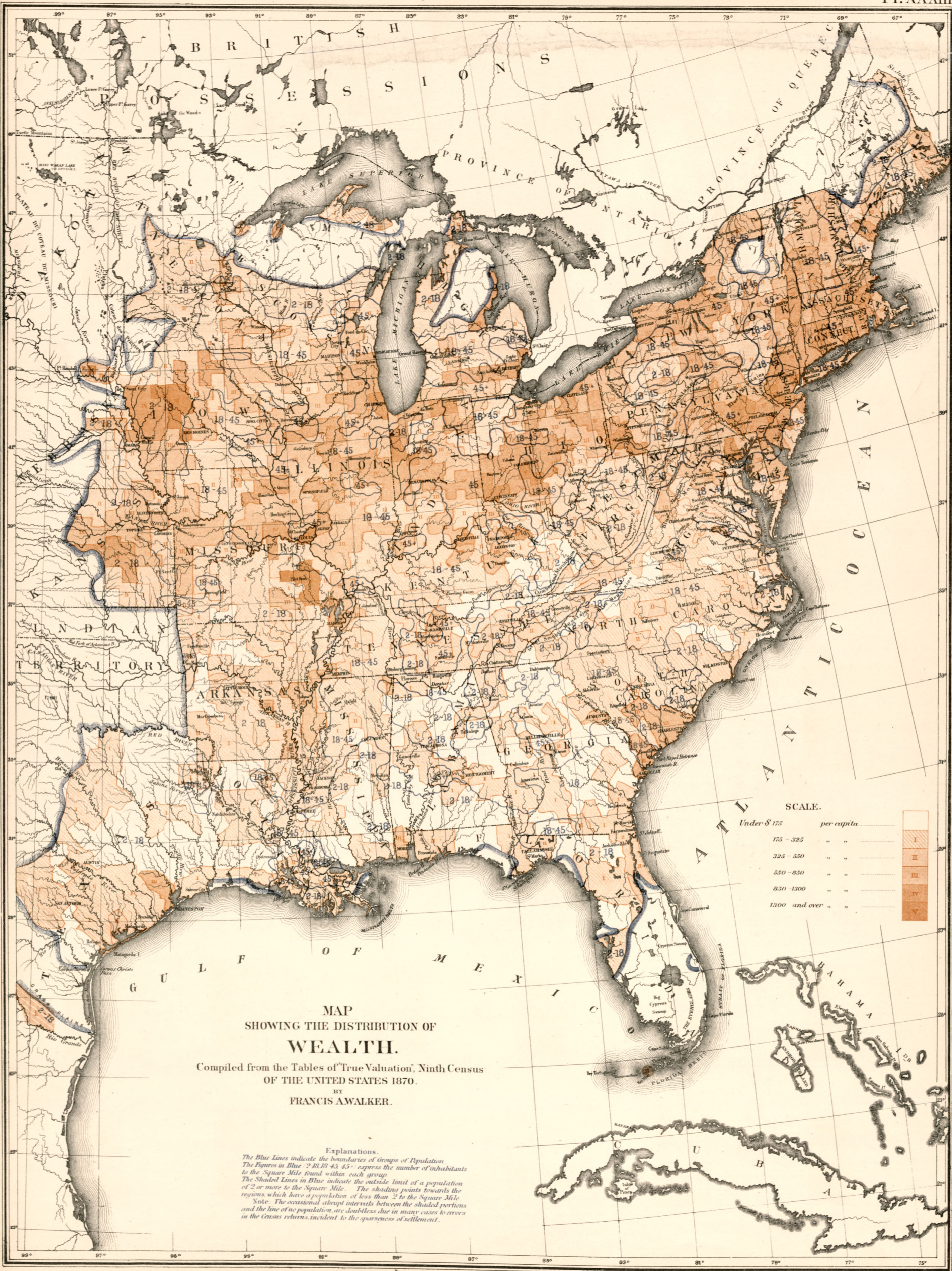
DISTRICT OF COLUMBIA



NORTH WEST TERRITORIES



SOUTH WEST TERRITORIES



MAP
SHOWING THE DISTRIBUTION OF
WEALTH.

Compiled from the Tables of "True Valuation", Ninth Census
OF THE UNITED STATES 1870.

BY
FRANCIS AWALKER.

SCALE.

per capita	Shading
Under \$ 175	I
175 - 325	II
325 - 550	III
550 - 850	IV
850 - 1300	V
1300 and over	

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue 2 18 18 45 45 express the number of inhabitants
 to the Square Mile found within each group
 The Shaded Lines in Blue indicate the outside limit of a population
 of 2 or more to the Square Mile. The shading points towards the
 regions which have a population of less than 2 to the Square Mile.
 Note. The occasional abrupt intervals between the shaded portions
 and the line of no population are doubtless due in many cases to errors
 in the census returns, incident to the sparseness of settlement.



MAP
SHOWING THE DEGREE OF
PUBLIC INDEBTEDNESS PER CAPITA.

CONTRACTED BY STATE, COUNTY OR MUNICIPAL AUTHORITY,
AT THE CLOSE OF THE FISCAL YEAR NEAREST THE CENSUS YEAR.

Compiled from the Statistics of Wealth, Taxation and Public Indebtedness
at the Ninth Census
OF THE UNITED STATES 1870.

BY
FRANCIS A. WALKER.

Explanations
The Blue Lines indicate the boundaries of Groups of Population
The Figures in Blue "2, 10, 45, 45" express the number of inhabitants to the Square Mile found within each group
The Shaded Lines in Blue indicate the outside limit of a population of 2 or more to the Square Mile. The shading points towards the regions which have a population of less than 2 to the Square Mile.
Note: The occasional abrupt intervals between the shaded portions and the line of no population are doubtless due in many cases to errors in the census returns incident to the sparseness of settlement.

SCALE

Under \$1 per Capita

\$1.5

\$5.0

\$10.20

\$20.04

\$34.80 and over





MAP
 SHOWING THE DEGREE OF
TAXATION PER CAPITA
 IMPOSED BY STATE, COUNTY OR MUNICIPAL AUTHORITY,
 WITHIN THE FISCAL YEAR NEAREST THE CENSUS YEAR.
 Compiled from the Statistics of Wealth Taxation and Public Indebtedness
 at the Ninth Census
OF THE UNITED STATES 1870.
 BY
FRANCIS A. WALKER.

SCALE

Under \$1 per Capita	I
\$1-4	II
\$4-7	III
\$7-12	IV
\$12-17	V
\$17 & over	

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue (2-18 18-45 45+) express the number of inhabitants
 to the Square Mile found within each group
 The Shaded Lines in Blue indicate the outside limit of a population
 of 2 or more to the Square Mile. The shading points towards the
 regions which have a population of less than 2 to the Square Mile
 Note: The occasional abrupt intervals between the shaded portions
 and the line of no population, are doubtless due in many cases to errors
 in the Census returns, incident to the sparseness of settlement.

FISCAL CHART OF THE UNITED STATES

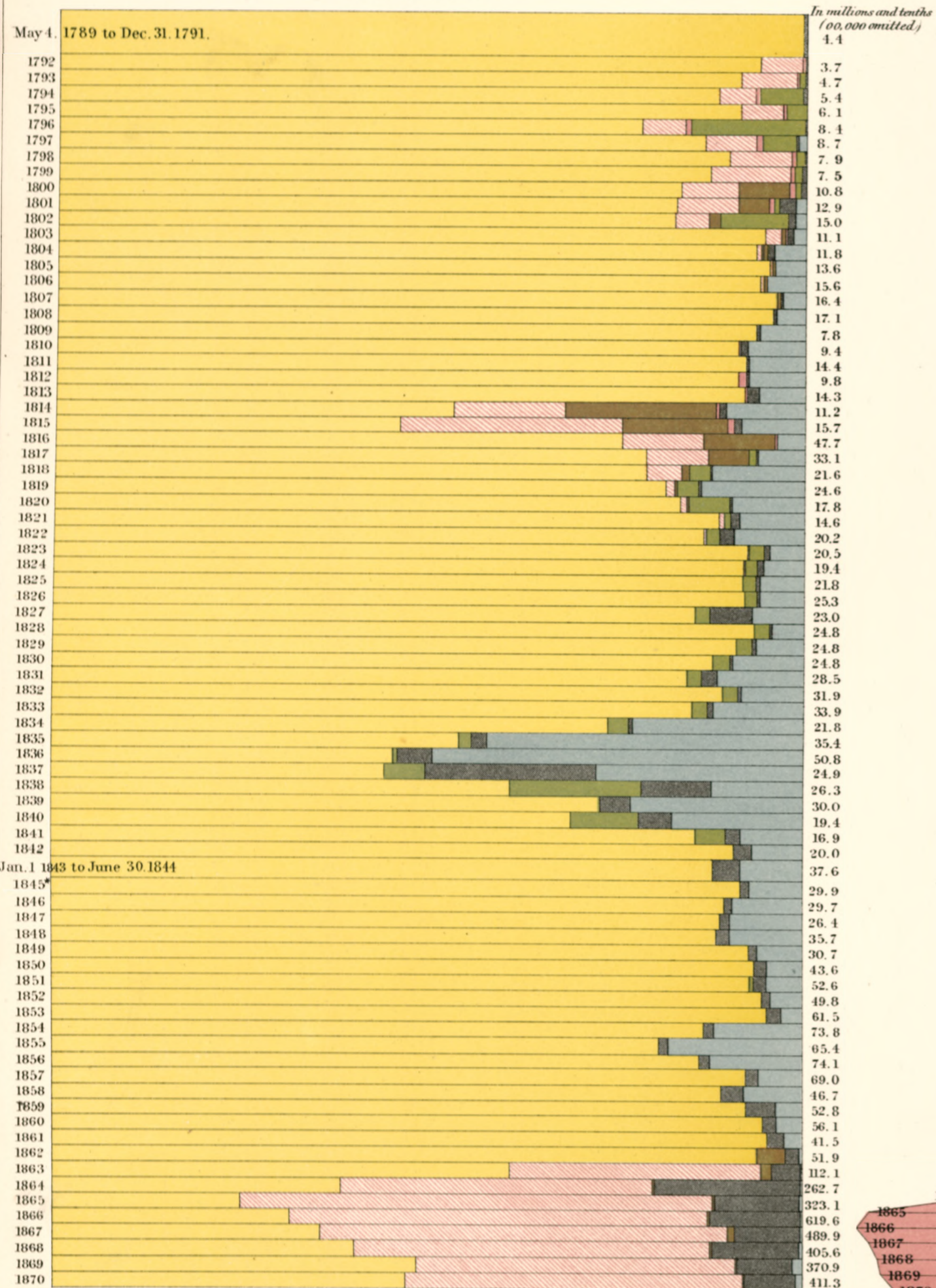
SHOWING THE COURSE OF THE PUBLIC DEBT BY YEARS 1789 TO 1870.
TOGETHER WITH THE PROPORTION OF THE TOTAL
RECEIPTS
FROM EACH PRINCIPAL SOURCE OF REVENUE
AND THE PROPORTION OF TOTAL
EXPENDITURES
FOR EACH PRINCIPAL DEPARTMENT OF THE
PUBLIC SERVICE.

Compiled from the Report of the Secretary of the Treasury for the year 1872,
BY
FRANCIS A. WALKER.

- From Public Lands
- " Bank Stock
- " Internal Revenue
- " Customs
- " Direct Tax
- " Postage
- " Miscellaneous

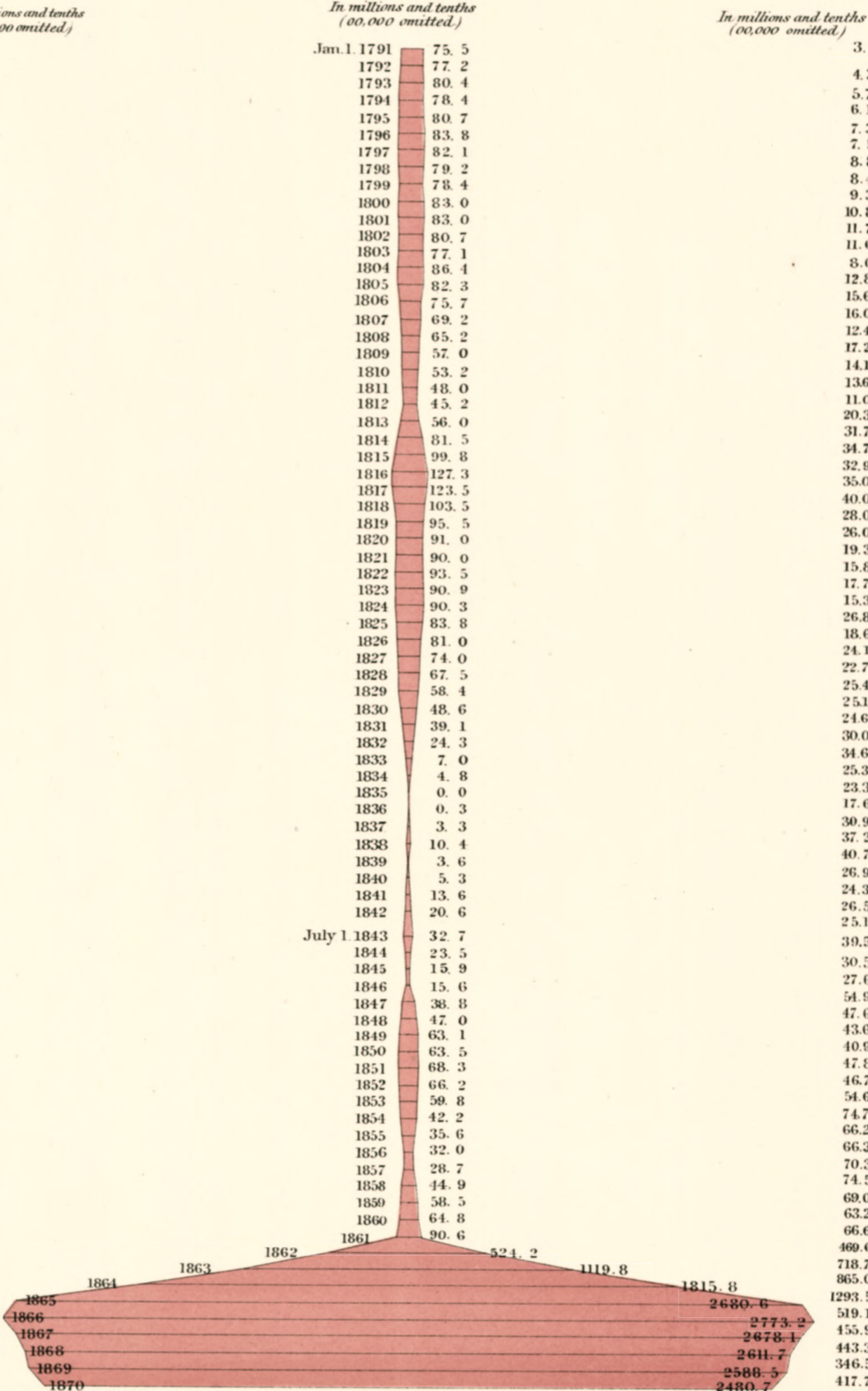
- Army
- Navy
- Pensions
- Civil
- Indians
- Foreign
- Miscellaneous
- Premium on Pub. Debt.
- Principal of Pub. Debt.
- Interest on Pub. Debt.

1-REVENUE.



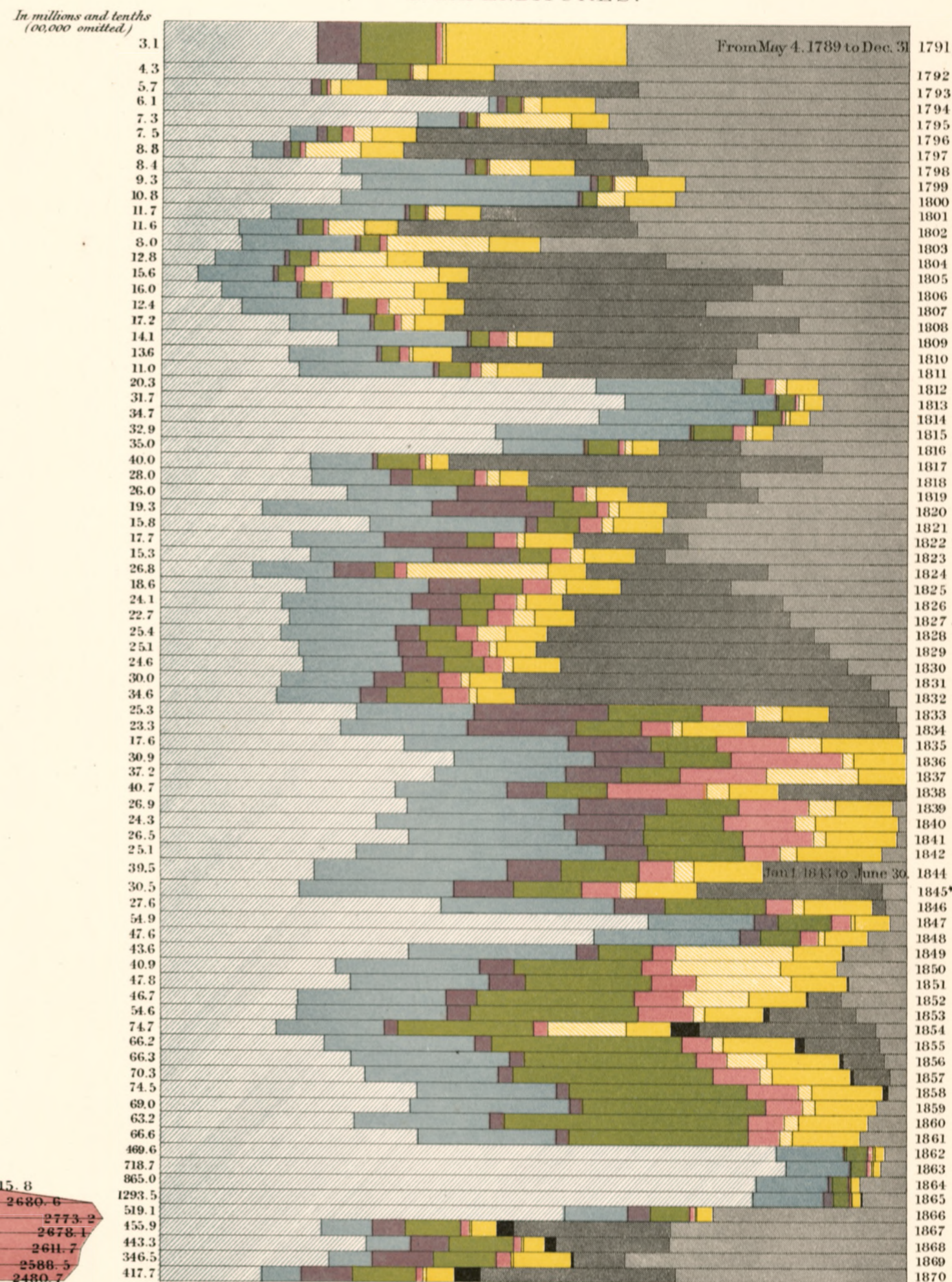
*Fiscal Year ending June 30.

2-PUBLIC DEBT.

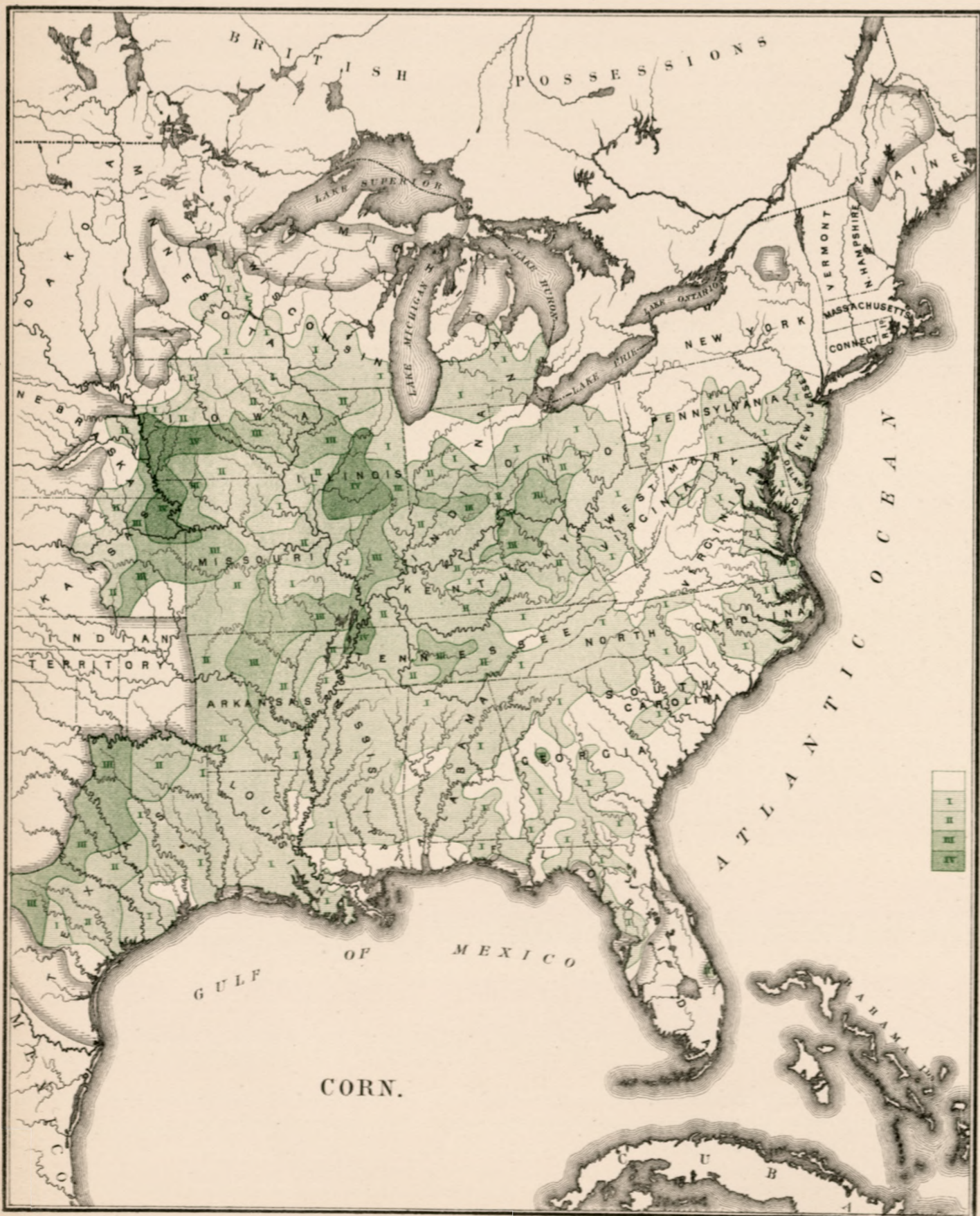
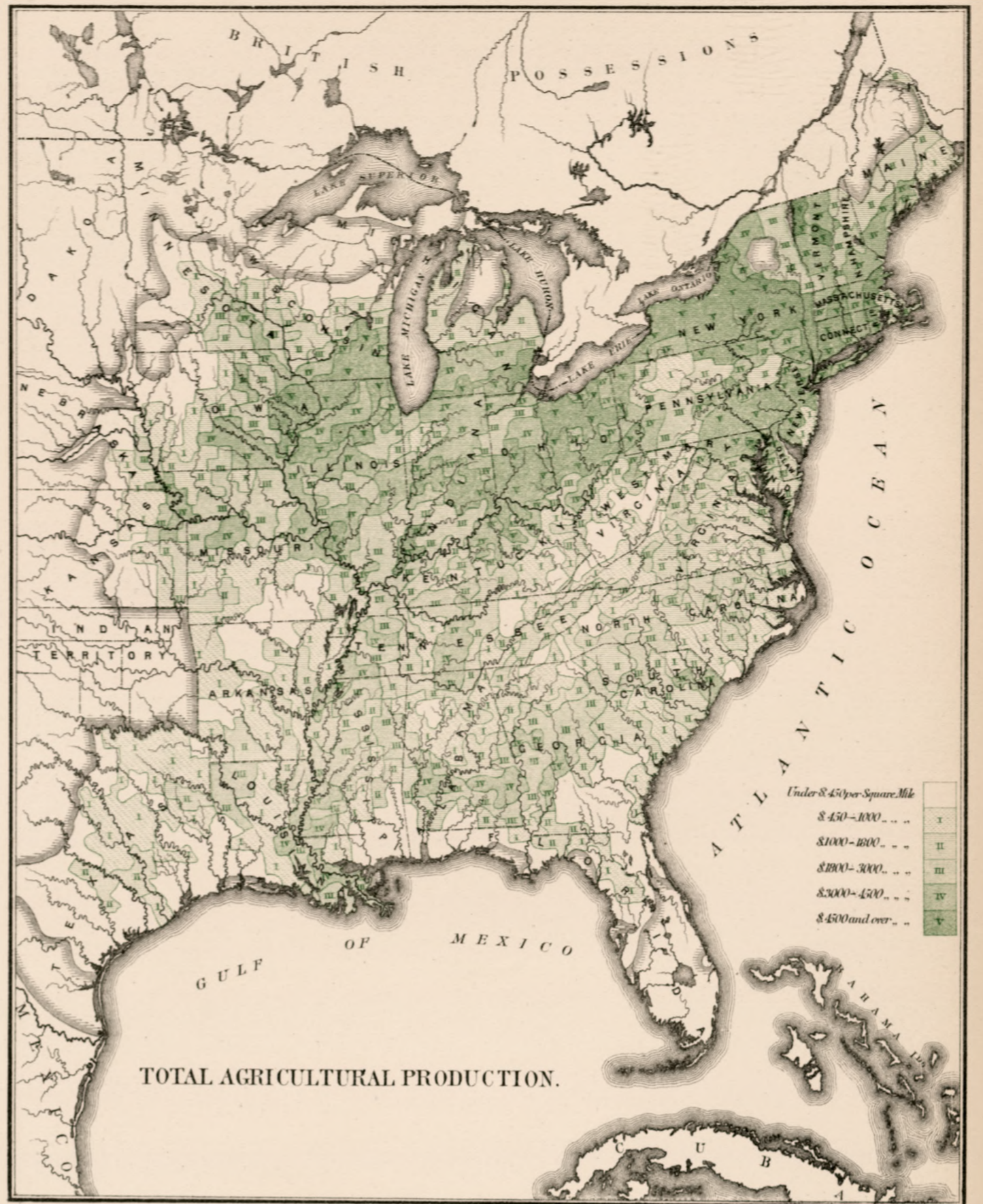
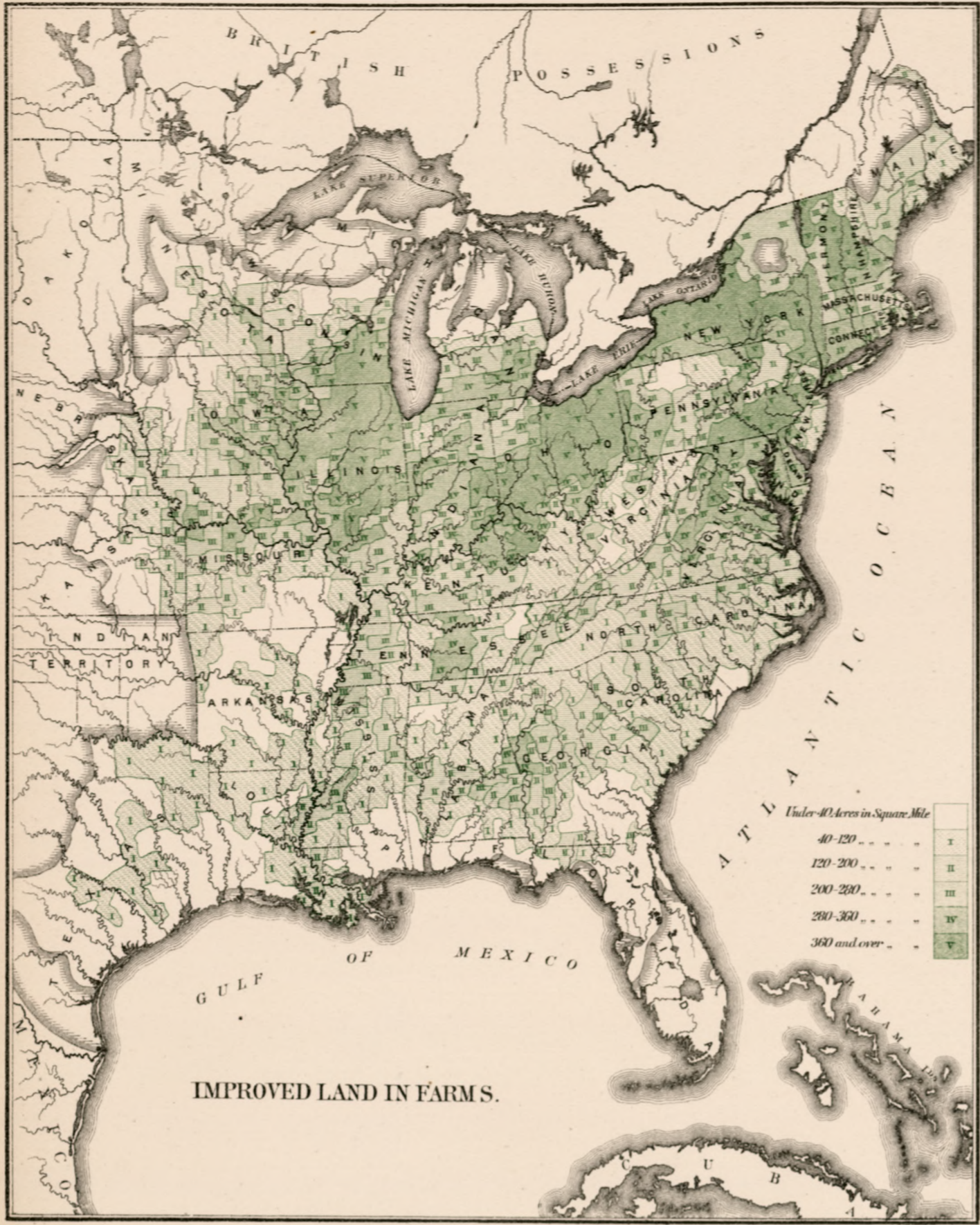


The Public Debt, January 1, 1835, was \$ 37,513.

3-EXPENDITURES.



*Fiscal Year ending June 30.



For Explanation of the Scale of the Corn Map, see PL. XXXVI.
 Note: The Shaded Lines in Black indicate the outside limit of a population of 2 or more to the square mile. The shading points towards the regions which have a population of less than 2 to the square mile.

MAPS
OF THE
PACIFIC COAST
EXHIBITING VARIOUS SUBJECTS
Compiled from the Statistics of the Eighth and Ninth Census
OF THE UNITED STATES
by
S. GALPIN.



Note: The Shaded Lines in Black indicate the outside limit of a population of 2 or more to the square mile.
The shading points towards the regions which have a population of less than 2 to the square mile.

AN APPROXIMATE LIFE-TABLE FOR THE UNITED STATES ON THE BASIS OF THE NINTH CENSUS, 1870.

[PLATES XXXVIII-IX; XLIII-IV.]

BY E. B. ELLIOTT, U. S. BUREAU OF STATISTICS.

[In a letter to the Superintendent of the Census, 1872.]

IN compliance with your request to be furnished with a "life-table," based on that portion of the returns of the United States census which purports to show distributed, according to age, the number of persons living on the first day of June, 1870, and the number of deaths which occurred during the twelve months which immediately preceded that date, I have prepared the following analysis and statement.

An important difficulty is encountered, at the outset of an attempt to arrive even approximately at a table which shall fairly represent the law of mortality obtaining in the general population, in the fact, manifest on intelligent inspection and confirmed by careful comparison with other analogous and trustworthy data, that the number of deaths reported as having occurred in the period above referred to falls far short of the number which must have taken place.*

In conducting the investigation proposed, this deficiency could only be supplied by resort to a somewhat arbitrary assumption, limited, however, by an investigation of the rates of mortality relative to population which obtain in other communities, so far as accessible, and in portions of our own country.

In the construction of the following tables the deficiency in the returns of deaths was assumed to be *forty-one* per cent of the full number of deaths which must have taken place. This assumed deficiency gives a general rate of mortality not differing greatly from that obtaining in England and Wales, and is also in substantial accord with the results of observation at different periods in the State of Massachusetts, in our own country. It is impossible to determine with precision the amount of deficiency in the return of deaths, but from the results herein computed on the assumption of a deficiency of forty-one per cent, it is easy to calculate corresponding values which shall conform to the assumption of any other supposed rate of deficiency.

The distribution of the ages of the living population, and of the deaths as furnished by the official returns of the census, although to some extent faulty, yield ratios which, augmented as above described, have been accepted in the construction of the following tables as satisfactorily correct.

TABLE I.
UNITED STATES CENSUS, 1870.

Ages—years.	Population at specified ages.	Deaths at specified ages.	Rate of mortality to population on the assumption of a deficit of 41 per cent in the return of deaths.	1. 2. 3. 4.			
				$\delta x : y.$	$P x : y.$	$Q x.$	$E x.$
0 to 1	1,100,475	110,445	.17010				
1 to 2	1,078,803	43,663	.06860				
2 to 3	1,143,139	23,944	.03550				
3 to 4	1,113,782	14,892	.02266				
4 to 5	1,078,514	10,269	.01614				
5 to 10	4,814,713	26,329	.00927				
10 to 15	4,786,189	15,979	.00666				
15 to 20	4,640,588	20,262	.00850				
20 to 25	3,748,299	25,988	.01175				
25 to 30	3,075,118	22,522	.01241				
30 to 35	2,562,820	19,528	.01291				
35 to 40	2,314,076	20,090	.01471				
40 to 45	1,939,712	17,836	.01558				
45 to 50	1,578,932	16,135	.01732				
50 to 55	1,367,969	16,123	.01998				
55 to 60	876,552	13,246	.02561				
60 to 65	778,971	15,883	.03456				
65 to 70	484,353	14,459	.05060				
70 to 75	344,358	14,619	.07195				
75 to 80	175,686	11,602	.11193				
80 to 85	94,602	9,592	.17185				
85 to 90	34,475	4,527	.22256				
90 to 95	12,671	1,983	.26525				
95 and over	7,504	1,327	.29973				
All specified ages.....	38,553,210	491,243	0.0216				
Unknown ages.....	5,161	1,020	.....			
All ages.....	38,558,371	492,263	.....			

$$\frac{100}{100-41} \times \frac{491,243}{38,553,210} = 0.0216$$

* It is easy to explain the cause of the wholesale omissions from the returns of deaths in the census, which have been referred to. To take the recent census as an example, the census law required the return of all deaths occurring in families from the 1st of June, 1869, to the 31st of May, 1870; in all, twelve months. The enumeration in the course of which this was to be accomplished began on the 1st of June, 1870, and closed, nominally, on the 1st of October, but really about the 1st of January, 1871. Thus, the officers of the census were called upon to recover all the deaths occurring during the census year, at a distance in time ranging from one day to nineteen months from the dates at which such deaths severally occurred. The antecedent improbability of success in such an attempt would be of the strongest; while the actual experience of three censuses has shown that assistant marshals fall short of the true number of deaths by not far from 40 per cent, as a rule. In some cases assistant marshals fail to put the question; in others, heads of families, or persons answering for them, fail to recall the fact of a death occurring during the year, especially when ten or eleven months have already elapsed since the date of death, and the mind, not unnaturally, refers to the event as having taken place a year or longer before. In still another large number of cases, persons die out of families, which class of cases seems not to have been in contemplation of the census law, which makes the return of mortality a family return. In still other cases, deaths occur in families, but the very death itself breaks up the family and scatters the surviving members, leaving no one to report the death in the census. In still other cases, deaths occur in what are constructively families for the purposes of the census, *i. e.*, boarding-houses, hotels, etc., but the common tie of membership or association is here so casual and so slight that the chances are altogether against the circumstance being retained in memory six or eight months after.

The dimensions attained by the life-insurance interest, within the past few years, make it peculiarly a matter of regret at the present time that the census should not afford the data for determining with absolute precision and certainty the death-rate of the country, whether in the aggregate or by classes of the population. This can never be done without a national scheme of registration, stringently enforced by penalties. Such a scheme, however, does not exist, and is, perhaps, in the nature of our Government, wholly impracticable. The number of States which provide for themselves a system of registering births, deaths, and marriages, will probably increase from decade to decade, while the results of registration will improve steadily with each year for which the effort is continued, affording thus fuller and better material for correcting errors and supplying deficiencies in the census statistics; but it is too much to expect, for many a decade to come, that all the States will join in efforts to secure exact information of this character.—[THE COMPILER.]

TABLE II.

APPROXIMATE LIFE-TABLE, CONSTRUCTED ON THE BASIS OF THE UNITED STATES CENSUS OF 1870, SHOWING FOR DIFFERENT INTERVALS OF AGE THE ANNUAL RATE OF MORTALITY PER 1,000 AT THE SPECIFIED AGES, THE NUMBERS LIVING IN A STATIONARY POPULATION SUSTAINED BY 100,000 ANNUAL BIRTHS, AND THE NUMBER OF ANNUAL DEATHS IN SUCH POPULATION.

Ages.	Rate of mortality — or ratio of annual deaths to 1000 persons living at specified ages.	Living at specified ages in stationary population, by 100,000 annual births.	Annual deaths at specified ages in stationary population, by 100,000 annual births.	1. 2. 3. 4.			
				$\delta x : y.$	$P x : y.$	$Q x.$	$E x.$
10 to 15	6.66	344,795	1,952				
15 to 20	6.59	332,854	2,829				
20 to 25	11.75	315,045	3,714				
25 to 30	12.1762	297,762	3,666				
30 to 35	12.8718	279,726	3,501				
35 to 40	13.0700	261,695	3,655				
40 to 45	15.6665	243,013	5,807				
45 to 50	18.2453	223,370	2,075				
50 to 55	22.1206	202,040	4,459				
55 to 60	27.8915	178,471	4,078				
60 to 65	36.4541	152,172	5,543				
65 to 70	48.9629	123,175	6,031				
70 to 75	67.3015	92,366	6,216				
75 to 80	94.0095	61,959	5,895				
80 to 85	132.7652	35,363	4,605				
85 to 90	188.8840	18,963	3,018				
90 to 95	269.6868	5,136	1,381				
95 to 100	386.0348	1,014.7	399				
100 to 105	553.0614	99.4	55.1				
105 to 110	792.3544	0.6	2.8				

TABLE III.

APPROXIMATE LIFE-TABLE (CONTINUED), CONSTRUCTED ON THE BASIS OF THE UNITED STATES CENSUS OF 1870, SHOWING, FOR DIFFERENT AGES OF LIFE, THE NUMBER OF PERSONS SURVIVING OUT OF 100,000 BORN ALIVE; THE NUMBER OF PERSONS LIVING AT AND OVER THOSE AGES IN A STATIONARY POPULATION SUSTAINED BY 100,000 ANNUAL BIRTHS; AND THE MEAN FUTURE DURATION OF LIFE.

Ages.	Proportion born and surviving specified ages; also, stationary population sustained by 100,000 annual births.	Persons living at and over specified ages in stationary population sustained by 100,000 annual births.	Mean future duration (or "expectation") of life from specified ages.	1. 2. 3. 4.			
				$\delta x : \omega$	$P x : \omega$	$Q x + L x.$	$E x.$
5	73,179	3,524,518	48.163				
10	69,864	3,166,954	45.330				
15	67,012	2,822,159	41.556				
20	65,083	2,489,305	38.248				
25	61,370	2,173,260	35.413				
30	57,744	1,875,498	32.480				
35	54,143	1,595,772	29.473				
40	50,489	1,334,147	26.425				
45	44,681	1,091,134	23.374				
50	42,606	867,764	20.367				
55	38,137	665,725	17.456				
60	33,159	487,254	14.695				
65	27,616	335,081	12.134				
70	21,585	211,906	9.817				
75	15,369	119,539	7.778				
80	9,544	57,580	6.033				
85	4,849	22,217	4.582				
90	1,830	6,254	3.416				
95	449.6	1,117.7	2.486				
100	57.9	103.0	1.779				
105	2.9	3.6	1.260				

In column (2) of Table III is shown the number surviving the different ages of life, out of 100,000 persons born alive. Thus, out of 100,000 born alive, 69,864 survive age 10; 65,083 survive age 20; 42,606 survive age 50; 9,544 survive age 80; 58 reaching the advanced age of 100 years. In column (4) of the same table is shown the mean after-life time, or mean future duration of life corresponding to the different ages specified. Thus, at birth, the mean future duration of life indicated is 39½ years; at age 20, 38½ years; at age 40, nearly 26½ years; at age 60, nearly 15 years; and at age 80, about 6 years.

TABLE IV.

PROPORTIONS BORN AND SURVIVING CERTAIN AGES IN DIFFERENT COMMUNITIES, COMPARED.

Ages—years.	United States, census 1870.	England and Wales, 1838-54, (17 years.)	Prussia, 1839-40-41, (3 years.) †	Carlisle, 1842-1850, (9 years.)	Belgium, 1842-1850, (9 years.) †	Massachusetts, (part of) 166 towns, (townships), 1854 ‡
	Elliott.	Farr.	Elliott.	Milne.	Elliott.	Elliott.
0	10,000	10,000	10,039	10,000	10,000	10,060
10	6,986	7,025	6,589	6,460	6,912	6,873
20	6,508	6,628	6,165	6,090	6,386	6,437
30	5,774	6,037	5,641	5,642	5,754	5,748
40	5,049	5,386	5,008	5,075	5,130	5,078
50	4,261	4,463	4,243	4,397	4,413	4,409
60	3,316	3,698	3,141	3,643	3,464	3,597
70	2,159	2,380	1,573	2,401	2,185	2,475
80	954	901	444	953	787	1,059
90	183	115	50	142	110	118
100	5.8	2	1	9	5	2

* The numbers in this column, from the age of 20 years to the extreme of old age, are the result of careful adjustment. The sum of the numbers between the ages of 20 and 45, of 45 and 70, and of 70 and 95, respectively, in the unadjusted series of Table I (column 4) and in the adjusted series of Table II (column 2), are identical; but in the adjusted series of all the numbers from the age of 20 years to the extreme limit of old age, are connected by a single exponential law of relation. The numbers above the age of 20 are left as in Table I, undisturbed.

† See published proceedings of American Association for the Advancement of Science, at its meeting held in Buffalo, in 1856.

‡ See published proceedings of American Association for the Advancement of Science, at its meeting held in Montreal, in 1857.

AN APPROXIMATE LIFE-TABLE FOR THE UNITED STATES.

TABLE V.

MEAN FUTURE DURATION OF LIFE AT CERTAIN AGES IN DIFFERENT COMMUNITIES, COMPARED.

Ages—years.	United States census.		England and Wales, 17 years.		Prussia, 3 years.		Carlisle, 9 years.		Massachusetts, (part of, 166 towns, (townships).	
	Elliott.	Farr.	Elliott.	Milne.	Elliott.	Milne.	Elliott.	Milne.	Elliott.	Milne.
	1870.	1838-'54.	1839-'40-'41.	1779-'87.	1855.	1855.	1855.	1855.	1855.	1855.
	Persons.	Persons.	Persons.	Persons.	Persons.	Persons.	Persons.	Persons.	Persons.	Persons.
0	39.25	40.9	36.7	38.7	39.8					
10	45.3	47.4	44.8	48.8	47.1					
20	38.2	39.9	37.5	41.5	39.9					
30	32.5	33.3	30.6	34.3	34.0					
40	26.4	26.7	23.8	27.6	27.9					
50	20.1	20.1	17.1	21.1	21.5					
60	14.7	13.9	11.2	14.3	15.0					
70	9.8	8.7	7.4	9.3	9.4					
80	6.0	5.1	4.8	5.5	5.0					
90	3.4	2.9	3.0	3.3	2.9					
95	2.5	2.2	....	3.5	2.3					

TABLE VI.—LIFE ANNUITIES—5 PER CENT. PER ANNUM.

PRESENT VALUE OF ONE DOLLAR, PAYABLE AT THE END OF EACH YEAR DURING THE LIFE OF A PERSON OF SPECIFIED AGE, THE RATE OF INTEREST ON INVESTMENTS BEING ASSUMED AT 5 PER CENT. PER ANNUM.

Ages—years.	United States census, 1870.		England and Wales, 1838-'54, (17 years).		Massachusetts, (part of,) 1855.	
	Persons.	Males.	Females.	Persons.	Males.	Females.
	Persons.	Males.	Females.	Persons.	Males.	Females.
0	\$12.6	\$12.7	\$13.2	\$12.6	\$12.6	\$12.6
10	16.0	16.5	16.5	16.3	16.3	16.3
20	14.9	15.5	15.5	15.3	15.3	15.3
30	14.1	14.4	14.6	14.5	14.5	14.5
40	12.9	13.0	13.3	13.4	13.4	13.4
50	11.1	11.0	11.4	11.7	11.7	11.7
60	9.0	8.6	9.0	9.3	9.3	9.3
70	6.6	5.9	6.2	6.5	6.5	6.5
80	4.3	3.6	3.9	3.6	3.6	3.6
90	2.4	2.1	2.2	2.1	2.1	2.1
100	1.1	1.1	1.2	1.0	1.0	1.0

NOTE.—For explanation of the process by which these adjustments are reached, reference is made to pp. xiv and xv, Vol. on "Vital Statistics," Ninth Census, 1870.

In this connection the Compiler has deemed it desirable to introduce the following abstract of Mr. Elliott's letter to the Superintendent of the Census [see Vol. on Vital Statistics, Ninth Census, pp. 515-31], respecting the distribution of the population at the earlier years of life. [Pl. XXXVIII, XXXIX, XL.]

In the examination of the numbers of population returned during the first two years of life, especially during the latter half of the first year, a very marked irregularity is observable.

It was desired that the data be so adjusted as to present approximately a correct exhibit of the distribution of the population of the United States during the first few years of life, more especially during the first five years. This task was undertaken, with the following general results:

The calculation is based upon the assumption that in a community comprising a large population, the number of persons existing within successive equal intervals of age, as a rule, gradually diminishes with advancing age. Under a strictly accurate census, involving large numbers, this rule will, in general, be found to hold, not merely with respect to a stationary population—that is, with respect to a population in which the loss at each interval of age caused by advancing age, by death, and by emigration, is exactly compensated by the gain arising from births, from advancing age, and from immigration, but also with respect to a population fluctuating by reason of excess or deficiency in the number of births, as compared with the number of deaths, and by any ordinary excess or deficiency in the number of immigrants as compared with the number of emigrants.

Inspection of the tabulated returns shows that the numbers purporting to represent the population at the earlier years of life, especially under the age of five years, do not conform to this standard, and the deviations are so marked and extreme as to impress the conviction that they are, to a notable extent, erroneous.

According to the returns, the number under 1 year of age (that is, for the first year of life) and the number from 1 to 2 (that is, for the second year of life) are each smaller than the numbers for the third and fourth years of life. From the third year of life onward, however, the general progress does not conflict with the test above assigned, the number diminishing by somewhat regular gradations with advancing age.

The following table shows, according to the United States census of 1870, the numbers for each of the first five years of life, and the annual mean of the first two years, compared with that of the three years next following, the number returned as of unknown ages (5,161) being proportionately distributed among those of specified ages, the addition amounting to about $1\frac{1}{3}$ for every 10,000 of the population.

Age in years.	Number of persons living for each annual interval of age.	Yearly mean.
0 to 1.....	1,100,622.....	} 1,089,785
1 to 2.....	1,078,947.....	
2 to 3.....	1,143,292.....	
3 to 4.....	1,113,931.....	} 1,111,960
4 to 5.....	1,078,658.....	

From this table it will be seen that the mean of the numbers of the first two years of life (to wit, 1,089,785) is less by two per cent. than the mean of the numbers of the three years next following (to wit, 1,111,960).

In England, according to the census of 1861, the mean of the earlier two years (to wit, 568,380) is in excess of the mean of the three years next following (to wit, 521,340) by nine per cent.

In France, Italy, and Norway the corresponding rates of excess, according to the censuses of 1861 and 1865, respectively, are ten, seventeen, and fourteen per cent.

In the calculated series of numbers for the United States, hereinafter given, the corresponding rate of excess is from 11 to 12 per cent., manifestly a more probable rate than that furnished directly by the census.

The following table exhibits by quarters and half-years the number and the monthly mean of persons returned, under the United States census of 1870, as surviving during the first year of life, commencing with the month of May, 1870, (the month immediately preceding the date of the census,) and reckoning backward; and also the number and monthly mean for the entire second year of life, the number of persons returned as of unknown ages being proportionally distributed among those of specified ages.

Ages by months.	Months.	Number of persons surviving.	Monthly mean.
0 to 3.....	May, 1870	} 355,177.....	} 118,390
	April, 1870		
	March, 1870		
3 to 6.....	February, 1870	} 346,188.....	} 115,396
	January, 1870		
	December, 1869		
6 to 9.....	November, 1869	} 273,309.....	} 91,103
	October, 1869		
	September, 1869		
9 to 12.....	August, 1869	} 125,948.....	} 41,893
	July, 1869		
	June, 1869		
0 to 6.....	May back to December inclusive.	701,365.....	116,894
6 to 12.....	December back to June, inclusive..	399,257.....	66,543
0 to 12.....	Entire year.....	1,100,622.....	91,719
12 to 24.....	Second year..	1,078,947.....	89,912

The irregularity noticeable in the first year of life, and the apparent defect in the returns of the United States census for the last half of that year, are very marked. During the first six months, the tabulated number returned is 701,365, being a monthly mean of 116,894, numbers not varying greatly from, but probably in excess of, the actual numbers within that half-year interval of age. During the last six months of the year the number returned is 399,257, showing a monthly mean of only 66,543, an incredible falling off of 43 per cent. from the number returned for the first six months.

The number returned during the second year of life is 1,078,947, a monthly mean of 89,912; this mean being 35 per cent. in excess of the mean of the preceding six months, but 2 per cent. less than the mean of the preceding twelve months, and 23 per cent. less than the mean of the first six months of life.

An important influencing cause of the irregularities is believed to be found in the fact that, although the enumeration was made with reference to the population as it existed on the 1st day of June, 1870, yet the actual collection of the facts by the marshals was extended over a period of several months subsequent to that date, some of the enumerations having been made as late as nine months after the date designated by law. Inquiries, therefore, relative to the month of birth of children under the age of twelve months, living on the first day of June, 1870, required not unfrequently that investigation be made relative to the month of birth of children who were, at the date of actual enumeration, from 16 to 20 months of age. With respect to these more distant months of birth, it is believed that there was less effort in general by the enumerator to secure the requisite information, and greater difficulty encountered in successfully conducting the inquiries.

It is earnestly hoped that, in future censuses of the population, the system will be followed which has proved so successful in England and certain other countries of Europe, to wit, that of taking the census in one day, or as nearly so as possible, through the instrumentality of a prior distribution of schedules, to be filled up with reference to a single night; such schedules to be collected by the enumerators on the following day, or as soon thereafter as practicable.

It was possible to adjust the irregularities in the data under consideration by one of two methods—the one based on the assumption that there is no actual deficiency in the number of persons enumerated, but that the irregularities observed are due exclusively to an erroneous distribution of the numbers as regards age; that there may be, for some cause, or combination of causes, a general tendency on the part of the enumerators to record the ages of those under two years, and especially those of the second half of the first year of life as either less advanced or more advanced than accords with fact. The other method is based on the assumption that the irregularities in question are not to be wholly accounted for by imperfect distribution as respects age; but that, in addition to a faulty distribution, there were, with regard to the younger ages, actual deficiencies in the

AN APPROXIMATE LIFE-TABLE FOR THE UNITED STATES.

returns, and that some considerable portion of those who were under the age of two years escaped enumeration.

The latter assumption is deemed the more probable.

An adjustment of the data under the age of five years has, however, been prepared in accordance with each of these two assumptions, and is herewith presented: the one, on the assumption that the irregularities in question are due entirely to faults in distribution; the other, that they are due in part to defective distribution of the numbers returned, and, in part, to actual omissions.

In the following table the third column exhibits the reported number of the population in 1870, according to the officially published abstract, the number of persons returned as of "Unknown Ages" being proportionately distributed among those of specified ages.

The fourth and fifth columns give adjusted values, the adjustment being made in conformity with the rule that the numbers of the population, in equal intervals of age, diminish gradually with advancing years. In the preparation of the former of these two columns, there has been no addition from without to supply supposed omissions; but the average number under the age of 5 years, and also from ages 5 to 25 in this adjusted column, are retained the same as furnished by the returns. In the second of the adjusted columns, however, the number expressing the aggregate of the adjusted values, under the age of five years, has been augmented by an addition of 100,000 to supply supposed omissions.

AGE.	PERIODS OF BIRTH.	OBSERVED.	ADJUSTED.		
			Without addition.	With 100,000 added under the age of 5 years.	
1.	2.	3.	4.	5.	
Years.	From May 31 June 1	Average per month.	Average per month.	Average per month.	
1 to 2	1869 to 1868 (one year)	1,078,947	89,912	1,132,498	94,375
2 to 3	1868 to 1867	1,143,292	95,274	1,086,707	90,559
3 to 4	1867 to 1866	1,113,931	92,828	1,052,799	87,733
4 to 5	1866 to 1865	1,078,658	89,888	1,025,102	85,425
5 to 10	1865 to 1860 (five years)	4,815,358	80,256	4,819,822	80,330
10 to 15	1860 to 1855	4,786,820	79,780	4,448,765	74,146
15 to 20	1855 to 1850	4,041,129	67,352	4,173,668	69,561
20 to 25	1850 to 1845	3,748,801	62,480	3,949,863	65,831
All other ages.	Prior to June 1, 1845.	15,650,803		15,650,803	
All ages.		38,558,371		38,558,371	
Years.	From May 31 June 1				
0 to 1	1870 to 1869 (one year)	1,100,622	91,719	1,218,344	101,529
0 to 2	1870 to 1868 (two years)	2,179,569	90,815	2,350,842	97,952
2 to 5	1868 to 1865 (three years)	3,335,881	92,663	3,164,608	87,966
0 to 5	1870 to 1865 (five years)	5,515,450	91,924	5,515,450	91,924

TABLE

SHOWING THE NUMBER OF PERSONS SURVIVING WITHIN EACH SPECIFIED AGE-INTERVAL, ACCORDING TO THE CENSUS OF 1870, THE NUMBER OF PERSONS (5161) RETURNED AS OF "UNKNOWN AGES" BEING PROPORTIONATELY DISTRIBUTED AMONG THOSE OF SPECIFIED AGES (38,553,210).*

AGE.	PERIODS OF BIRTH.	OBSERVED.	ADJUSTED.	
			Without addition.	With 100,000 added under the age of 5 years.
1.	2.	3.	4.	5.
Months.				
0 to 1	May, .....1870	117,097	109,661	111,314
1 to 2	April, .....1870	115,436	106,266	108,169
2 to 3	March, .....1870	122,644	104,455	106,391
3 to 4	February, .....1870	115,168	103,113	105,094
4 to 5	January, .....1870	114,507	102,021	104,016
5 to 6	December, .....1869	116,513	101,089	103,088
6 to 7	November, .....1869	91,605	100,269	102,267
7 to 8	October, .....1869	93,404	99,534	101,527
8 to 9	September, .....1869	88,300	98,866	100,851
9 to 10	August, .....1869	69,688	98,249	100,226
10 to 11	July, .....1869	42,469	97,678	99,643
11 to 12	June, .....1869	13,791	97,143	99,096

* The addition for those of unknown ages is slightly in excess of 1/3 in every 10,000 of the number at specified ages; more exactly, 0.00013387.

It will be seen, on comparing, at the foot of the preceding table, the observed series of values (column 3) with the first of the adjusted series of values (column 4), that 171,273 of the number of persons reported as surviving in the last three years of the first five-year group are transferred to the first two years of that group, making the entire number under two years of age, in the adjusted series, 2,350,842 instead of 2,179,569 as in the observed or unadjusted series.

On comparing the values in the observed series (column 3) of that table with those in the second series of adjusted values (column 5), it will be seen that the number in the first two years of life has been augmented by 216,962, 100,000 of which were added from without for supposed omissions, and the remaining 116,962 transferred from the group of three years of age next following, the number of persons in the adjusted series, under the age of two years, thereby becoming 2,396,531 instead of the observed number, 2,179,569.

Each of these adjusted series conforms, as already stated, to the test of progressive and gradual diminution with advancing years.

The mean annual number of births calculated in accordance with each of these adjustments (1,404,040 according to the first method of adjustment, and 1,408,721 according to the second method), is somewhat in excess of the mean annual number of survivors (1,402,730), indicated by the numbers returned for the first six months of life.

NOTE.—By reference to the Volume on Vital Statistics, of the census 1870, pp. 524-531, will be found an appendix to the letter of Mr. Elliott there published, showing in detail the process of arriving at the adjustments of the population at the younger years of life. On comparing the tables as now printed with the earlier tables there presented, it will be seen that in the later tables the numbers at Unknown Ages are distributed proportionately among the different periods of life; while in the earlier tables they are not so distributed.

THE RELATIONS OF RACE AND NATIONALITY TO MORTALITY IN THE UNITED STATES.*

[PLATE XLIV, Fig. 3.]

BY THE COMPILER OF THE ATLAS.

THE gross incompleteness of the Returns of Deaths, in a census of the United States, is shown in Mr. Elliott's paper, "An approximate Life-table," etc., which accompanies Plates XXXVIII and XXXIX (Part III); and the Compiler has, in a note to that paper (page 1), sought to state the main reasons for the omissions which are admitted to occur in enumeration.

What, it may be asked, can be the value of statistics confessedly so imperfect? Can any deductions be made with confidence from returns of mortality, which omit one-third or more of the deaths which occurred within the period which the returns profess to cover? I shall attempt to answer this question only so far as relates to the immediate subject of the present discussion, the Relations of Race and Nationality to Mortality in the United States.

Can we assume that the omissions acknowledged occur so uniformly among the several races and nationalities represented in a census of the United States, as to allow conclusions to be founded with assurance upon the relations which are disclosed by the body of deaths actually reported?

I answer that the several elements of our population, with respect to race and nationality, are *not* so placed that we can assume that error is quite as likely to occur in the enumeration of one as of another, and consequently that, in covering so large a field, errors may be relied upon to balance each other, leaving a result of substantial accuracy. On the contrary, the tendency to omission in the enumeration of deaths varies with the intelligence of the several communities, the density of settlement, the prevailing occupations of the people, and the habits of life, so far as these affect the permanence of residence. It is notorious that the several elements of our population are, the country over, variously placed with reference to these conditions. Hence we may not assume an equal liability to omission in all. Undoubtedly, some of the elements we are to consider are more concerned in the defects of the census law than others; and these differences I believe to be sufficiently great to invalidate conclusions based on anything like a nice determination of preponderance in the census statistics of mortality.

To enter into such a discussion of this subject as would serve to establish, even provisionally, the order in which the several elements sustain loss from the causes indicated; much more, to seek to determine the exact degree of such loss within each such element, would occupy more of space than remains at my disposal. I will, therefore, content myself with expressing the conviction, arising out of a long and careful examination of the subject, that in no case, the most extreme, do the proportions disclosed by the census statistics of mortality by race and nationality depart, *as between any one element and another*, to the extent of five per cent. from the real facts of mortality as they existed during the census year; while in the great majority of cases, one, two, or three per cent. would amply cover the margin of disturbance due to the causes indicated. If this belief be correctly founded, the results arrived at in the following discussion may be accepted as true, for I shall restrict myself at the present time to the exposition of those relations which are determined by preponderances too large to come within any reasonable limits of error.

The total number of deaths reported in the census of 1870, when reduced to thousandths, was distributed as follows, among the several elements of population which it is proposed in the present paper to take into account: Native white, 726; native colored, 137; total native, 863; total foreign, 134, of which there were, Irish, 55; Germans, 38; English and Welsh, 15; Swedes, Norwegians, and Danes, 4; Scotch, 4; French, 3.

The total population of the United States at the date of the enumeration, when likewise reduced to thousandths, was distributed as follows: Native white, 730; native colored, 126; total native, 856; total foreign, 144, of which there were, Irish, 48; Germans, 44; English and Welsh, 16; Swedes, Norwegians, and Danes, 6; Scotch, 4; French, 3.

Comparing, now, the number of deaths returned for each enumerated element of population, with the number of living inhabitants representing the same, we have the number of deaths in each to each 1000 living persons, as follows: Native white, 12.7; native colored, 13.9; total native, 12.9; total foreign, 11.8; Irish, 14.6; Germans, 11; English and Welsh, 11.4; Swedes, Norwegians, and Danes, 9.2; Scotch, 12.5; French, 14.

Figure 3, Plate XLIV, exhibits to the eye the proportions above expressed, with others which are deemed essential or advantageous for the discussion of the relations of race and nationality to mortality.

The first four vertical lines, counting from the left, relate to the number of living inhabitants on the 1st of June, 1870, the first representing the aggregate population; the second, third, and fourth, the population, respectively, above ten, above twenty, and above thirty years of age. The fifth line represents the aggregate body of deaths reported as occurring during the census year as above. The group of twelve lines next succeeding represent the body of deaths occurring within each important group of diseases. The group of twenty-one lines which complete the diagram represent the body of deaths occurring within each of the enumerated special diseases or subordinate groups of diseases. The thirty-eight vertical lines described are crossed by lines which show the division of each of the thirty-eight subjects represented, among the larger elements of the population which

have been taken for our present consideration. The scale of the diagram will not allow the lines representing the Swedes, Norwegians, and Danes, the Scotch and the French to be laid down. These proportions are also, for further convenience of comparison, expressed in parts of 1000 in the following table, in which the nationalities omitted from the diagram appear:—

TABLE I.—A.

GROUPS OF DISEASES.	Aggregate.	Native White.	Native Colored.	Total Native.	Total Foreign.	Irish.	Germans.	English and Welsh.	Swedes, Norwegians, and Danes.	Scotch.	French.
All Diseases.....	1000	726	137	863	134	55	38	15	4	4	3
General Diseases—A.....	1000	772	139	911	87	25	29	9	7	7	2
General Diseases—B.....	1000	662	122	784	214	97	59	19	5	5	5
Diseases of the Circulatory System.....	1000	684	96	780	217	94	60	29	6	6	6
Diseases of the Urinary System and Organs of Generation.....	1000	599	125	724	274	121	79	30	6	7	6
Diseases of the Respiratory System.....	1000	711	179	890	109	45	31	12	12	12	3
Diseases of the Digestive System.....	1000	782	119	901	97	37	27	11	11	11	3
Diseases of the Organs of Locomotion.....	1000	796	106	902	95	46	22	11	11	11	3
Diseases of the Nervous System.....	1000	795	108	903	95	46	22	11	11	11	3
Diseases of the Integumentary System.....	1000	751	182	933	66	27	15	11	11	11	3
Conditions not necessarily associated with general or local diseases.....	1000	741	124	865	130	63	34	13	13	13	3
Accidents and Injuries.....	1000	582	178	760	222	94	56	28	7	7	5
Other and Unknown.....	1000	674	227	901	89	41	22	8	3	3	2

TABLE I.—B.

SPECIAL DISEASES.	Aggregate.	Native White.	Native Colored.	Total Native.	Total Foreign.	Irish.	Germans.	English and Welsh.	Swedes, Norwegians, and Danes.	Scotch.	French.
Bright's Disease of the Kidneys.....	1000	522	35	557	438	253	93	48	6	12	3
Apoplexy.....	1000	672	62	735	259	99	55	36	3	3	9
Cancers.....	1000	684	61	745	253	104	78	30	3	10	10
Consumption.....	1000	661	111	772	226	108	59	19	6	6	28
Rheumatism.....	1000	648	157	805	193	76	55	20	2	2	7
Paralysis.....	1000	760	65	825	173	71	44	20	2	2	6
Cerebro-Spinal, Enteric, and Typhus Fevers.....	1000	718	135	853	144	43	48	13	13	13	6
Pleurisy and Hydrothorax.....	1000	597	266	863	142	54	42	14	3	3	6
Bronchitis.....	1000	760	90	850	137	73	31	12	2	2	4
Small Pox.....	1000	632	228	860	131	27	58	5	3	3	3
Pneumonia.....	1000	688	193	881	117	48	33	14	3	3	3
Diarrhoea, Dysentery, and Enteritis.....	1000	762	123	885	113	44	31	13	7	7	3
Erysipelas.....	1000	851	36	887	109	39	34	15	3	3	3
Intermittent and Remittent Fevers.....	1000	647	255	902	96	32	32	8	3	3	4
Encephalitis and Meningitis.....	1000	804	144	948	51	17	15	6	2	2	1
Scarlet Fever and Diphtheria.....	1000	928	27	955	44	8	13	8	3	3	1
Measles.....	1000	734	223	957	42	7	10	5	11	11	*
Scrofula.....	1000	700	266	966	34	10	7	4	3	3	1
Hydrocephalus.....	1000	918	50	968	32	9	7	4	1	1	1
Croup.....	1000	828	153	981	19	3	7	3	1	1	*
Hooping Cough.....	1000	796	191	987	13	2	3	2	2	2	*

* Less than one in each 1000.

We have previously expressed the belief that the statistics of mortality as reported in the census approximately *represent* the facts of mortality throughout the United States, notwithstanding the considerable omission which is acknowledged to take place in the aggregate number of deaths. It is a different question, however, whether the facts of mortality as they exist in the country can, without important corrections, be held to represent, even approximately, the relations of the several elements of the population, as respects their vitality or their liability to specific forms of disease. Indeed, examination will disclose that two very important corrections require to be made before the several elements of the population can fairly be put in comparison with each other as to their respective vitality, or their liability to specific forms of disease. It is to the discussion of these corrections that this paper will be mainly devoted. The necessity of the first correction is discovered by observing the proportions in which the deaths from children's diseases, represented by the seven vertical lines on the extreme right of the diagram, are divided between the native and the foreign population. The abruptness with which the lines representing the foreign elements here rise and almost run out at the top of the figure, would convince the most casual observer, either that the returns of the census are exceedingly defective in respect to deaths from these diseases, or else that some important correction requires to be made before the several foreign elements can fairly be brought, in these respects, into comparison with the native white and native colored elements of the population. Reference to the series of figures on Plate XXXIX, shows that a most important correction does require to be made on account of

THE EXCESSIVE DISPROPORTION BETWEEN THE NUMBER OF ADULTS AND OF CHILDREN WITHIN OUR FOREIGN POPULATION.

Giving our attention first to that disproportion as it exists with reference to children under ten years of age, we have the following facts: Number of children under ten years of age in each 1,000 of the total population, 268; number of children under ten in each

* This paper is in substance identical with that read by the author before the American Public Health Association at its meeting in New York in 1873, and published in the Transactions of that year.

1,000 of the native population, 306; number of children under ten in each 1,000 of the foreign population, 47.

If, now, the liability to death were observed to be the same in each period of life, no correction on account of this relative deficiency of children of foreign birth would need to be introduced in a comparison of the grand elements of native and foreign, in respect to their relative vitality; but if there is observed to be an excessive liability to death at early ages, we must either eliminate all deaths at such ages before making comparison of these elements, or we must assume to add to the foreign population a corresponding number of children and to the foreign deaths a corresponding mortality among such children. As matter of fact we find that 41.4 per cent. of the whole body of deaths occur under five years of age, and 46.7 per cent. under ten years of age, while of the total living inhabitants only 14.3 per cent. were found to be under five years of age, and only 26.8 per cent. under 10 years of age. Vol. on "Vital Statistics," Ninth Census, 1870. Cf. Pl. XLIII.

Let us seek to exclude the deaths occurring under ten years of age. We do not know the distribution of the deaths within this period of life between the native and foreign elements; but the foreign population under ten is relatively so small that it makes very little difference in the adult mortality what per cent. be taken (within reasonable limits) for the unquestionably greater liability to fatal diseases of the children of foreign birth. If we assume the proportion of deaths to living persons to be greater by 30 per cent. in the foreign than in the native population under ten, and thereupon reject from consideration *all* deaths occurring in this period of life, we shall have the following ratios:

Deaths to each 1,000 living inhabitants over 10 years of age:

NATIVE	8.84
FOREIGN	11.2

But this correction on account of the number of children of foreign birth requires to be made not alone in the aggregate of deaths from all causes as above, but is even more imperatively demanded in treating of the body of deaths occurring within most special diseases, and groups of diseases. Thus it is evident that where the distribution by age and sex of the deaths occurring from any specified disease or group of diseases conforms substantially to the distribution of the total body of deaths by age and sex, there the correction already indicated will serve approximately for such disease or group. But where diseases or groups of diseases vary widely, as in fact most do, from the type afforded by the aggregate of deaths from all causes, in respect to the proportion of deaths occurring under ten years of age, the effect of the deficiency noted in the number of children of foreign birth will be greater or less, according as such diseases or groups of diseases are found to be more fatal or less fatal in the early periods of life than are the whole body of diseases taken together. Thus, referring to the series of figures numbered 2 on Pl. XLIII, while of all diseases, 467 deaths in each 1,000 are under ten years of age, of the deaths from the Febrile Group of General Diseases (General Diseases "A"), not less than 603 in each 1,000 occur under ten years of age. It is evident, therefore, that the share of the foreign element in the deaths from these diseases should be less than its share in the whole body of deaths from all diseases; and accordingly we find (Pl. XLIV, fig. 3) that, while of all diseases 134 deaths in each 1,000 occur among the foreign population, only 87 in each 1,000 deaths from this group of diseases occur among the foreign population.

On the other hand, of deaths from the Constitutional Group of General Diseases (General Diseases "B"), only 108 in each 1,000 occur under the age of ten years. Now, as the foreign population consists much more largely than the native of persons within that period of life, namely, above ten years, in which diseases of this group are found to be more fatal, we should expect to find the share of the foreign element in deaths from diseases of this group much greater than their share of the total body of deaths, and of course much greater still than their share of deaths from General Diseases "A." Accordingly we find that of 1,000 deaths from diseases of the Constitutional Group, 214 occur among the foreign population. That, over and above the proper effect of the deficiency in the foreign children, peculiarities of stock, breeding, and condition may tend to produce a larger proportion of deaths from the diseases of the Constitutional Group than of the Febrile Group, among the foreign population, I do not question; but it is evident that the astonishing disproportion which appears at first sight between the deaths within the foreign population from these two groups of causes (that is to say, 87 in each 1,000 from the Febrile Group to 214 in each 1,000 from the Constitutional Group), does not wholly represent real differences in the liability to peculiar forms of disease, but mainly this abnormal distribution of the foreign population by periods of life.

Proceeding to examine in the same manner the most important remaining groups of diseases in this respect, we find that of each 1,000 deaths from all diseases of the Nervous Group, 591 occur under the age of ten years. Unless, therefore, the foreign population have some very marked and urgent predisposition to diseases of this class, we should expect to find their share of this body of deaths less than their share of the aggregate mortality of the country; and accordingly we find that only 95 in each 1,000 of the deaths from this group occur in the foreign population.

Strongly contrasted in this respect with the diseases of the nervous system, are the diseases of the circulatory system, from which only 129 deaths in each 1,000 occur under ten years of age. Unless there is some marked indisposition of the foreign population to diseases of this class, we should expect to find their share of this body of deaths far greater than their share of the deaths from all causes, and slightly greater than their share of the deaths from General Diseases "B," in which, as we have seen, 108 deaths only in each 1,000 are under the age of ten years. The results correspond to the conjecture. Of 1,000 deaths from diseases of the circulatory system, 218 occur within the foreign population.

Again, of the deaths from the diseases of the respiratory system, 503 in each 1,000 are under the age of ten years, and the proportion of deaths from this class of causes within the foreign population sinks to 109 in each 1,000.

On the other hand, of the deaths from diseases of the urinary system and the organs of generation, including affections connected with pregnancy, only 40 in each 1,000 occur under the age of ten years, and as the foreign population consists much more largely than the native of persons within the period of life within which the great bulk of deaths from

these diseases occur, their share in the mortality from causes of this class is found to be much greater than their share of the aggregate mortality, being not less than 286 in each 1,000.

Of the deaths from diseases of the digestive system, lastly, not less than 686 occur under ten years, and the deaths within the foreign population from diseases of this group sink to 98 in each 1,000.

For the purposes of this comparison, I have also taken nine special diseases or subordinate groups of diseases, in which the proportion of deaths under ten exceeds that of the general body of deaths. The following table exhibits the proportions maintained in these cases, the first sum against each title of disease representing the number in each 1,000 deaths from such cause or causes which occur under ten years of age, the second sum representing the number in each 1,000 which occur within the foreign population.

TABLE II.

NAMES OF DISEASES	Number under Ten Years of Age, in each 1,000 Deaths.	Number within the Foreign population, in each 1,000 Deaths.
All Diseases	467	134
Small Pox	564	132
Bronchitis	577	137
Diarrhoea, Dysentery, and Enteritis	761	113
Measles	804	42
Diphtheria	854	41
Scarlet Fever	906	45
Hydrocephalus	925	32
Hooping-Cough	985	13
Croup	988	19

Now, if the reason of the comparatively small number of deaths occurring within the foreign population from the above mentioned diseases, is found alone in the deficiency of foreign children, it is evident that, inasmuch as the proportion of deaths under ten is here greater than the proportion of deaths under ten from all diseases, the share of the foreign population in the deaths from each and all such specified causes should be less, and less in a degree corresponding generally to that excess of the total number of deaths under ten. If, on the contrary, we find that, as the proportion of deaths under ten increases in respect to any disease, the share of the foreign population in the whole body of deaths from that cause remains nearly the same or becomes greater than the share of the foreign population in the whole body of deaths from all causes, we have a very strong assurance that the foreign population has a decided liability to this form of disease.

Applying this principle, it will be observed that in eight of these nine cases, the proportion of deaths from such causes among the foreign population is less than the proportion of deaths from all causes within the foreign population. This is as was to be expected, except upon the assumption that the foreign population had a peculiar predisposition to such forms of disease. In one case, however, that of bronchitis, while the proportion of deaths under ten years of age is greater by 110 in each 1,000 than the proportion of the whole body of deaths, the share of the foreign population in this body of deaths is greater by three in the 1,000 than its share in the deaths from all causes, proving conclusively the exceptional tendency of the foreign population to this form of disease in a fatal degree. In two other cases, namely, those of small-pox and of the group, diarrhoea, dysentery, and enteritis, while the share of the foreign population in deaths from these causes is less than its share of deaths from all causes, it is not less in any such degree as to correspond to the increased proportion of mortality under ten years of age; and I think it, therefore, perfectly safe to conclude from this exhibit, without further inquiry, that the foreign population have also a very distinct predisposition to these forms of disease in a fatal degree.

Looking at the six remaining cases in the above table, we can, without deeper investigation, determine certain relations, as, for example, that scarlet fever is relatively more fatal to the foreign population than measles or diphtheria; but we cannot with assurance determine as to the comparative mortality of the native and of the foreign populations from these forms of disease without additional information, which is given in the following table, the analysis in respect to these diseases being carried down below the period of five years, the several years under five being taken separately, and the figures relating to each year under each title of disease being compared with the proportion of the total population in each such period of life which is of foreign birth, and the figures being also given separately for each five years upward to twenty.

TABLE III.

PERIOD OF LIFE.	Proportion of Foreign to Total Population.	DEATHS IN EACH 1000 FROM					
		Measles.	Diphtheria.	Scarlet Fever.	Hydrocephalus.	Hooping-Cough.	Croup.
Under 1 . . . . .	.005	202	160	103	447	492	455
1 . . . . .	.010	241	158	146	259	231	197
2 . . . . .	.015	136	126	161	99	118	130
3 . . . . .	.020	79	117	144	43	59	88
4 . . . . .	.026	42	87	113	26	33	53
5 to 10 . . . . .	.036	104	206	239	51	52	65
10 to 15 . . . . .	.043	40	53	56	18	9	6
15 to 20 . . . . .	.082	39	22	16	10	2	2

Now, since 103 deaths in each 1,000 from scarlet fever, to take an instance from the above table, occur under the age of one year, and as but .005 of the population within that

period of life are of foreign birth, it will follow, if we assume no more than an equal liability to this disease on the part of this element of the population, that of these 103 deaths, but .515 (fractions being preserved throughout this computation) occur among the foreign children. As 146 deaths additional in each 1,000 occur between the ages of one and two, and as but .01 of the total population within this period are of foreign birth, it would follow, that of these 146 deaths, but 1.46 occur among the foreign children. In the same way we should find that, of the 161 deaths from this cause between the ages of two and three, but 2.415; of the 144 deaths between three and four, but 2.88; of the 113 deaths between four and five, but 2.938; of the 239 deaths between five and ten, but 8.604; of the 56 deaths between ten and fifteen, but 2.408; and of the 16 deaths between fifteen and twenty, but 1.312 occur among the population of foreign birth, making the proportionate share of the foreign population in the 978 deaths enumerated out of each 1,000 from this disease, but 22.532. If we assume the mortality among this element of the population from this cause to be 30 per cent. greater than that of the native population, the contribution of foreign children to the 978 deaths which occur under twenty years out of each 1,000 deaths at all ages from scarlet fever, would still be but 29.6, leaving even at this extreme assumption, out of each 1,000 deaths from this cause among all classes not less than 15.4 deaths among the foreign population above twenty years of age. But as only 22 deaths in each 1,000 from this cause occur above twenty years of age, among all classes of the population, and as the foreign element constitutes but 24.6 per cent. of the total population above twenty, it would follow that their proportional share of this latter body of deaths would be but 5.412. Hence we must conclude either that the mortality among the foreign population from this cause under twenty years must be greater than that of the native population by much more than the 30 per cent. assumed, or else that the mortality from this cause among the adult foreign population is excessive in a most extraordinary degree.

Subjecting to the same analysis the figures relating, severally, to the remaining seven diseases on our list, we have results which appear to establish a mortality among the foreign population from croup and hydrocephalus, proportionally greater than that of the native population, while measles, diphtheria, and hooping-cough would seem to be less fatal to the foreign than to the native population.

On the other hand, there are eight special diseases which may be taken for the purposes of this comparison, in which the proportion of deaths under twenty is less than that of the general body of deaths, and the share of the foreign population is accordingly greater, often in a very important degree, than its share of the aggregate of deaths from all causes.

The following table exhibits the proportion maintained in these cases, the first sum against each title of disease representing the number in each 1,000 deaths from such cause which occur under twenty years of age, the second sum representing the number in each 1,000 occurring within the foreign population.

TABLE IV.

NAMES OF DISEASES.	Number under 20 Years of Age in each 1,000 Deaths.	Number within the Foreign Population in each 1,000 Deaths.
All Diseases.....	541	134
Cancers.....	58	253
Paralysis.....	59	174
Apoplexy.....	78	260
Bright's Disease of the Kidneys.....	140	440
Consumption.....	174	226
Hydrothorax.....	204	112
Rheumatism.....	236	193
Pleurisy.....	247	216

Applying to the above figures a method of analysis similar to that applied to the figures in Table III, we seem to establish beyond controversy the excessive fatality among the foreign population of Bright's disease of the kidneys, the somewhat greater liability of this element of the population to deaths from cancers, pleurisy, and apoplexy, and, on the other hand, their comparative immunity from death from paralysis, rheumatism, and hydrothorax. In respect to consumption the foreign population of the country would seem to stand in about the same relation as the native population within corresponding periods of life.

A second important correction, however, requires to be introduced before we can make satisfactory comparison between the reported mortality of the Colored and the Foreign elements of our population. This correction is on account of

THE COMPLEMENTAL LOCATION OF THESE TWO ELEMENTS.

Speaking broadly, where the blacks are found in the United States, the foreigners are not. There are only five (5) States in which the two elements, each in any considerable degree, are found together. These are Delaware, Kentucky, Maryland, Missouri, and West Virginia (the District of Columbia falls in this group), with an aggregate population of 4,521,929, of whom 411,558 are foreign, and 599,850 are colored. South and southwest of these lie eleven (11) States, with an aggregate population of 9,487,386, of whom 210,684 are foreign, and 3,939,032 are colored. Again, to the north and northwest of the first mentioned States are eighteen (18) States with an aggregate population of 23,544,365, of whom 4,626,809 are foreign and 334,653 are colored. The Pacific States and the territories are excluded for the purposes of this comparison. I cannot satisfy myself from the data given, whether any correction needs to be introduced on account of this complemental

relation* of these two elements of the population, before comparison is made between the (aggregate) mortality of the colored and the foreign elements. But it is clear that the apparent liability of these two elements to certain forms of disease may be very greatly affected by this complemental location. If there are diseases which especially prevail at the South, it is to be expected that the colored population, being so largely found within that section, will suffer more from such diseases than the native white population which is distributed with greater uniformity over the whole country, and still more, in a high degree, than the foreign population which is scarcely represented in the lowest group of States described. On the other hand, the foreign population may, by the mere force of its location, and not by any constitutional liability, sustain a greater loss from diseases specially characteristic of the northern group of States.

Let us compare the mortality from intermittent and remittent fevers with that from consumption. The population of the northern group of States being 61 per cent. of the total population of the country, we find 69.5 per cent. of the deaths from consumption and 30.1 per cent. of the deaths from intermittent and remittent fevers occurring in this group. The population of the middle group of States being 11.8 per cent. of the total population of the country, we find 11.9 per cent. of the deaths from consumption, and 14.1 per cent. of the deaths from intermittent and remittent fevers occurring within this group. The population of the southern group of States being 24.6 per cent. of the total population of the country, we find 16.2 per cent. of the deaths from consumption and 53.7 per cent. of the deaths from intermittent and remittent fevers occurring within this group.

It is clear, therefore, that the diseases thus taken for comparison are in a high sense complemental as to their range. There is a middle belt, in which the two are in a degree found together, a northern group in which the first is found in a very high, and the second in a very low degree, and a southern group in which these relations are reversed.

It is evident, therefore, that in respect to these diseases, the colored population of the South ought to be compared with the foreign population of the South, and not with the foreign population of the whole country; and, on the other hand, the foreign population of the North ought to be compared with the colored population of the North, and not with the colored population of the whole country.

I have treated according to this plan four important diseases and subordinate groups of diseases, which are known to have exceptional relations to temperature,† with the following results:—

TABLE V.

NAMES OF DISEASES.	THE UNITED STATES.			THE NORTHERN STATES.			THE MIDDLE STATES.			THE SOUTHERN STATES.		
	Native White.	Native Colored.	Foreign.	Native White.	Native Colored.	Foreign.	Native White.	Native Colored.	Foreign.	Native White.	Native Colored.	Foreign.
Population.....	727	127	144	789	14	197	776	133	91	563	415	22
Consumption.....	662	112	226	697	32	271	659	200	141	537	400	63
Diarrhoea, Dysentery, and Enteritis.....	762	123	114	847	13	140	804	102	94	530	418	52
Intermittent and Remittent Fevers.....	648	256	96	831	18	151	782	94	124	595	441	54
Pneumonia.....	688	194	118	799	27	174	746	168	86	475	501	24

The greater liability of the colored population to malarial than to intestinal diseases in the northern and in the southern States, with the reversal of this proportion in the middle group, the high rate of mortality among the colored population from consumption in the northern States (32:14), being rapidly reduced as we pass through the middle belt (200:133) until it falls below average (400:415) in the congenial climate of the South; the wider liability of the same race to the acuter form of lung disease, not so excessive in the North, but more fully sustained through the transition southward (27:14, 168:133, 501:415); the increasing fatality of each specified form of disease as the foreign population moves southward, most marked, however, as is natural, in the case of the two groups of diseases especially characteristic of the South; and finally the uniformity with which the native white population contributes to the mortality from each specified cause in each section of the country by turns, as contrasted with the fluctuations among the colored and the foreign elements of the population,—these are the most noticeable features of this table. As the diseases mentioned are the cause of 32.1 per cent. of all the deaths occurring in the country, the importance of this discussion of their complemental relation cannot be exaggerated.

In the use of the above table, it should be noted that while before comparing the foreign population within any geographical section, with either the native white or the colored population of that section, the correction heretofore noted as required on account of the deficiency of foreign children must be made, the foreign population in one section may, without any such antecedent correction, be compared with the foreign population of any other section,‡ as the deficiency of foreign children may, for the purposes of so large a comparison, be assumed to be uniform as between sections.

Such being the readiness and the (comparative) certainty of comparisons between the several constituents of the foreign population, we present in the following table the contributions, in parts of 1,000, made by each specified foreign nationality to the total number of deaths from each enumerated cause, within the total foreign population.

* The correction on account of the deficiency in foreign children must, however, still be carried through in comparisons between these two elements, as the colored population of the United States is of normal growth, and contains its due proportion of persons of the early periods of life.

† The statistical proof that these diseases sustain important relations to temperature, is exhibited graphically in the appropriate figures in Series No. 2, Pl. XLIV.

‡ The native white and the colored population may be compared with each other in any section, without any important correction, both elements being of normal growth.

TABLE VI.—A.

GROUPS OF DISEASES.	Total Foreign.	Irish.	Germans.	English and Welsh.	Swedes, Norwegians, and Danes.	Scotch.	French.
All Diseases.....	1000	410	282	108	34	27	25
General Diseases—A.....	1000	282	329	101	78	22	23
General Diseases—B.....	1000	454	276	90	24	26	23
Diseases of the Circulatory System.....	1000	431	279	134	18	26	30
Diseases of the Urinary System and Organs of Generation.....	1000	442	289	108	22	25	21
Diseases of the Respiratory System.....	1000	408	287	112	29	27	29
Diseases of the Digestive System.....	1000	379	280	121	51	28	27
Diseases of the Organs of Locomotion.....	1000	477	231	108	28	38	33
Diseases of the Nervous System.....	1000	378	292	142	21	36	27
Diseases of the Integumentary System.....	1000	417	236	160	17	27	22
Conditions not necessarily associated with general or local diseases.....	1000	478	260	101	12	32	27
Accidents and Injuries.....	1000	424	251	125	30	23	22
Other and Unknown.....	1000	461	243	88	38	23	20

TABLE VI.—B.

SPECIAL DISEASES.	Total Foreign.	Irish.	Germans.	English and Welsh.	Swedes, Norwegians, and Danes.	Scotch.	French.
Bright's Disease of the Kidneys.....	1000	576	213	110	13	28	8
Apoplexy.....	1000	381	328	139	9	28	34
Cancers.....	1000	412	307	117	11	41	39
Consumption.....	1000	478	262	84	25	24	20
Rheumatism.....	1000	392	284	103	39	30	36
Paralysis.....	1000	409	253	173	11	41	26
Cerebro-Spinal, Enteric, and Typhus Fevers.....	1000	302	332	90	88	20	24
Pleurisy and Hydrothorax.....	1000	380	299	99	19	36	43
Bronchitis.....	1000	534	228	87	16	25	31
Small Pox.....	1000	203	441	36	25	3	24
Pneumonia.....	1000	413	284	116	27	29	29
Diarrhoea, Dysentery, and Enteritis.....	1000	384	271	118	66	30	28
Erysipelas.....	1000	358	309	133	29	44	23
Intermittent and Remittent Fevers.....	1000	328	335	83	34	18	45
Encephalitis and Meningitis.....	1000	332	301	121	38	34	21
Scarlet Fever and Diphtheria.....	1000	192	283	189	75	28	7
Measles.....	1000	175	240	123	255	39	8
Scrofula.....	1000	287	218	113	78	17	26
Hydrocephalus.....	1000	277	231	139	15	23	31
Croup.....	1000	163	366	159	64	25	10
Hooping Cough.....	1000	153	254	161	178	68	..

The following appear to be the most noteworthy features of this table:—

Among the Irish, a comparative exemption from all the General diseases of the Febrile Group, and from diseases of the digestive and nervous systems; and, on the other hand, a marked liability to General diseases of the Constitutional Group, including consumption, but with exception of rheumatism, scrofula, and cancers, and to diseases of the organs of locomotion and of the urinary system, with extraordinary mortality from Bright's disease of the kidneys.

Among the Germans, a reduced mortality from General diseases of the Constitutional Group, and a decided liability to those, especially small-pox, of the Febrile Group (being an exact reversal of the relations of the Irish thereto); a comparative immunity from diseases of the organs of locomotion and of the integumentary system, and otherwise a general evenness in the distribution of the body of deaths among the several groups of diseases, and through the list of special diseases.

Among the English and Welsh, a liability to the diseases of the nervous, circulatory, digestive, and integumentary systems contrasted with comparative immunity from General diseases, both of the Febrile and the Constitutional Groups; of the special diseases, scarlet fever, diphtheria, hooping-cough, hydrocephalus, croup, erysipelas, apoplexy, and paralysis being relatively most fatal, and consumption, intermittent and remittent, cerebro-spinal, enteric, and typhus fevers, bronchitis, and small-pox, least fatal.

Among the Swedes, Norwegians, and Danes, a marked liability to diseases of the digestive system, especially, dysentery, diarrhoea, and enteritis, and an extraordinary mortality from General diseases of the Febrile Group, notably measles, scarlet fever, diphtheria, and typhus, enteric, and cerebro-spinal fevers, with comparative immunity from General diseases of the Constitutional Group, and from diseases of the circulatory, nervous, urinary, and integumentary systems, and of the organs of locomotion, the deaths from cancers, apoplexy, paralysis, bronchitis, hydrocephalus, and Bright's disease of the kidneys, being remarkably few.

Among the Scotch, an evenness in the distribution of the body of deaths among the several groups with marked exception only of the diseases of the nervous system and of the organs of locomotion, the most noticeable exemptions among the special diseases being small-pox, scrofula, and the fevers; the most noticeable instances of liability, cancers, paralysis, erysipelas, measles, and hooping-cough.

Among the French, a general evenness in the distribution of the body of deaths among the several groups of diseases, with somewhat more of irregularity as to the distribution among the special diseases than among the Scotch.



MAP OF PREDOMINATING SEX

SHOWING THE LOCAL EXCESS OF MALES OR OF FEMALES
IN THE DISTRIBUTION OF POPULATION OVER THE TERRITORY
OF THE UNITED STATES EAST OF THE
100TH MERIDIAN.

Compiled from the Statistics of Population
at the Ninth Census 1870.

BY
FRANCIS AWALKER.

Explanations.

The Blue Lines indicate the boundaries of Groups of Population
The Figures in Blue 2-18; 45-45 express the number of inhabitants
to the Square Mile found within each group
The Shaded Lines in Blue indicate the outside limit of a population
of 2 or more to the Square Mile. The shading points towards the
regions which have a population of less than 2 to the Square Mile.
Note. The occasional abrupt intervals between the shaded portions
and the line of no population, are doubtless due in many cases to errors
in the Census returns incident to the sparseness of settlement.

SCALE

Females in excess
Males less than 5 per cent
From 5 to 10
10 to 20
20 per cent and over.

I
II
III
IV

CHARTS SHOWING THE DISTRIBUTION BY AGE AND SEX OF THE POPULATION OF THE UNITED STATES at the date of enumeration June 1st

IN THE AGGREGATE AND WITH DISTINCTION OF RACE COLOR AND NATIVITY FOR THE UNITED STATES AND IN THE AGGREGATE AND AS NATIVE OR FOREIGN FOR EACH STATE AND TERRITORY.

Compiled from the Returns of Population at the Ninth Census 1870

FRANCIS A. WALKER.

To which are added for purposes of comparison certain corresponding figures for 1850 and 1860 prepared from the published Statistics of the Seventh and Eighth Censuses.

The total number of living Inhabitants in each case, as reported in the Census, is reduced to thousandths, and the number of thousandths of each sex in each decade of life is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line.

The Males are on the left of the perpendicular base line, and the Females on the right. The lowest horizontal line represents the number in the first decade of life, i.e. under ten years of age and the highest the number over eighty years. The sex which preponderates is shaded.

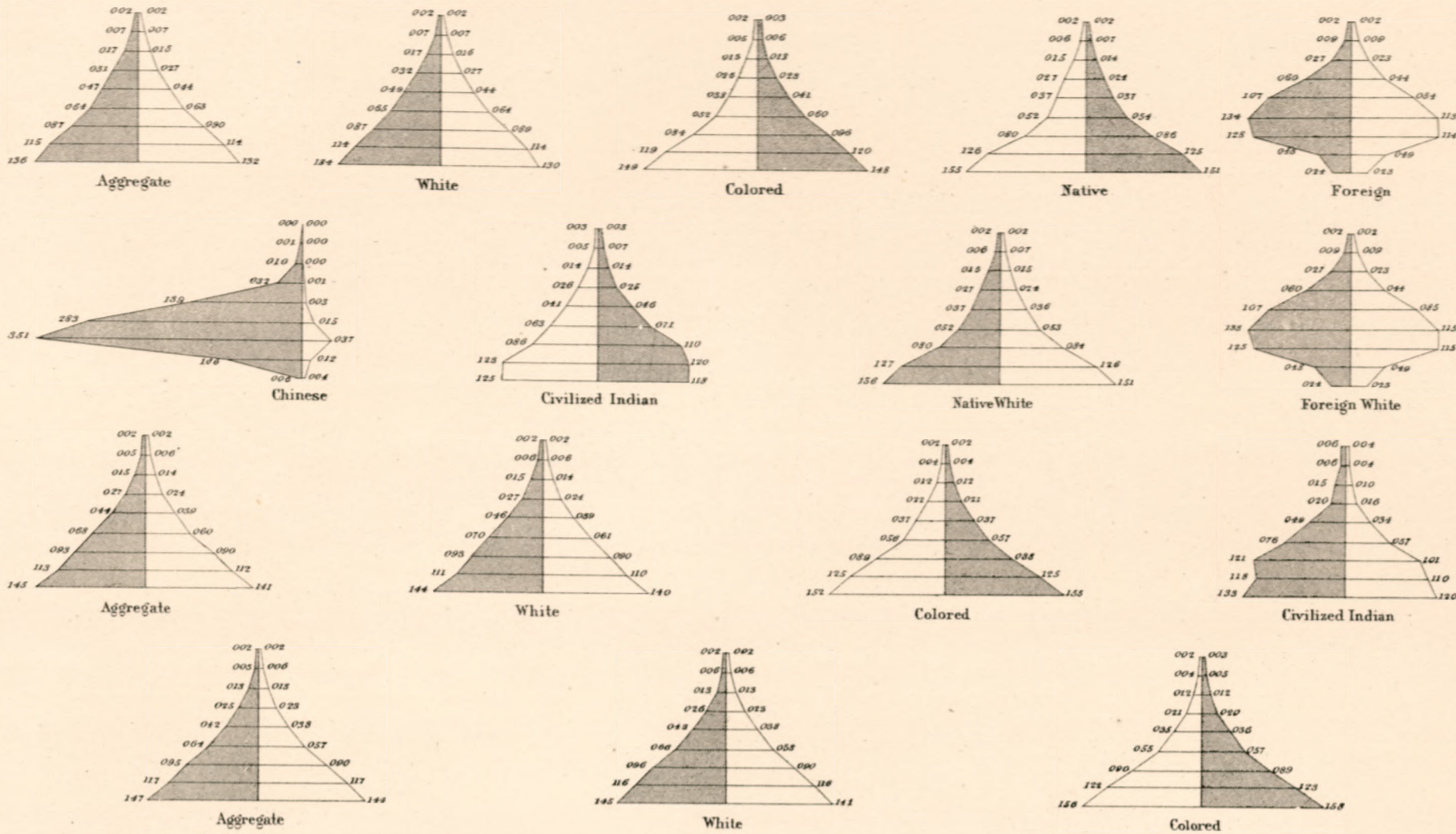
I.- UNITED STATES, IN THE AGGREGATE AND WITH CERTAIN DISTINCTIONS FOR 1870 1860 AND 1850.

THE UNITED STATES.

1870

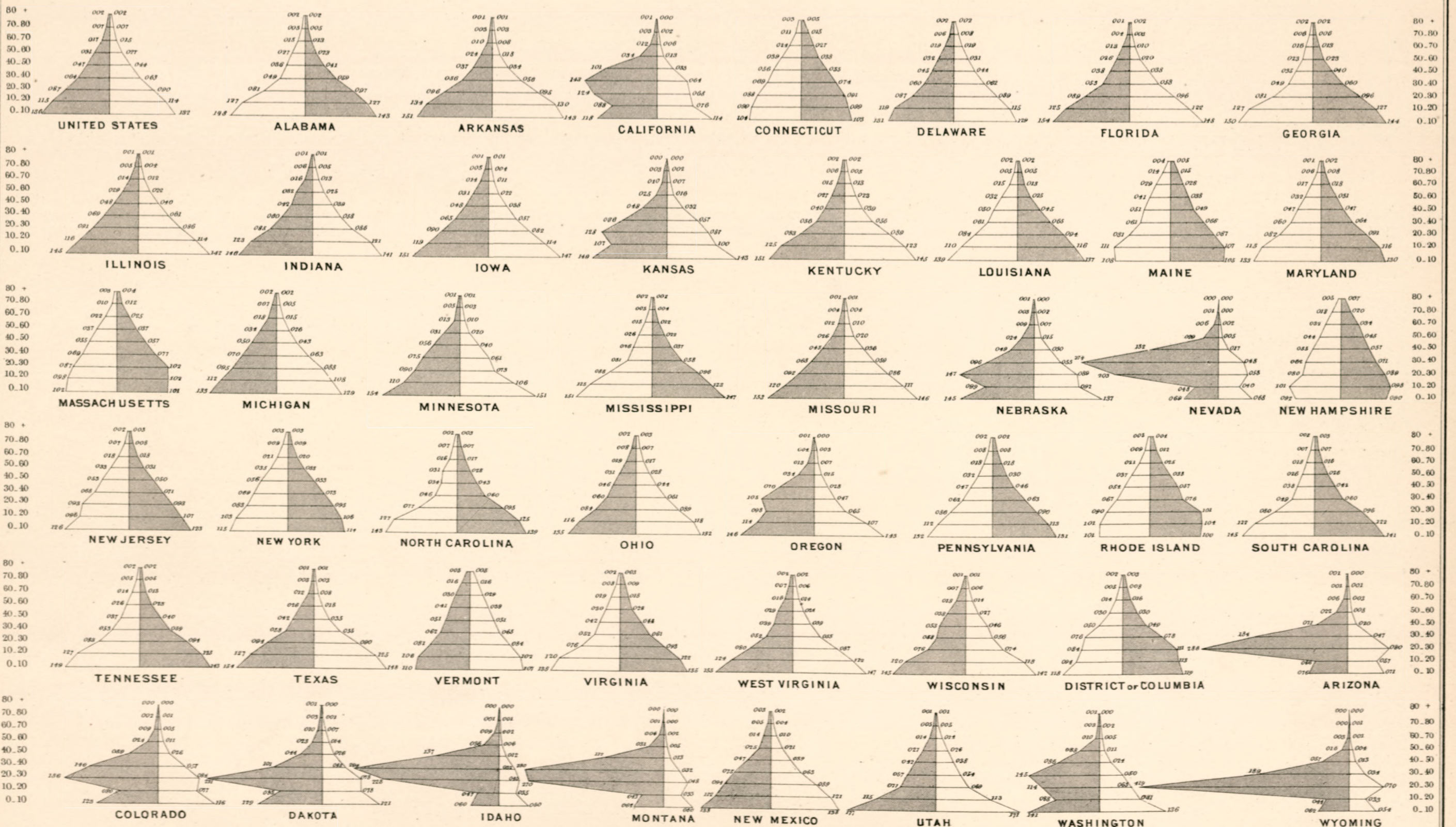
1860 *

1850 *



* The population was not distinguished as native or foreign in the tabulation by age and sex at the Seventh and Eighth Censuses.

2.- AGGREGATE POPULATION 1870. BY STATES AND TERRITORIES.

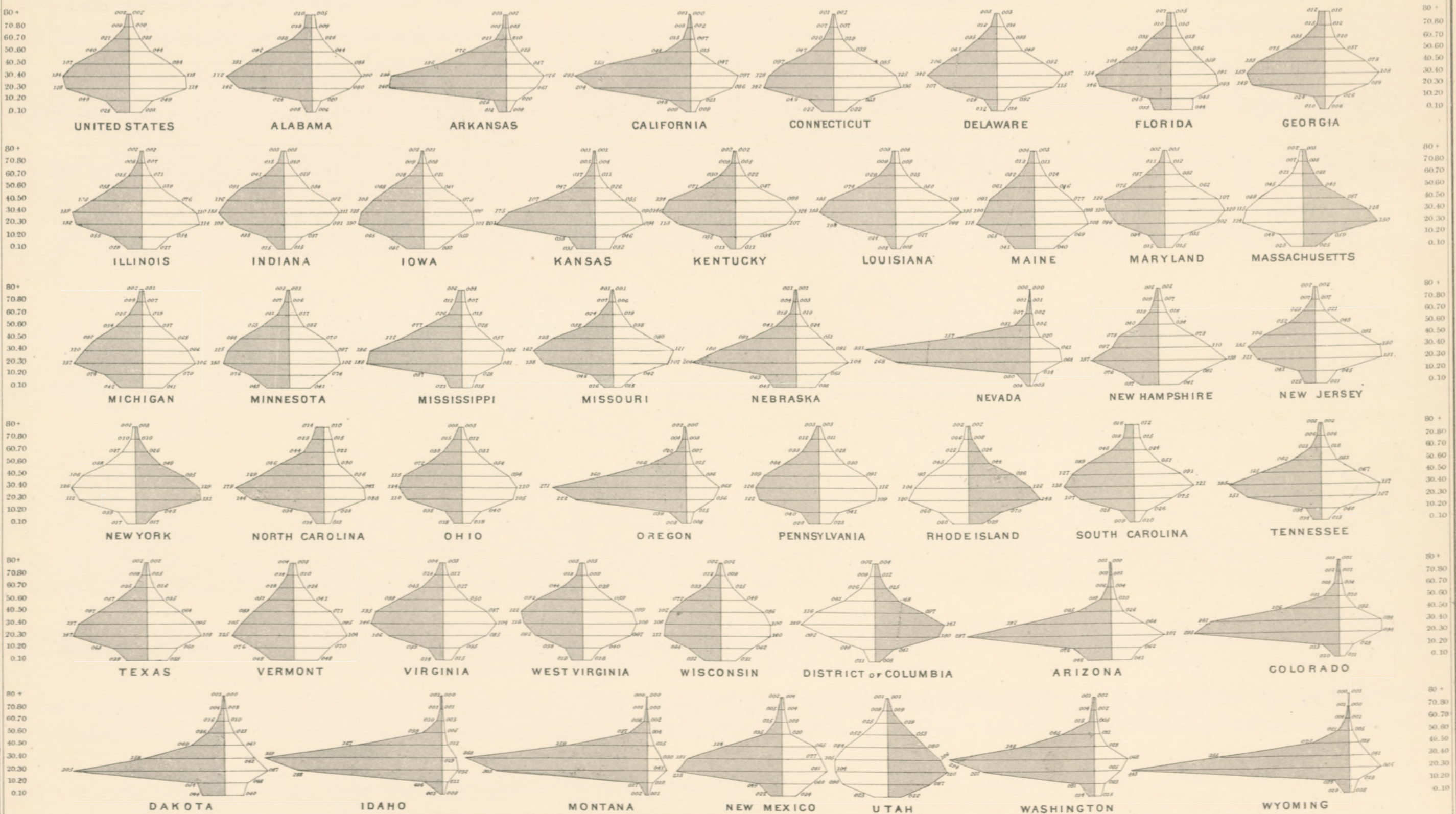


3.- NATIVE POPULATION 1870. BY STATES AND TERRITORIES.



* In the United States the females are in excess of the males among the native population, and in Delaware the males in excess of the females, but so slightly as not to allow the preponderance to be exhibited to the eye upon the scale of the present chart.

4.- FOREIGN POPULATION 1870. BY STATES AND TERRITORIES.





MAP
 SHOWING IN FIVE DEGREES OF DENSITY, THE
BIRTH RATE
 PREVAILING IN THE TERRITORY OF THE UNITED STATES EAST OF THE 100th MERIDIAN,
 SO FAR AS THE SAME IS INDICATED BY THE RATIO BETWEEN THE TOTAL POPULATION
 AND THE NUMBER OF CHILDREN UNDER ONE YEAR OF AGE
 SURVIVING AT THE DATE OF ENUMERATION, JUNE 1st.
 Compiled from the Returns of Population at the Ninth Census
 OF THE UNITED STATES, 1870.
 BY
FRANCIS A. WALKER.

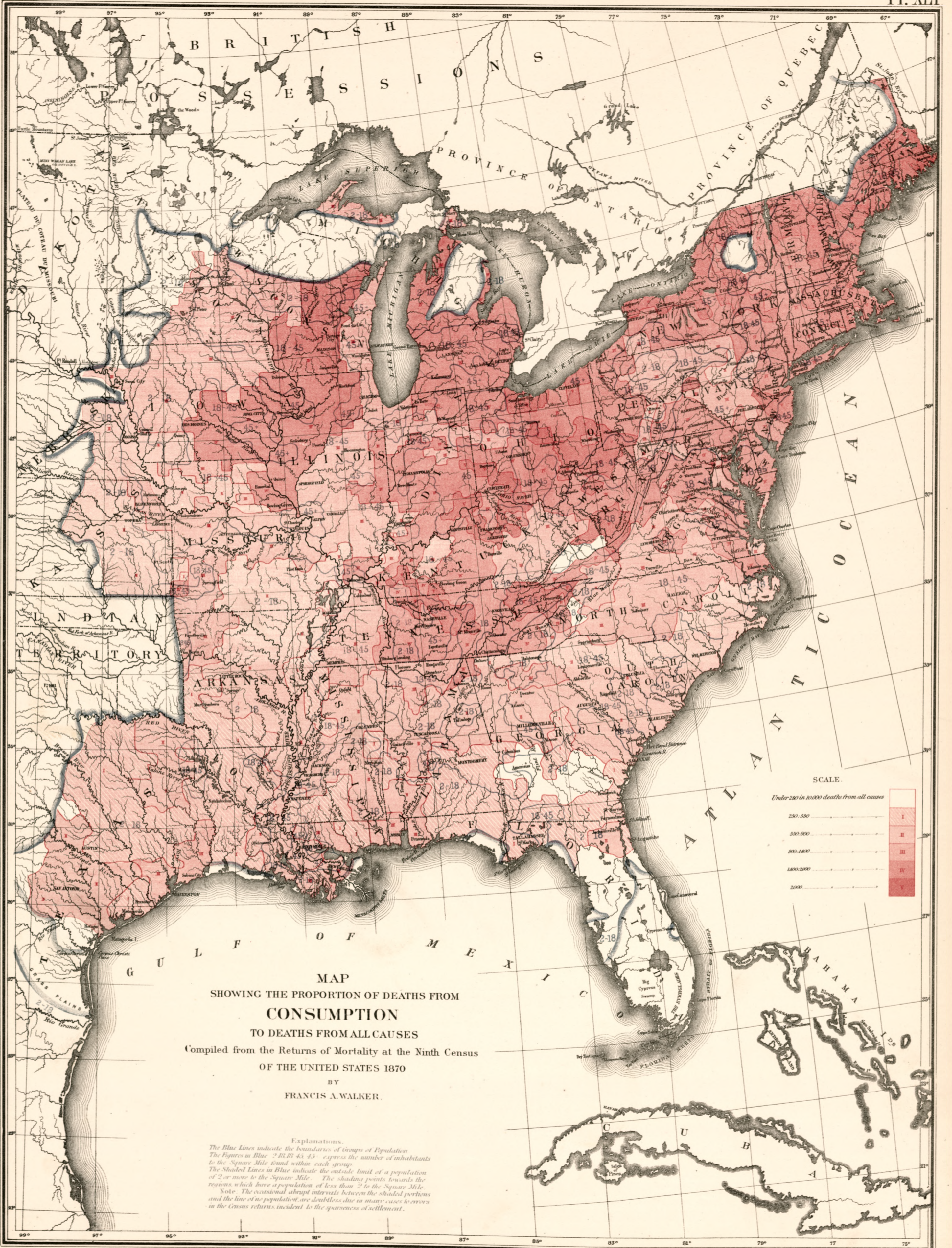
SCALE.

Inhabitants to each child under one year

Under 30	IV
30 33	III
33 36	II
36 40	I
40 48	I
48 and over	I

Note: The smaller the number of inhabitants to each child, the larger the Birth Rate.

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue 2 18 19 45 45 express the number of inhabitants
 to the Square Mile found within each group
 The Shaded Lines in Blue indicate the outside limit of a population
 of 2 or more to the Square Mile. The shading points towards the
 regions, which have a population of less than 2 to the Square Mile.
 Note: The occasional abrupt intervals between the shaded portions
 and the line of no population, are doubtless due in many cases to errors
 in the Census returns, incident to the sparseness of settlement.



MAP
SHOWING THE PROPORTION OF DEATHS FROM
CONSUMPTION
TO DEATHS FROM ALL CAUSES

Compiled from the Returns of Mortality at the Ninth Census
 OF THE UNITED STATES 1870

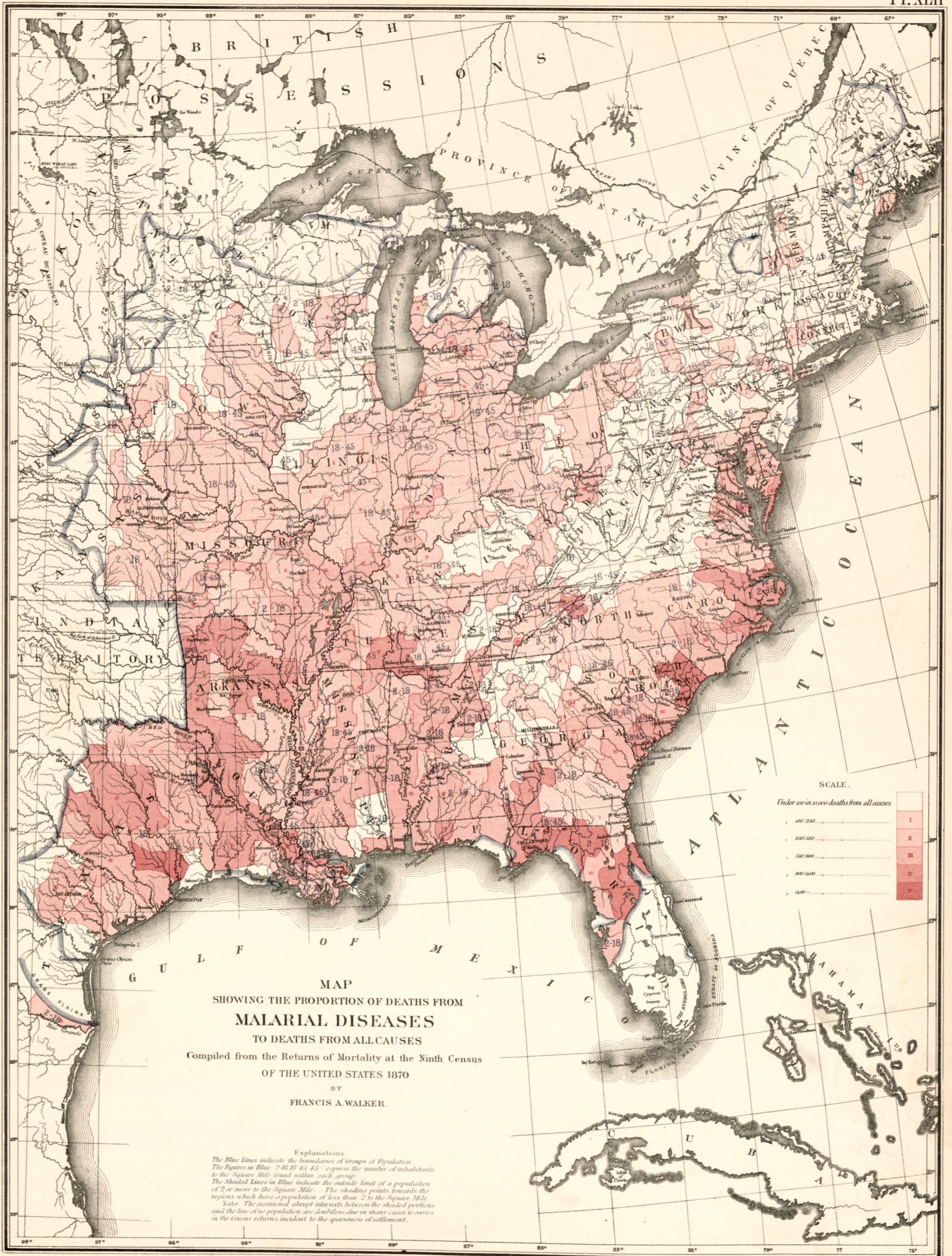
BY
 FRANCIS A. WALKER.

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue 2 18 43 45 express the number of inhabitants to the Square Mile found within each group
 The Shaded Lines in Blue indicate the outside limit of a population of 2 or more to the Square Mile. The shading points towards the regions which have a population of less than 2 to the Square Mile.
 Note. The occasional abrupt intervals between the shaded portions and the line of no population are doubtless due in many cases to errors in the Census returns incident to the sparseness of settlement.

SCALE.

Under 250 in 10,000 deaths from all causes

250-550	I
550-900	II
900-1400	III
1400-2000	IV
2000	V



MAP
 SHOWING THE PROPORTION OF DEATHS FROM
MALARIAL DISEASES
 TO DEATHS FROM ALL CAUSES
 Compiled from the Returns of Mortality at the Ninth Census
 OF THE UNITED STATES 1870
 BY
 FRANCIS A. WALKER.

SCALE.

Under 100 in 10000 deaths from all causes

400-250	I
250-150	II
150-100	III
100-75	IV
75-50	V

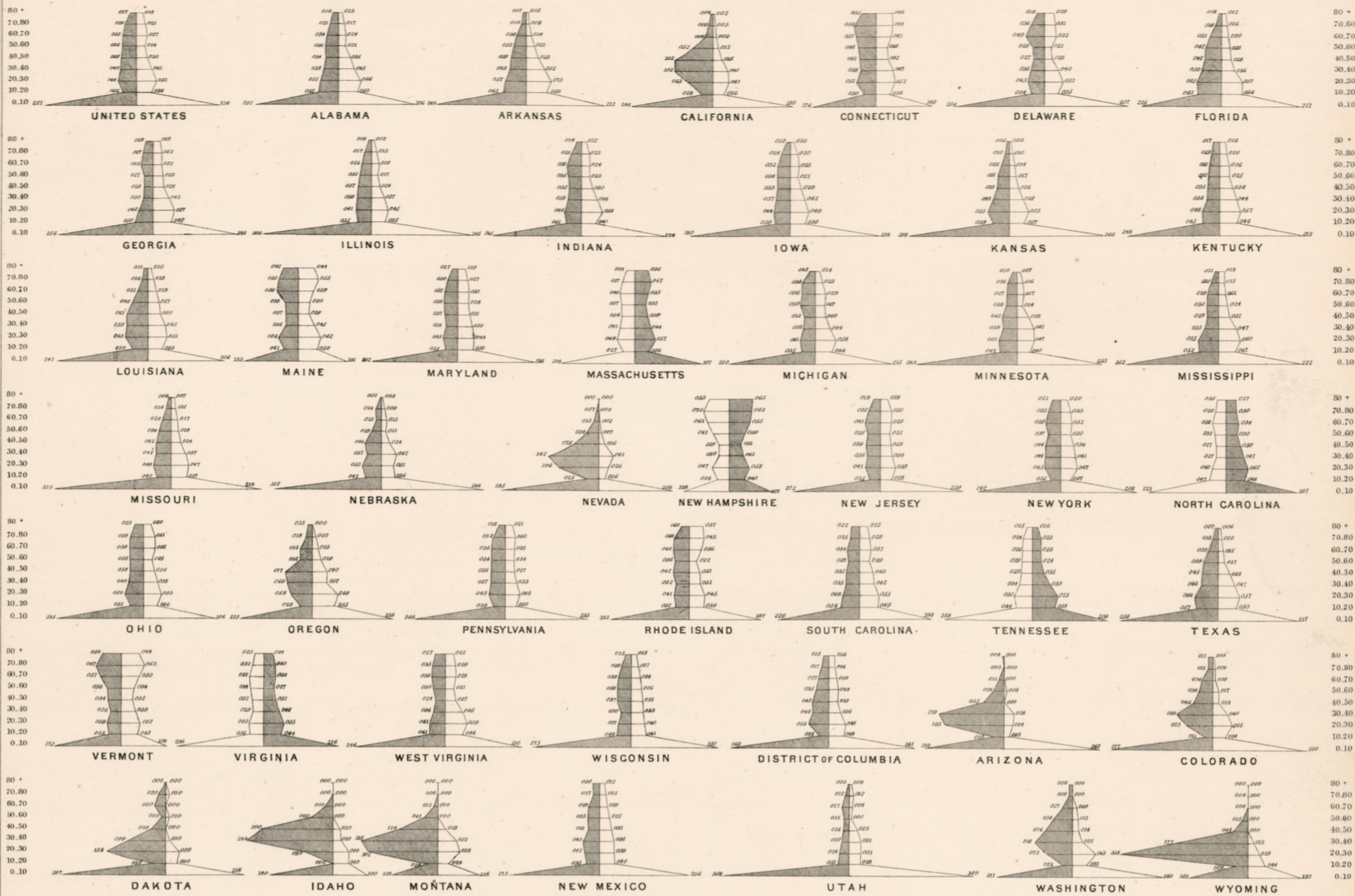
Explanations.
 The Blue Lines indicate the boundaries of Groups of Population
 The Figures in Blue 2 18 45 45 express the number of inhabitants to the Square Mile found within each group.
 The Shaded Lines in Blue indicate the outside limit of a population of 2 or more to the Square Mile. The shading points towards the regions which have a population of less than 2 to the Square Mile.
 Note: The occasional abrupt intervals between the shaded portions and the line of no population are doubtless due in many cases to errors in the Census returns incident to the sparseness of settlement.

CHART
SHOWING THE DISTRIBUTION BY AGE AND SEX
OF THE
DEATHS
OCCURRING DURING THE CENSUS YEAR ENDING JUNE 1ST,
compiled from the Returns of Mortality at the Ninth Census 1870.
BY
FRANCIS A. WALKER.

The total number of Deaths in each State or from each specified Disease or Group of Diseases as reported in the Census is reduced to thousandths, and the number of thousandths of each sex, in each decade of life, is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line.

The males are on the left of the perpendicular base line and the females on the right.
The lowest horizontal line represents the deaths in the first decade under ten years of age, and the highest the deaths over eighty years. The sex which preponderates is shaded.

1. FOR THE UNITED STATES AND FOR THE SEVERAL STATES AND TERRITORIES.



2. FOR GROUPS OF DISEASES AND CERTAIN SPECIAL DISEASES.

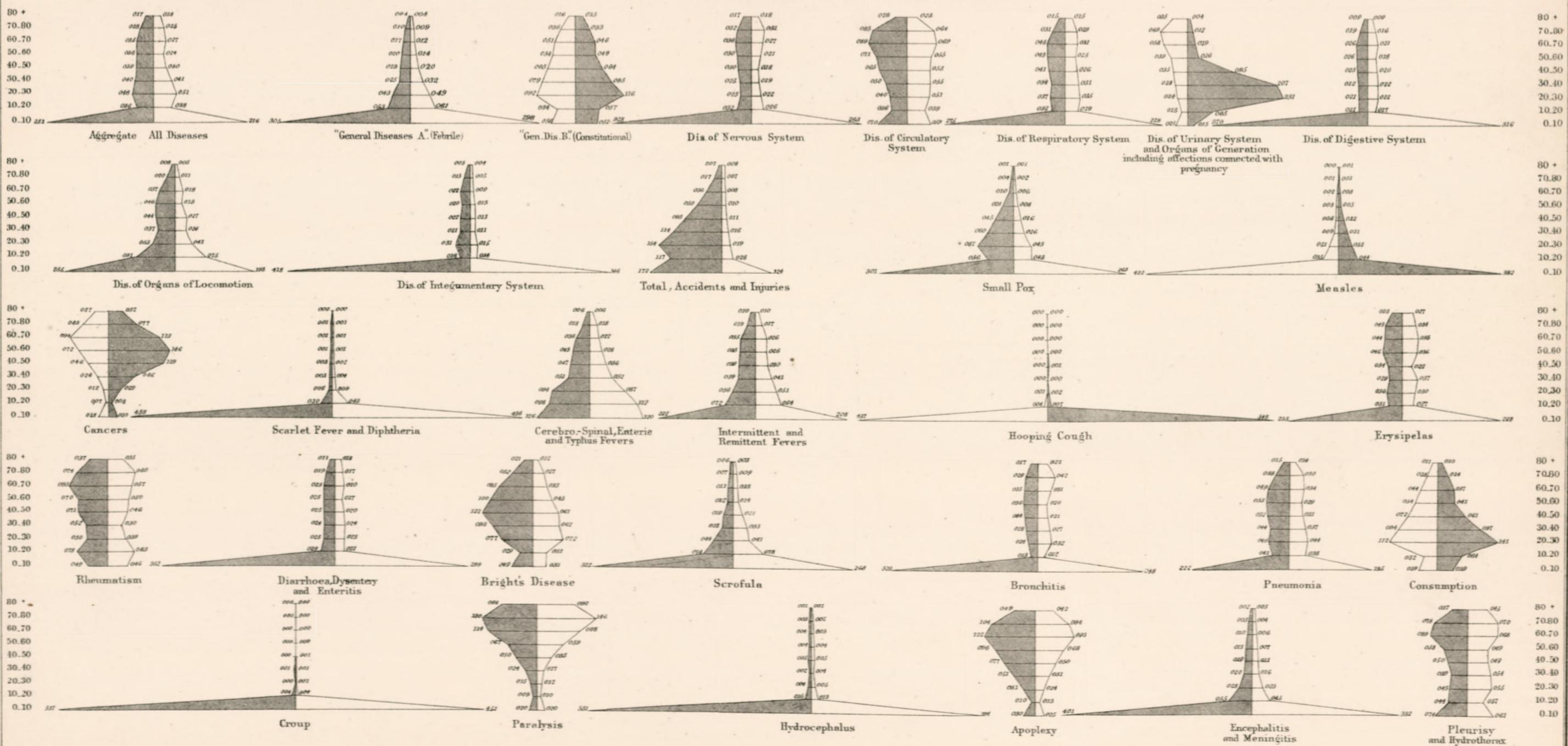
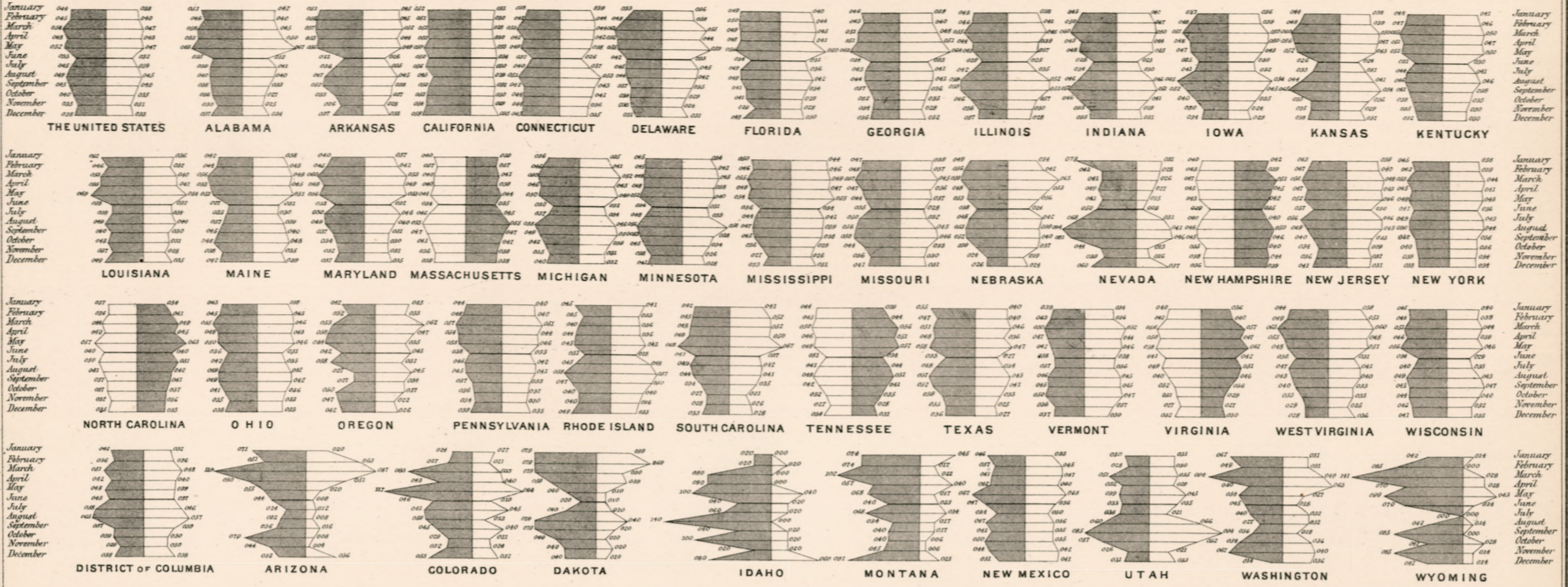


CHART
SHOWING THE DISTRIBUTION
OF THE
DEATHS

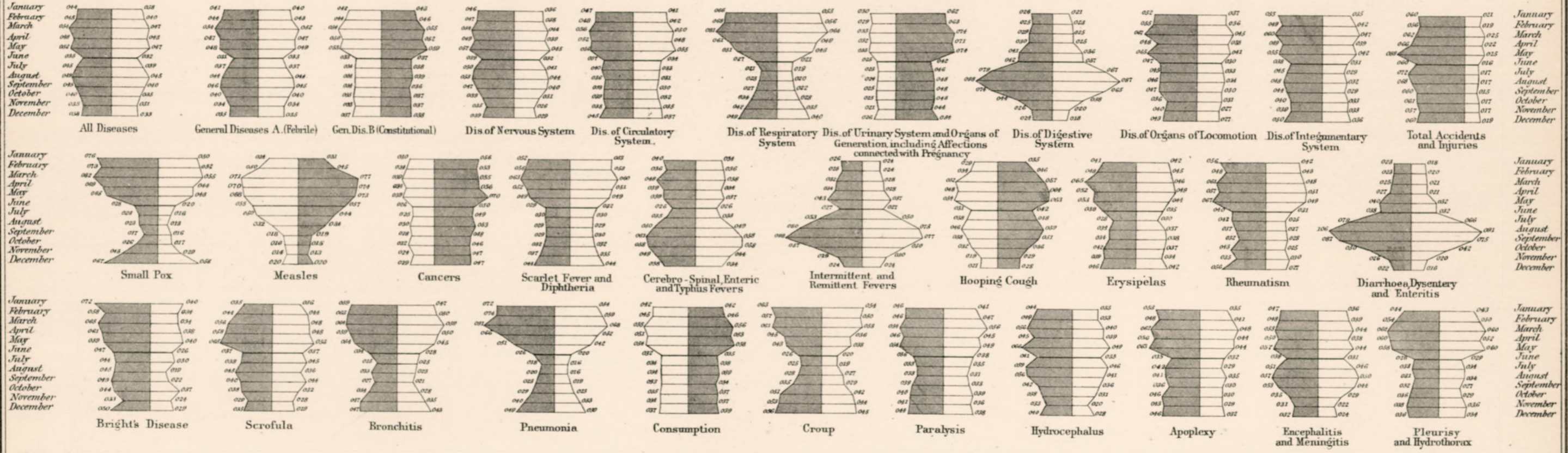
OCCURRING DURING THE CENSUS YEAR ENDING JUNE 1ST
BY SEX AND MONTH OF DEATH AND ACCORDING TO RACE AND NATIONALITY.
compiled from the Returns of Mortality at the Ninth Census U.S. 1870.

BY
FRANCIS A. WALKER.

1. BY SEX AND MONTH OF DEATH, FOR THE UNITED STATES AND FOR THE SEVERAL STATES AND TERRITORIES.

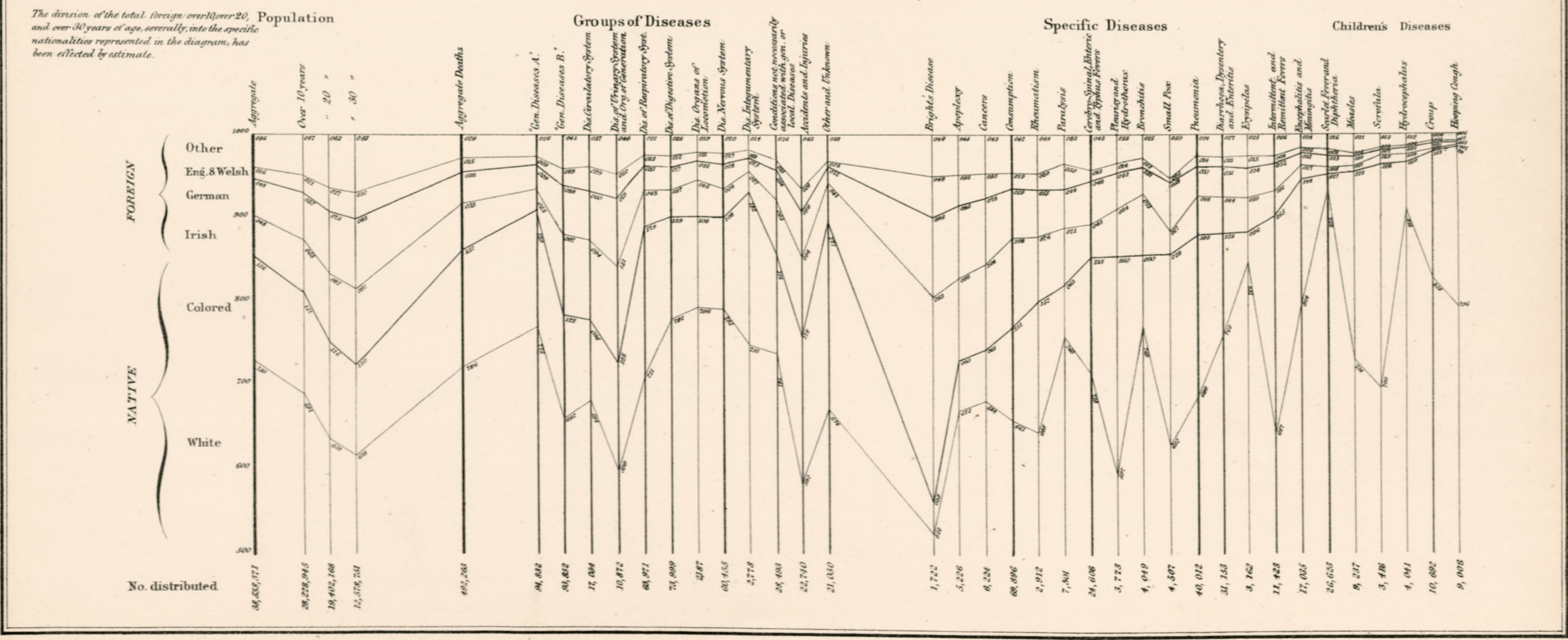


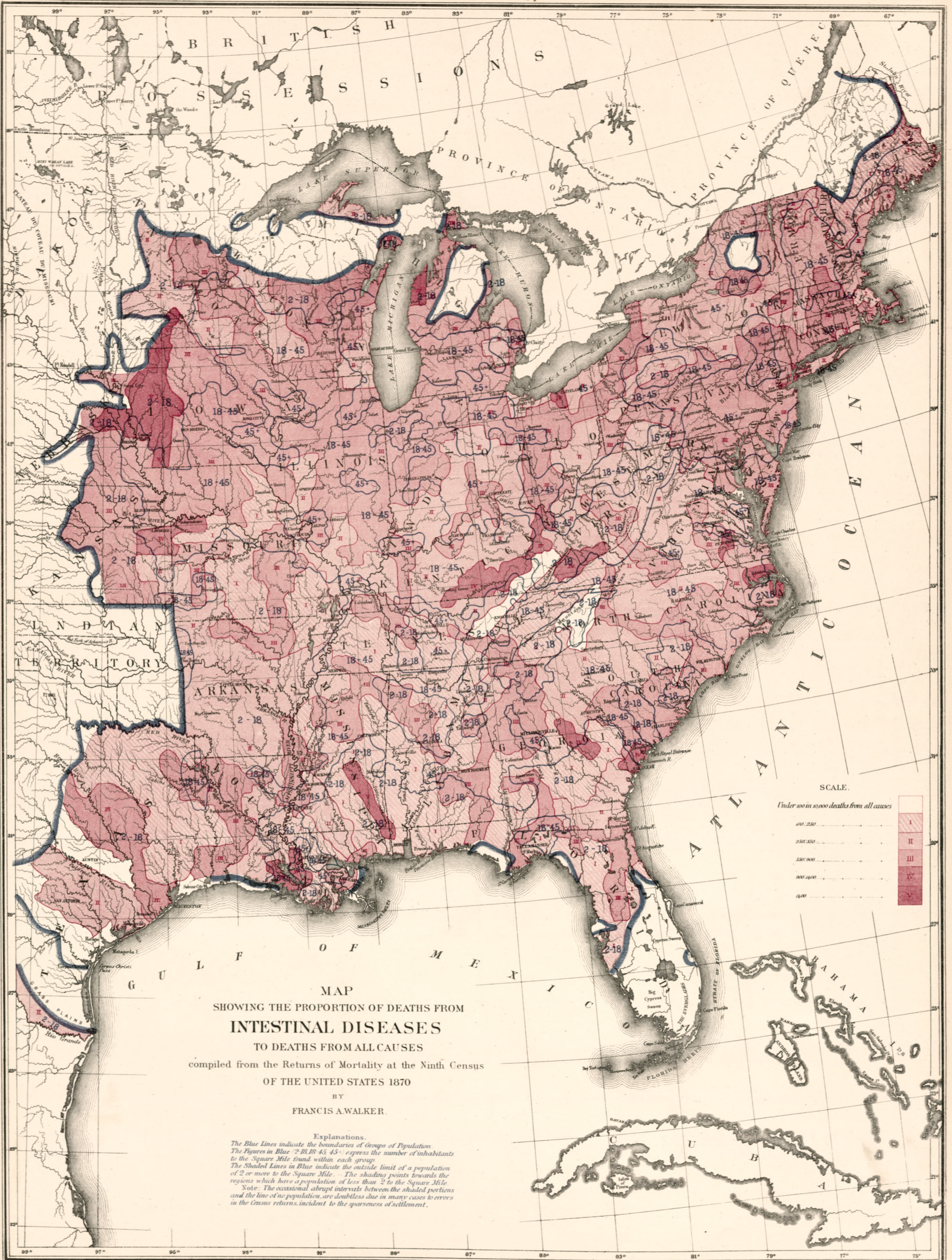
2. BY SEX AND MONTH OF DEATH, FOR GROUPS OF DISEASES AND CERTAIN SPECIAL DISEASES.



Note: In this diagram the vertical lines are supposed to be drawn downwards through a further distance of four inches, making them exactly twice the length at which they appear in the diagram as engraved.

3. BY RACE AND NATIONALITY, FOR THE UNITED STATES.





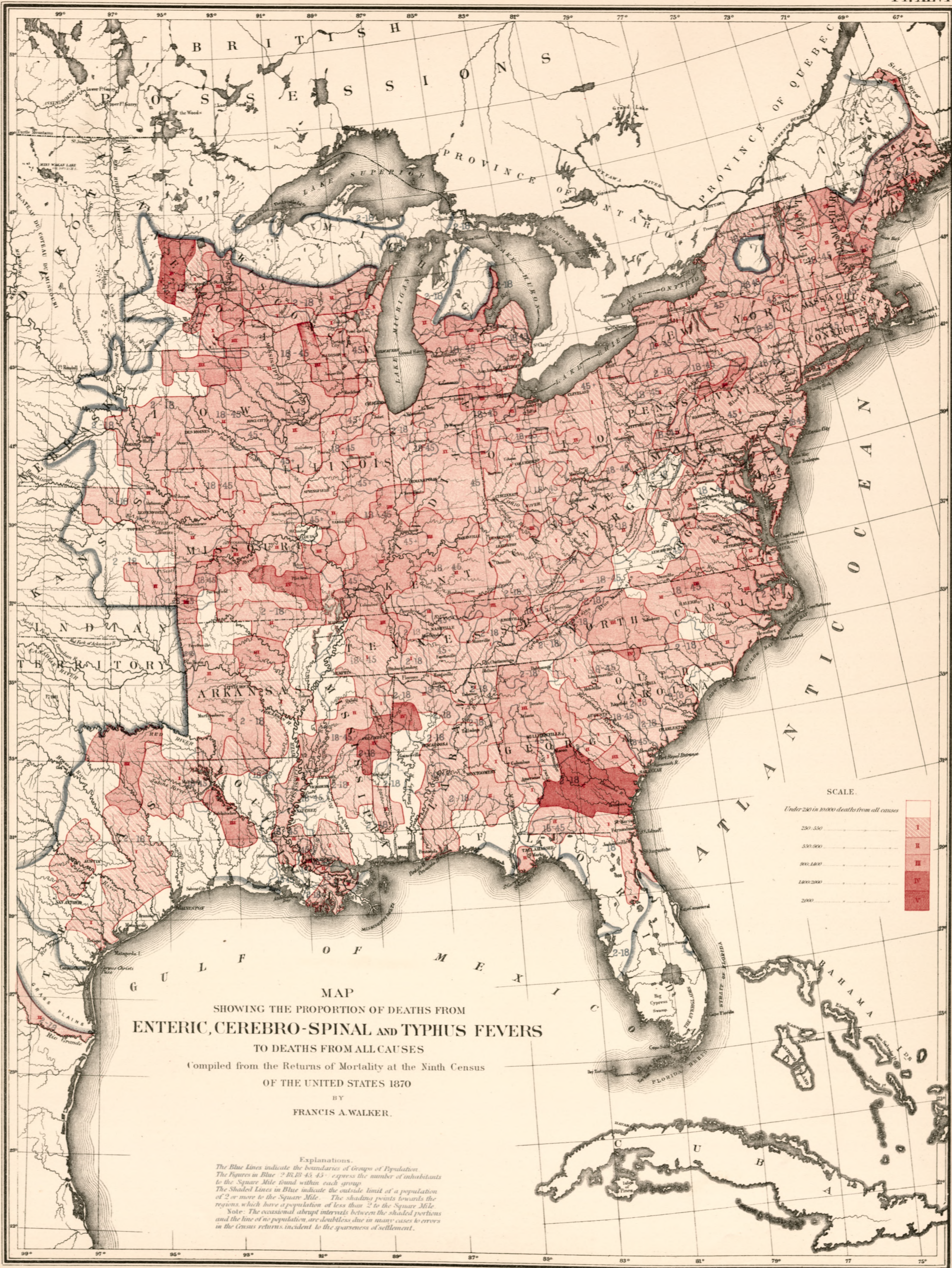
MAP
 SHOWING THE PROPORTION OF DEATHS FROM
 INTESTINAL DISEASES
 TO DEATHS FROM ALL CAUSES
 compiled from the Returns of Mortality at the Ninth Census
 OF THE UNITED STATES 1870

BY
 FRANCIS A. WALKER.

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population.
 The Figures in Blue (2-18, 18-45, 45+) express the number of inhabitants to the Square Mile found within each group.
 The Shaded Lines in Blue indicate the outside limit of a population of 2 or more to the Square Mile. — The shading points towards the regions which have a population of less than 2 to the Square Mile.
 Note: The occasional abrupt intervals between the shaded portions and the line of no population, are doubtless due in many cases to errors in the Census returns, incident to the sparseness of settlement.

SCALE.
 Under 100 in 10,000 deaths from all causes

100-250	I
250-500	II
500-1000	III
1000-1400	IV
1400	V



MAP
SHOWING THE PROPORTION OF DEATHS FROM
ENTERIC, CEREBRO-SPINAL AND TYPHUS FEVERS
TO DEATHS FROM ALL CAUSES

Compiled from the Returns of Mortality at the Ninth Census
 OF THE UNITED STATES 1870

BY
 FRANCIS A. WALKER.

Explanations.
 The Blue Lines indicate the boundaries of Groups of Population.
 The Figures in Blue "2-18 45-45" express the number of inhabitants to the Square Mile found within each group.
 The Shaded Lines in Blue indicate the outside limit of a population of 2 or more to the Square Mile. The shading points towards the regions which have a population of less than 2 to the Square Mile.
 Note: The occasional abrupt intervals between the shaded portions and the line of no population, are doubtless due to errors in the Census returns incident to the sparseness of settlement.

Explanation:

The total number of **BLIND** in each state as reported in the Census is reduced to thousandths, and the number of thousandths of each sex in each decade of life, is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line. The males are on the left of the base line, and the females on the right. The lowest horizontal line represents the first decade, under ten years of age, and the highest over one hundred years. The sex which preponderates is shaded.

CHART
SHOWING THE DISTRIBUTION BY AGE AND SEX
OF

BLINDNESS.

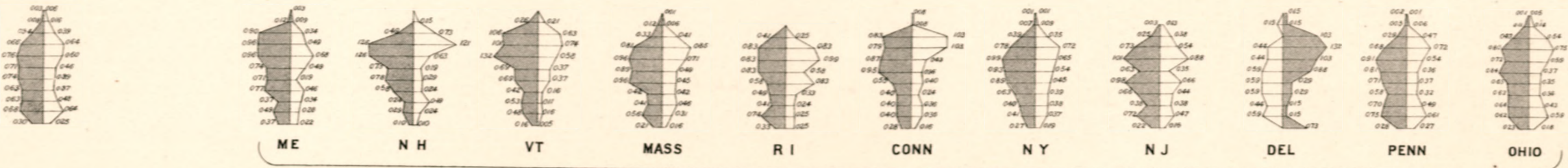
PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES
by FRED H. WINES, Secy. Illinois State Board of Charities.
NINTH CENSUS 1870.

NUMBER OF BLIND IN THE UNITED STATES

divided by age and sex as follows, viz:

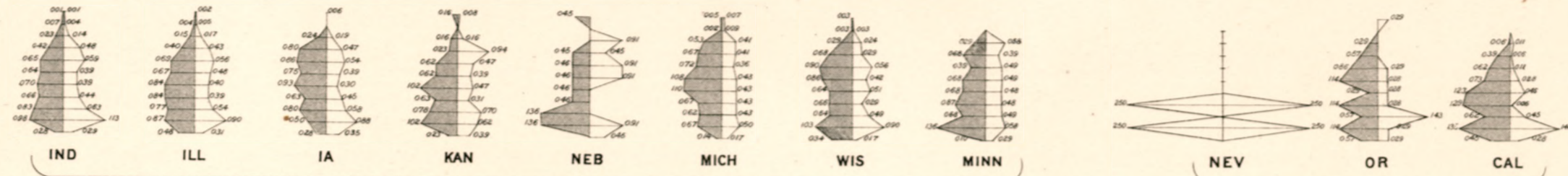
Males.			Females.		
Over	No.	Per Cent.	Over	No.	Per Cent.
Between 100 & 1000	60	.003	Between 100 & 1000	129	.006
80 & 90	156	.008	80 & 90	232	.016
70 & 80	1353	.066	70 & 80	1308	.094
60 & 70	1554	.076	60 & 70	1232	.087
50 & 60	1453	.075	50 & 60	933	.066
40 & 50	1510	.074	40 & 50	796	.057
30 & 40	1286	.063	30 & 40	750	.057
20 & 30	1278	.063	20 & 30	977	.071
10 & 20	1381	.074	10 & 20	1301	.094
Under 10	604	.030	Under 10	515	.035
Total	11,341		Total	8,972	

(Blind of unknown age omitted.)



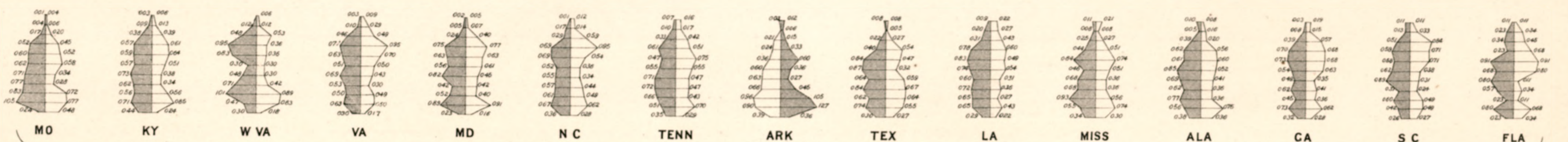
UNITED STATES

EASTERN



WESTERN

PACIFIC



SOUTHERN

Explanation:

The total number of **BLIND** in each state as reported in the Census is reduced to thousandths, and the number of thousandths of each sex in each decade of life, is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line. The males are on the left of the base line, and the females on the right. The lowest horizontal line represents the first decade, under ten years of age, and the highest over one hundred years. The sex which preponderates is shaded.

CHART
SHOWING THE DISTRIBUTION BY AGE AND SEX
OF

BLINDNESS.

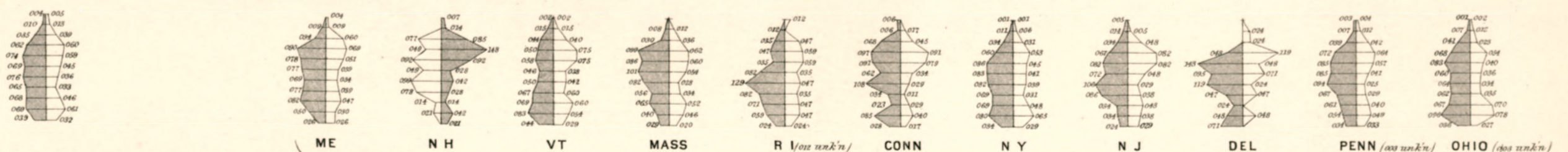
PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES
by FRED H. WINES, Secy. Illinois State Board of Charities.
EIGHTH CENSUS 1860.

NUMBER OF BLIND IN THE UNITED STATES

divided by age and sex as follows, viz:

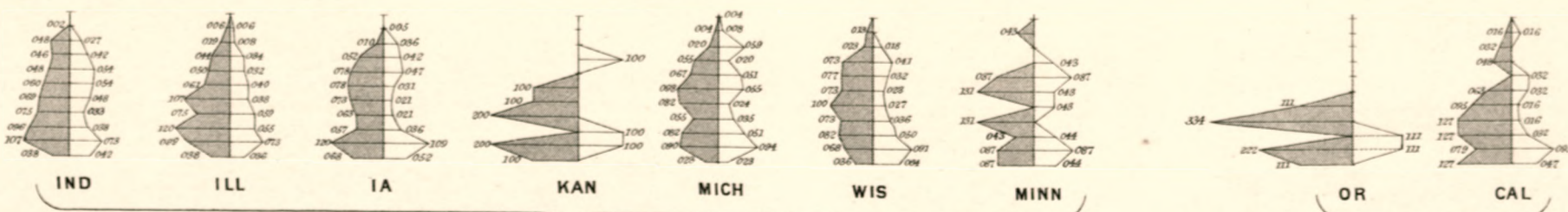
Males.			Females.		
Over	No.	Per Cent.	Over	No.	Per Cent.
Between 100 & 1000	50	.009	Between 100 & 1000	61	.012
80 & 90	130	.010	80 & 90	164	.018
70 & 80	138	.013	70 & 80	196	.022
60 & 70	716	.062	60 & 70	752	.080
50 & 60	927	.078	50 & 60	738	.069
40 & 50	869	.074	40 & 50	573	.049
30 & 40	980	.076	30 & 40	459	.038
20 & 30	821	.065	20 & 30	421	.035
10 & 20	860	.068	10 & 20	584	.048
Under 10	874	.068	Under 10	775	.063
	497	.039		398	.032
Total	7,213		Total	5,421	

(Blind of unknown age omitted.)



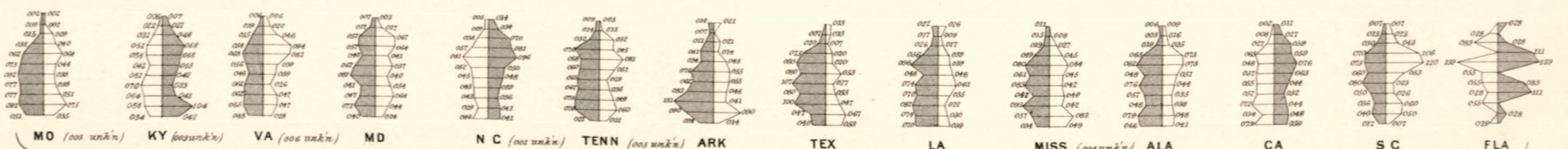
UNITED STATES

EASTERN



WESTERN

PACIFIC



SOUTHERN

Explanation:

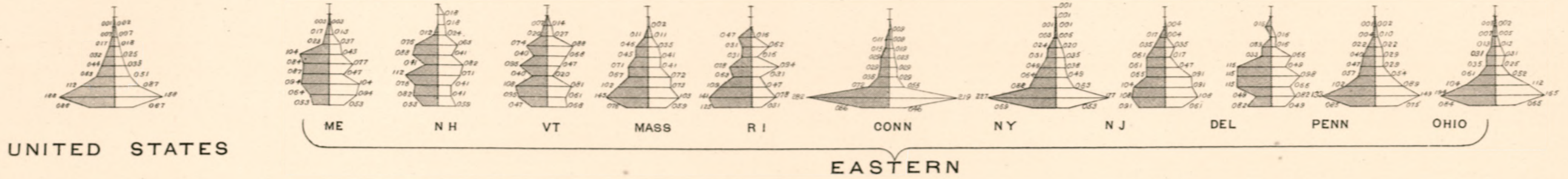
The total number of DEAF MUTES in each state as reported in the Census is reduced to thousandths, and the number of thousandths of each sex in each decade of life, is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line. The males are on the left of the base line, and the females on the right. The lowest horizontal line represents the first decade, under ten years of age, and the highest over one hundred years. The sex which preponderates is shaded.

CHART
SHOWING THE DISTRIBUTION BY AGE AND SEX
OF
DEAF MUTISM.
PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES
by FRED H. WINES, Secy. Illinois State Board of Charities.
NINTH CENSUS 1870.

NUMBER OF DEAF MUTES IN THE UNITED STATES
divided by age and sex as follows, viz:

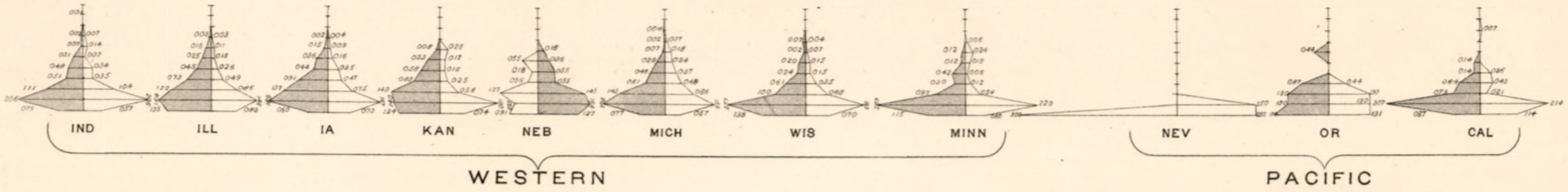
Males			Females		
Over	No.	Per M.	Over	No.	Per M.
Between 1000	1400	2	Between 1000	1400	2
800	800	1.8	800	800	2.9
700	700	1.9	700	700	10.8
600	600	2.3	600	600	2.9
500	500	5.2	500	500	4.0
400	400	7.1	400	400	5.6
300	300	10.2	300	300	8.5
200	200	14.0	200	200	11.2
100	100	19.8	100	100	14.8
Under 100	1380	88.6	Under 100	1078	68.7
Total	8895		Total	7255	

(Deaf Mutes of unknown age omitted.)



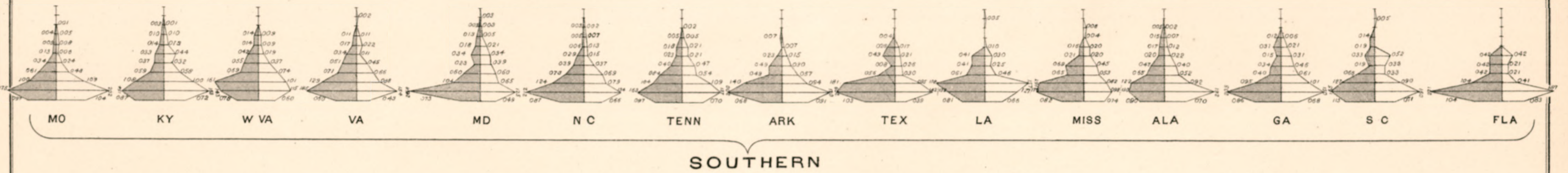
UNITED STATES

EASTERN



WESTERN

PACIFIC



SOUTHERN

Explanation:

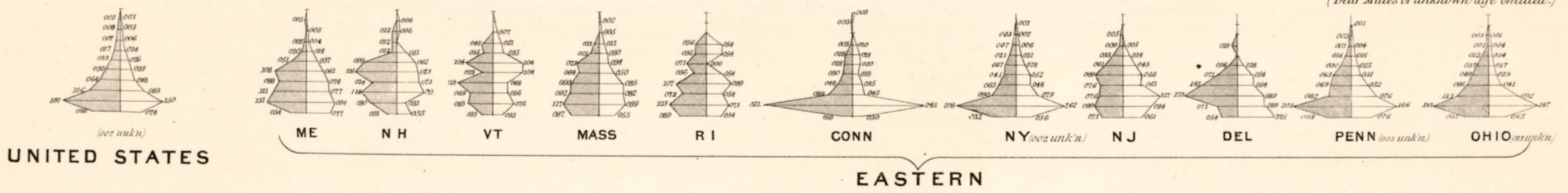
The total number of DEAF MUTES in each state as reported in the Census is reduced to thousandths, and the number of thousandths of each sex in each decade of life, is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line. The males are on the left of the base line, and the females on the right. The lowest horizontal line represents the first decade, under ten years of age, and the highest over one hundred years. The sex which preponderates is shaded.

CHART
SHOWING THE DISTRIBUTION BY AGE AND SEX
OF
DEAF MUTISM.
PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES
by FRED H. WINES, Secy. Illinois State Board of Charities.
EIGHTH CENSUS 1860.

NUMBER OF DEAF MUTES IN THE UNITED STATES
divided by age and sex as follows, viz:

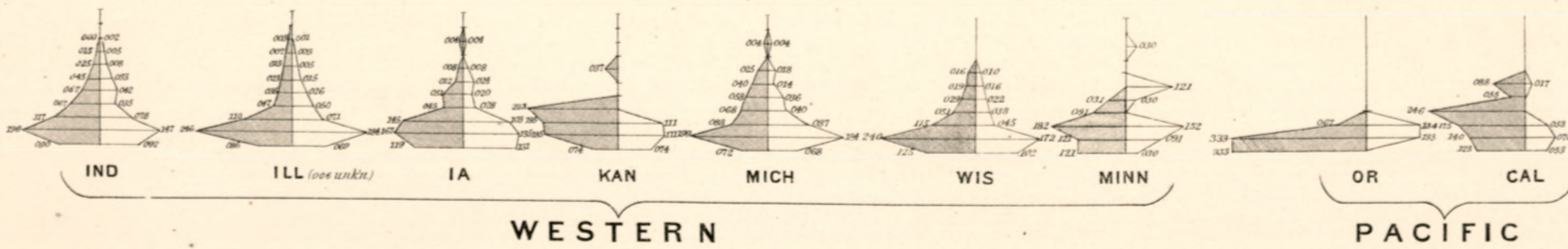
Males			Females		
Over	No.	Per M.	Over	No.	Per M.
Between 1000	1400	2	Between 1000	1400	2
800	800	3.3	800	800	1.4
700	700	8.0	700	700	2.8
600	600	2.0	600	600	1.7
500	500	4.2	500	500	3.9
400	400	6.3	400	400	4.9
300	300	8.2	300	300	6.2
200	200	13.7	200	200	10.6
100	100	24.0	100	100	19.2
Under 100	3103	68.6	Under 100	2683	68.6
Total	7103		Total	5683	

(Deaf Mutes of unknown age omitted.)



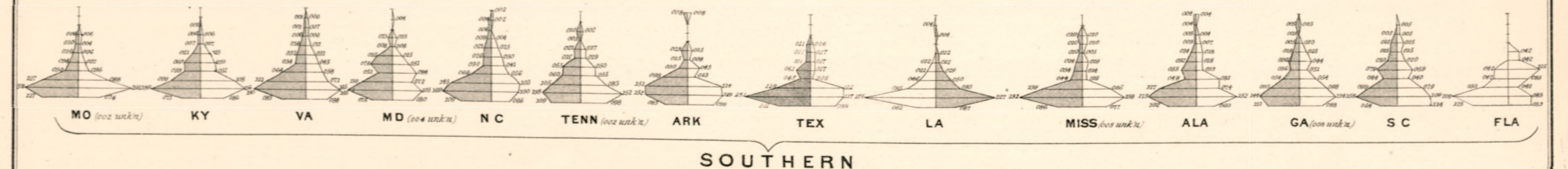
UNITED STATES

EASTERN



WESTERN

PACIFIC



SOUTHERN

Explanation:

The total number of *INSANE* in each state as reported in the Census is reduced to thousandths and the number of thousandths of each sex in each decade of life, is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line. The males are on the left of the base line, and the females on the right. The lowest horizontal line represents the first decade, under ten years of age, and the highest over one hundred years.

The sex which preponderates is shaded.

CHART SHOWING THE DISTRIBUTION BY AGE AND SEX

OF *INSANITY.*

PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES

by FRED H. WINES, Secy. Illinois State Board of Charities.

NINTH CENSUS 1870.

NUMBER OF *INSANE* IN THE UNITED STATES

divided by age and sex as follows: viz

Males			Females		
Over	No.	Per Cent	Over	No.	Per Cent
Between 100 & 1000	2.4	0.001	Between 100 & 1000	1.0	0.000
70-100	2.0	0.001	70-100	2.5	0.001
60-70	6.9	0.019	60-70	8.7	0.024
50-60	24.7	0.068	50-60	31.7	0.087
40-50	71.5	0.199	40-50	90.1	0.247
30-40	247.1	0.678	30-40	308.2	0.845
20-30	863.3	2.367	20-30	1,071.1	2.925
10-20	1,042.2	2.867	10-20	1,251.1	3.431
Under 10	1.7	0.005	Under 10	2.5	0.007
Total	18,033		Total	19,136	

(Insane of unknown age omitted.)

UNITED STATES

EASTERN

WESTERN

PACIFIC

SOUTHERN

Explanation:

The total number of *INSANE* in each state as reported in the Census is reduced to thousandths and the number of thousandths of each sex in each decade of life, is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line. The males are on the left of the base line, and the females on the right. The lowest horizontal line represents the first decade, under ten years of age, and the highest over one hundred years.

The sex which preponderates is shaded.

CHART SHOWING THE DISTRIBUTION BY AGE AND SEX

OF *INSANITY.*

PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES

by FRED H. WINES, Secy. Illinois State Board of Charities.

EIGHTH CENSUS 1860.

NUMBER OF *INSANE* IN THE UNITED STATES

divided by age and sex as follows: viz

Males			Females		
Over	No.	Per Cent	Over	No.	Per Cent
Between 100 & 1000	1.6	0.001	Between 100 & 1000	2.6	0.002
70-100	1.2	0.001	70-100	1.6	0.001
60-70	4.0	0.003	60-70	5.0	0.004
50-60	9.1	0.007	50-60	11.5	0.009
40-50	15.3	0.012	40-50	18.2	0.014
30-40	24.5	0.019	30-40	27.7	0.021
20-30	45.0	0.035	20-30	51.1	0.039
10-20	68.2	0.053	10-20	77.0	0.059
Under 10	1.6	0.001	Under 10	2.1	0.002
Total	11,789		Total	12,157	

(Insane of unknown age omitted.)

UNITED STATES

EASTERN

WESTERN

PACIFIC

SOUTHERN

Explanation:

The total number of IDIOTIC in each state as reported in the Census is reduced to thousandths, and the number of thousandths of each sex in each decade of life, is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line. The males are on the left of the base line, and the females on the right. The lowest horizontal line represents the first decade, under ten years of age, and the highest over one hundred years. The sex which preponderates is shaded.

CHART SHOWING THE DISTRIBUTION BY AGE AND SEX

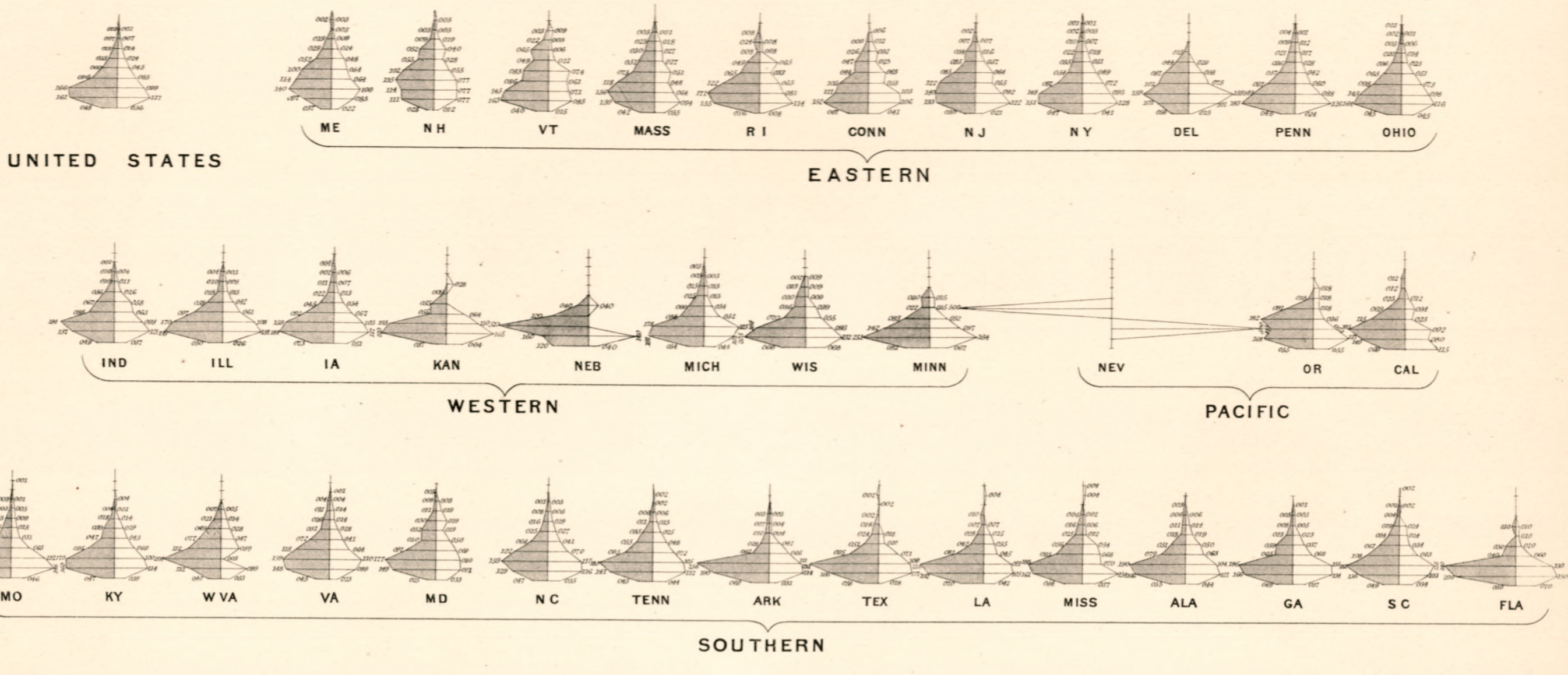
OF IDIOCY.

PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES
by FRED H. WINES, Secy. Illinois State Board of Charities.
NINTH CENSUS 1870.

NUMBER OF IDIOTIC IN THE UNITED STATES

Males			Females		
Age	No.	Per-M.	Age	No.	Per-M.
Over 100	7	.000	Over 100	5	.000
Between 80 & 100	46	.007	Between 80 & 100	12	.009
70 & 80	183	.027	70 & 80	167	.027
60 & 70	458	.069	60 & 70	356	.054
50 & 60	810	.123	50 & 60	581	.088
40 & 50	1468	.223	40 & 50	1102	.165
30 & 40	2356	.355	30 & 40	1582	.238
20 & 30	4045	.608	20 & 30	2831	.424
10 & 20	3927	.589	10 & 20	2667	.396
Under 10	1171	.176	Under 10	882	.131
Total	14472		Total	11036	

(Idiotic of unknown age omitted)



Explanation:

The total number of IDIOTIC in each state as reported in the Census is reduced to thousandths, and the number of thousandths of each sex in each decade of life, is represented by the distance measured on the horizontal lines, severally, from the perpendicular base line. The males are on the left of the base line, and the females on the right. The lowest horizontal line represents the first decade, under ten years of age, and the highest over one hundred years. The sex which preponderates is shaded.

CHART SHOWING THE DISTRIBUTION BY AGE AND SEX

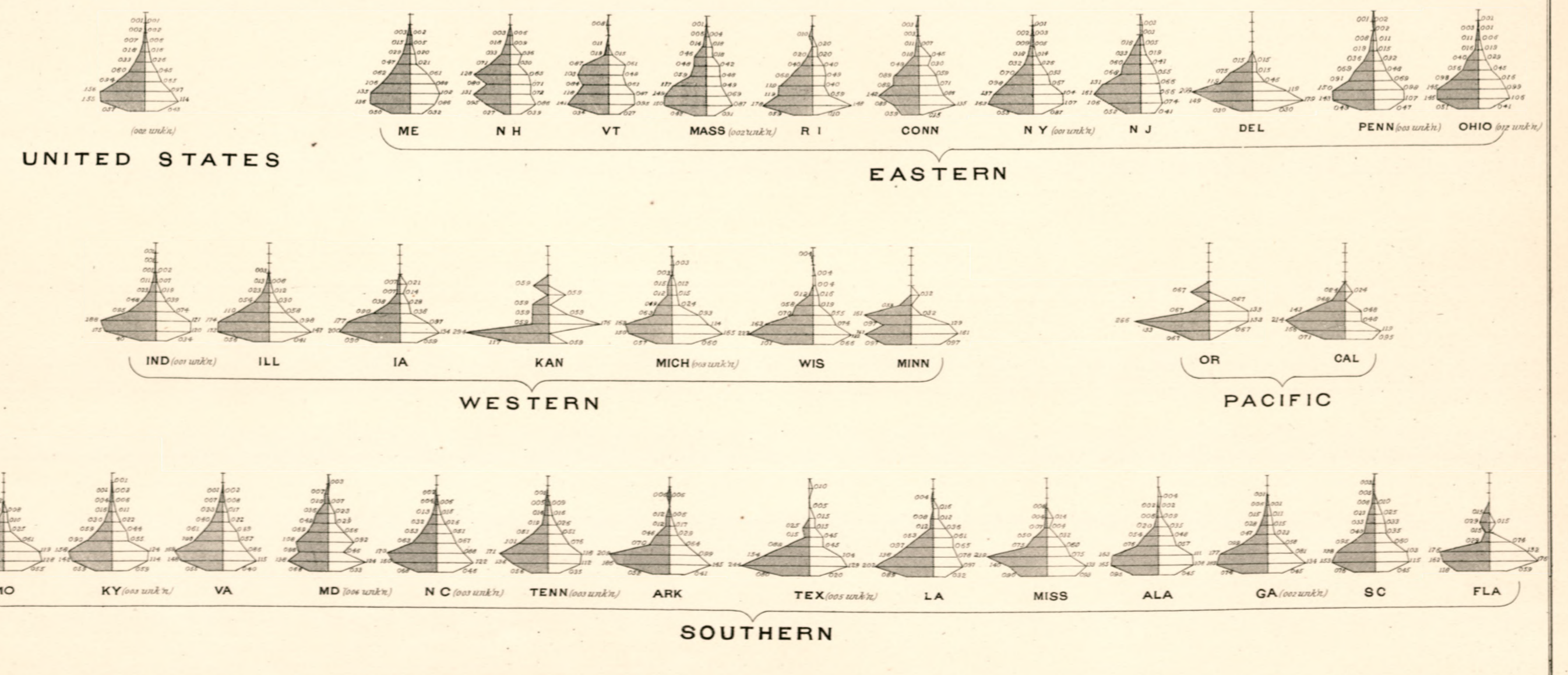
OF IDIOCY.

PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES
by FRED H. WINES, Secy. Illinois State Board of Charities.
EIGHTH CENSUS 1860.

NUMBER OF IDIOTIC IN THE UNITED STATES

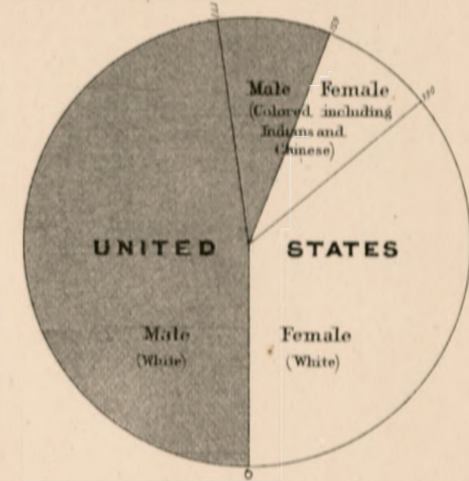
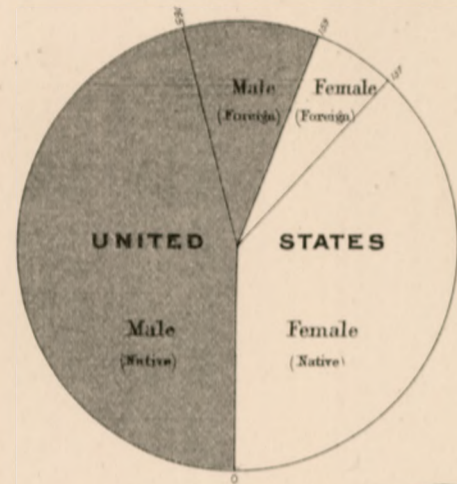
Males			Females		
Age	No.	Per-M.	Age	No.	Per-M.
Over 100	1	.000	Over 100	2	.000
Between 80 & 100	8	.001	Between 80 & 100	13	.002
70 & 80	32	.005	70 & 80	55	.008
60 & 70	131	.021	60 & 70	226	.034
50 & 60	334	.052	50 & 60	592	.088
40 & 50	629	.100	40 & 50	1126	.167
30 & 40	1140	.180	30 & 40	2048	.301
20 & 30	1796	.275	20 & 30	3245	.478
10 & 20	2943	.450	10 & 20	5315	.770
Under 10	2931	.449	Under 10	5314	.770
Total	11061		Total	7828	

(Idiotic of unknown age omitted)

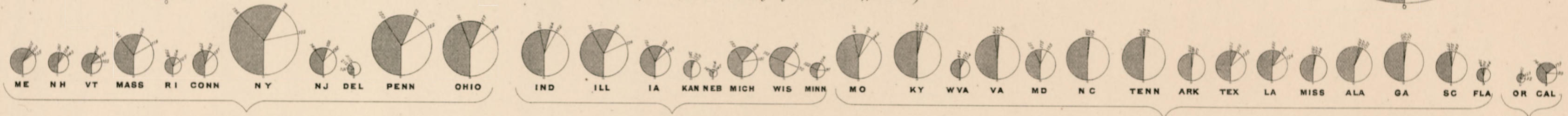


Areas of Circles proportional.
Scale: 1800 to the square inch.

CHART
SHOWING THE AGGREGATE NUMBER OF
BLIND
AND THE PROPORTION OF MALES AND FEMALES,
WHITE OR COLORED, NATIVE OR FOREIGN
AT THE NINTH CENSUS 1870;
also the increase since 1860.
PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES
by FRED. H. WINES Secy. Illinois State Board of Charities.

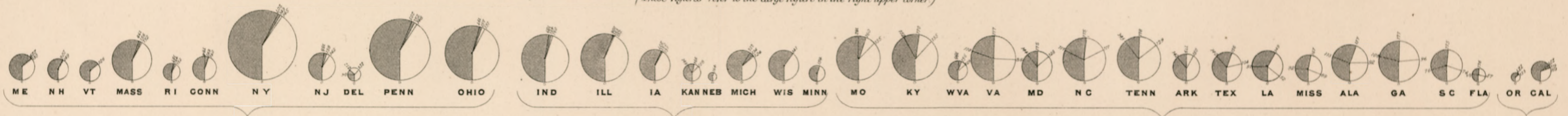


I. Comparative view of the distribution of Blindness by sex and nativity in the several States.
(These figures refer to the large figure in the left upper corner.)



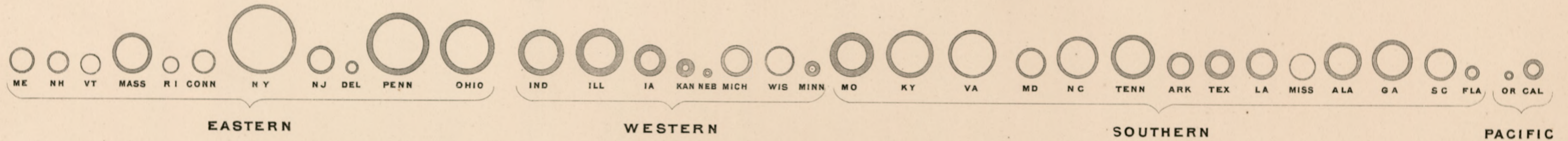
I. No opposite first radius from Zero to left, denotes degrees in sector for Native Males, that opposite first radius to right from Zero, degrees in sector for Native Females, and that opposite second radius to right, the sum of the degrees in the two sectors for Females, Native and Foreign.

II. Comparative view of the distribution of Blindness by sex and color.
(These figures refer to the large figure in the right upper corner.)



II. No opposite first radius from Zero to left denotes degrees in sector for White Males, that opposite first radius to right from Zero, degrees in sector for White Females, and that opposite second radius to right, the sum of the degrees in the two sectors for Females, White and Colored.

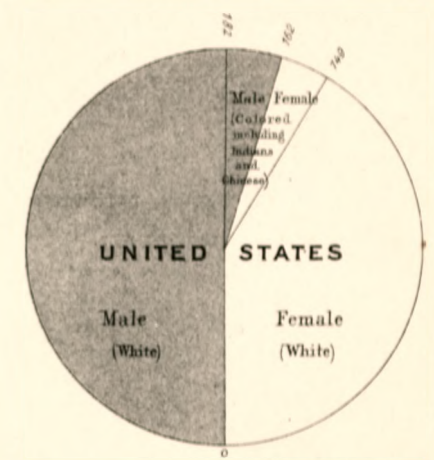
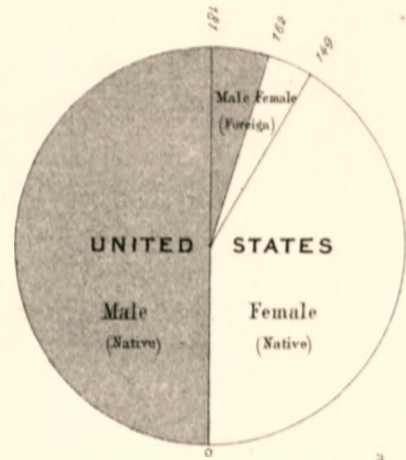
III. Comparative view of the increase in the number of the Blind between 1860 and 1870.



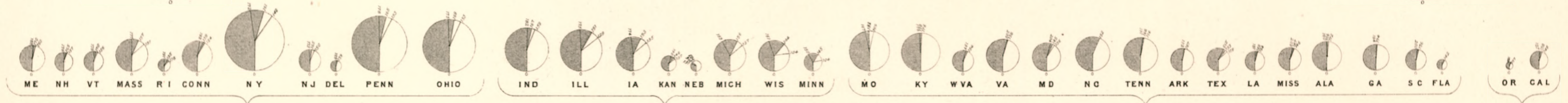
III. Inner circles represent numbers reported at 1860, outer circles, numbers at 1870, the shaded rims, the increase in the interval.

Areas of Circles proportional.
Scale: 4850 to the square inch.

CHART
SHOWING THE AGGREGATE NUMBER OF
DEAF MUTES
AND THE PROPORTION OF MALES AND FEMALES,
WHITE OR COLORED, NATIVE OR FOREIGN.
AT THE NINTH CENSUS 1870,
also the increase since 1860.
PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES
by FRED. H. WINES Secy. Illinois State Board of Charities.



I. Comparative view of the distribution of Deaf Mutism by sex and nativity in the several States.
(These figures refer to the large figure in the left upper corner.)



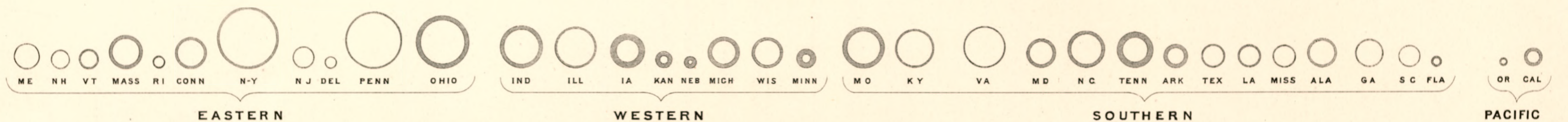
I. N° opposite first radius from Zero to left, denotes degrees in sector for Native Males, that opposite first radius to right from Zero, degrees in sector for Native Females, and that opposite second radius to right, the sum of the degrees in the two sectors for Females, Native and Foreign.

II. Comparative view of the distribution of Deaf Mutism by sex and color.
(These figures refer to the large figure in the right upper corner.)



II. N° opposite first radius from Zero to left denotes degrees in sector for White Males, that opposite first radius to right from Zero, degrees in sector for White Females, and that opposite second radius to right, the sum of the degrees in the two sectors for Females, White and Colored.

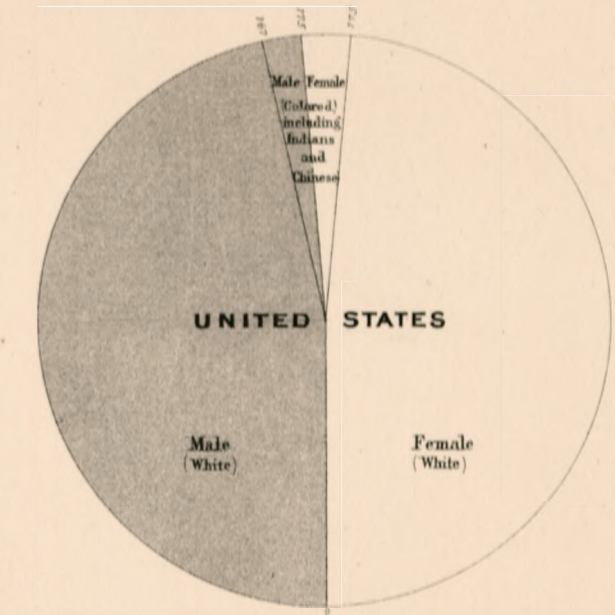
III. Comparative view of the increase in the number of the Deaf Mutes between 1860 and 1870.



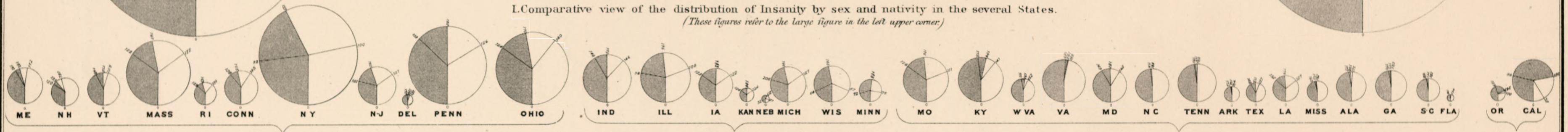
III. Inner circles represent numbers reported at 1860, outer circles, numbers at 1870, the shaded rims, the increase in the interval.

Areas of circles proportional.
Scale: 5350 to the square inch.

CHART SHOWING THE AGGREGATE NUMBER OF INSANE AND THE PROPORTION OF MALES AND FEMALES, WHITE OR COLORED, NATIVE OR FOREIGN. AT THE NINTH CENSUS 1870; also the increase since 1860. PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES by FRED. H. WINES Secy. Illinois State Board of Charities.

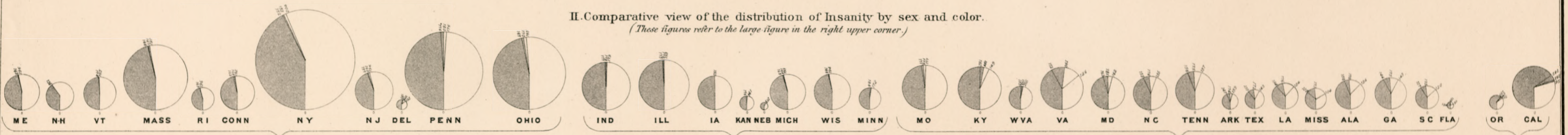


I. Comparative view of the distribution of Insanity by sex and nativity in the several States.
(These figures refer to the large figure in the left upper corner.)



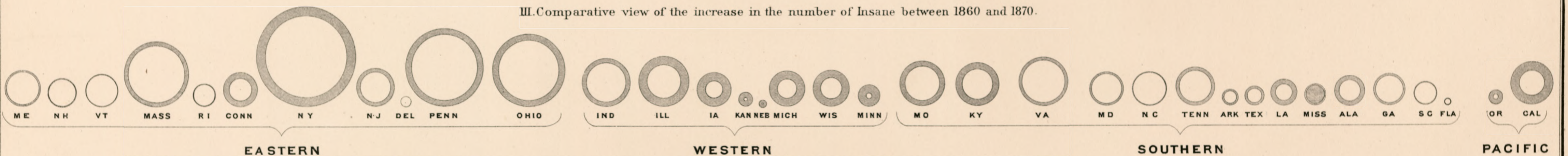
I. N° opposite first radius from Zero to left denotes degrees in sector for Native Males; that opposite second radius to left, the sum of the degrees in the two sectors for Males, Native and Foreign; that opposite first radius to right, degrees in sector for Native Females.

II. Comparative view of the distribution of Insanity by sex and color.
(These figures refer to the large figure in the right upper corner.)



II. N° opposite first radius from Zero to left denotes degrees in sector for White Males; that opposite second radius to left, the sum of the degrees in the two sectors for Males, White and Colored; that opposite first radius to right, degrees in sector for White Females.

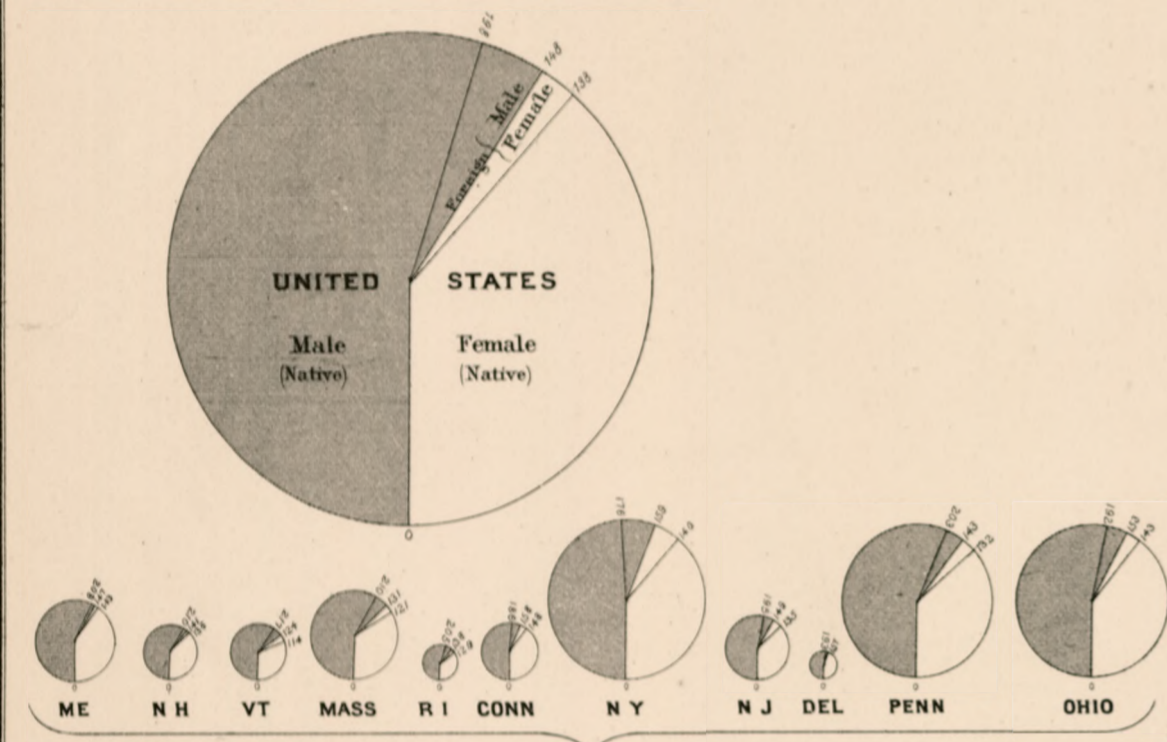
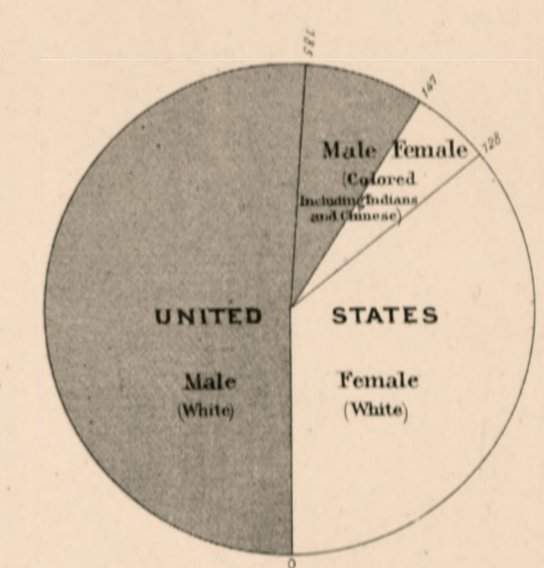
III. Comparative view of the increase in the number of Insane between 1860 and 1870.



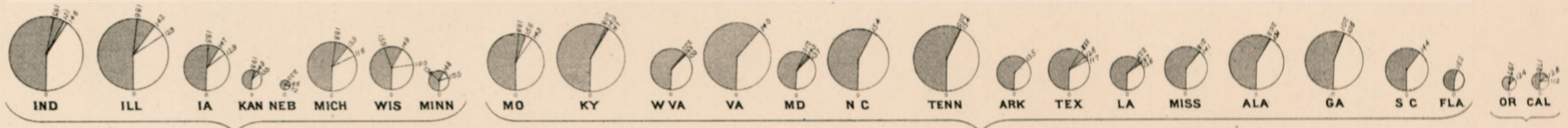
III. Inner circles represent numbers reported at 1860; outer circles, numbers at 1870; the shaded rims, the increase in the interval. In Mississippi the number reported at 1860 exceeds the number at 1870; in this case the inner circle represents 1870, and is shaded; the outer circle represents 1860, and the rim is left unshaded.

Areas of circles proportional.
Scale 1/50 to the square inch

CHART SHOWING THE AGGREGATE NUMBER OF IDIOTS AND THE PROPORTION OF MALES AND FEMALES, WHITE OR COLORED, NATIVE OR FOREIGN AT THE NINTH CENSUS 1870; also the increase since 1860. PREPARED FOR THE STATISTICAL ATLAS OF THE UNITED STATES by FRED. H. WINES Secy. Illinois State Board of Charities.

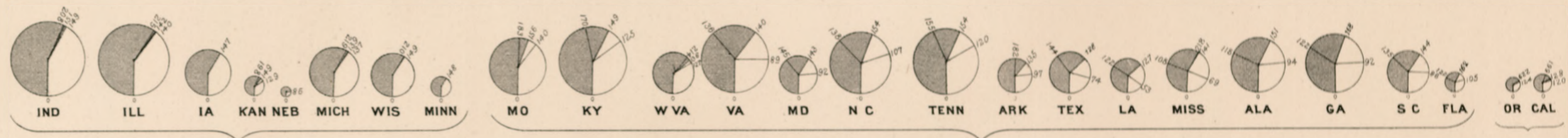
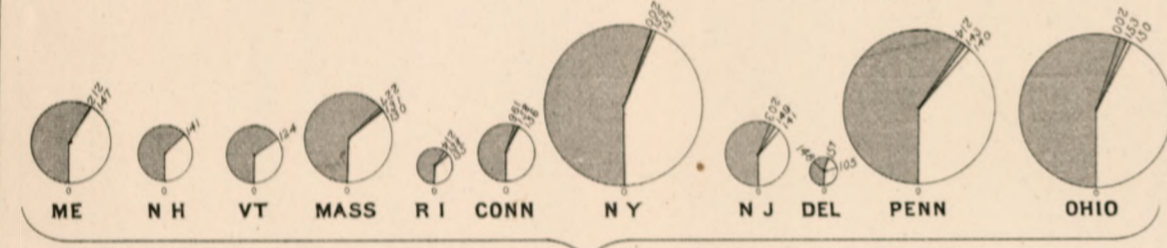


I. Comparative view of the distribution of Idiocy by sex and nativity in the several States.
(These figures refer to the large figure in the left upper corner.)



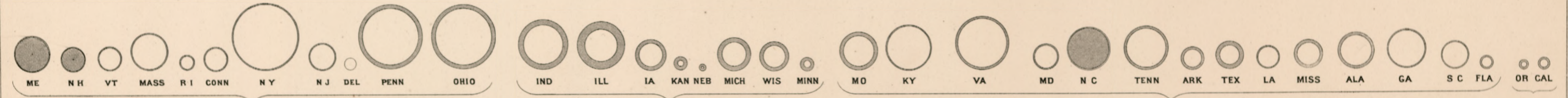
I. N° opposite first radius from Zero to left denotes degrees in sector for Native Males, that opposite first radius to right from Zero, degrees in sector for Native Females, and that opposite second radius to right, the sum of the degrees in the two sectors for Females, Native and Foreign.

II. Comparative view of the distribution of Idiocy by sex and color.
(These figures refer to the large figure in the right upper corner.)



II. N° opposite first radius from Zero to left denotes degrees in sector for White Males, that opposite first radius to right from Zero, degrees in sector for White Females, and that opposite second radius to right, the sum of the degrees in the two sectors for Females, White and Colored.

III. Comparative view of the increase in the number of the Idiocy between 1860 and 1870.



III. Inner circles represent numbers reported at 1860, outer circles, numbers at 1870, the shaded rims, the increase in the interval, in three cases viz Maine, N.H. and N.C. the number reported at 1860 exceeds the number at 1870, in these cases the inner circles represent 1870 and are shaded, the outer circles represent 1860 and the rims are left unshaded.