

INFLUENCE OF THE PHYSICAL FEATURES UPON THE DISTRIBUTION OF POPULATION.

TOPOGRAPHY OF THE COUNTRY.

To explain and illustrate the influence of the physical features of the United States upon the development and distribution of population a series of physical maps, nine in number, has been introduced into this report.

The first of these, forming the frontispiece to the volume, shows, as far as is consistent with the scale adopted, the topographical features of the country, its shore line, river systems, lakes, swamps, valleys, plains, plateaus, and mountains. In further illustration of the relations of the topography to the course of settlement is given the following general description of the surface of the country, which is drawn largely from the admirable sketch prepared by Prof. J. D. Whitney for the *Statistical Atlas* of 1874.

In describing the physical features of a country, we have first to consider its general plan, the skeleton or framework of mountains, to which its plains, valleys, and river systems 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 framework by which the central portion of our continent is embraced. These two systems are the Appalachian ranges and the Cordilleras of North America. These systems are of very different magnitude and extent. Between them stretches a great interior valley, occupied by the Mississippi and the great lakes.

THE CORDILLERAN REGION.

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, South and North America, and forms its dominating and most imposing feature.

From Mexico the system of the Cordilleras enters our territory, 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, and here the continent may be traversed without rising to an elevation of over 4,000 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 in the Cordilleras are universally called, of which the cañon of the Colorado may be taken as the type.

On this plateau, in latitude 35°, is a group of extinct volcanoes, similar to the range which traverses Mexico. These grand volcanic cones, of which San Francisco mountain is the loftiest and the best known, rise to nearly double the altitude of the plateau on which they stand. 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 and plateaus 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 *complexus* of ranges will be, in its maximum, over 1,100 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, or one-third the area of the country. 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 sides 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 on geological grounds.

The Rocky mountains proper form the eastern rim of the Cordilleras. Throughout New Mexico, Colorado, and southern Wyoming their face ranges north and south. The northern part of this system, lying in northern Wyoming and Montana, presents to the plains a northwest and southeast face, similar to that of 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, incloses a high plateau, which, through its center, east and west, has an elevation of from 4,000 to 10,000 feet above sea-level, falling off toward both the north and the south from its central line.

Let us consider it in its great general features. It may be divided into—

- 1st. The section of the Rocky mountains,
- 2d. That of the plateaus,
- 3d. That of the Great Basin, and
- 4th. That of the Pacific.



LEGEND

I	Below 1 per cent
II	1 to 5
III	5 to 10
IV	10 to 20
V	20 to 34
VI	34 and over

NOTE: The absence of color indicates a population of less than 2 to a Square Mile.

MAP OF THE UNITED STATES SHOWING THE PROPORTION OF THE FOREIGN TO THE AGGREGATE POPULATION Compiled from the Returns of Population at the Tenth Census. 1880.

Scale 0 100 200 300 400 500 600 Miles.

Julius Bienlith.

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The country lying east of the first section is a great plain, extending to an undefinable eastern limit, which may be set, however, roughly at the 100th meridian. This plain is not strictly level, but undulating, like the swell of the sea. Most of the stream valleys are shallow depressions, and the divides between them are but slightly marked. These plains rise slowly westward, with an even gradient, to a height of 4,000 to 6,000 feet at the eastern base of the Rocky mountains, being highest in Colorado, decreasing thence northward and southward. They are covered with grasses almost throughout, and form a grazing-ground of almost incalculable capacity.

With the exception of the Missouri and the Yellowstone, none of the streams are of any importance to navigation, and they are of use only for irrigation. The capacity of this region for supporting life is largely dependent upon its rainfall, which will be discussed further on.

THE ROCKY MOUNTAIN REGION.

The Rocky mountains form the eastern member of the Cordilleran system. From the south border of the United States to about latitude 43° their general course is nearly north and south, and from this point northward to the British line it is nearly northwest, thus forming the two eastern sides of the lozenge above spoken of. They consist of a number of ranges, nearly all of which trend parallel to one another—a few degrees east of south and west of north, or roughly parallel to the northeastern side of this region.

In the southern portion the ranges run out one after another into the plains, forming an *echelon* arrangement, thus giving to the system a nearly north and south face.

In Colorado the underlying plateau attains a greater elevation than in any other part of the Cordilleran system, reaching an extreme height in the South Park of 10,000 feet. Here, too, the ranges reach a greater altitude than in any other part of the Rocky mountain system. Numberless peaks rise from 14,000 to 14,500 feet above sea-level. There are few passes in the ranges at a height much below timber line, which is from 11,000 to 12,000 feet. Northward and southward the plateau decreases gradually in height, carrying downward the ranges which stand upon it. Southward through New Mexico the ranges not only decrease in height, but become broken and scattering, while the extent of level plateau country becomes much greater. Toward the north, in southern Wyoming, all the ranges stop abruptly, leaving to represent the Rocky mountain system only a line of plateaus of an elevation of 6,000 to 7,000 feet, stretching from Bridger pass, in the southern part of the territory, northwestward to the South pass, at the south end of the Wind River chain. In this latitude a number of ranges rise abruptly from the plateau, beginning with the Big Horn on the east, then the Wind River range, some of whose peaks are more than 13,000 feet in altitude, and the multitudinous ranges which border the headwaters of the Snake river. From this point, as the system continues onward into Idaho and Montana, the underlying plateau and the ranges also greatly decrease in height, but not in complexity. In the northwestern part of Montana and northern Idaho, indeed, the whole country is a mass of mountain ranges, whose elevation is from 8,000 to 9,000 feet, separated, in most cases, by very narrow valleys, the whole area being densely covered with forests.

THE PLATEAU REGION.

This region may be roughly defined as comprising the drainage-basin of the Colorado river and its tributaries. The upper portions of its tributaries flow, however, in the Rocky mountains and the Wahsatch range, and enter the plateau region lower in their courses. This region lies west of the southern section of the Rocky mountains and east of the Great Basin, and constitutes a great depression or valley in the Cordilleran region of a roughly triangular shape, its apex being in western Wyoming, near the head of the Green river, one of the forks of the Colorado. It is a region of table lands and cañons; of table lands horizontal or nearly so, stretching for many miles with scarcely an undulation in the uniform surface, but suddenly ending abruptly in a line of cliffs, perhaps thousands of feet in height, and extending in an unbroken line for hundreds of miles. In this region every stream is in a gorge, cut hundreds, or even thousands of feet below the surface by the action of water on the soft, stratified sandstones and limestones. Most of this region is uninhabited and uninhabitable, not only by reason of the climate, which forbids agricultural pursuits, but from its almost hopeless impassableness.

Separating this region from the Great Basin is the Wahsatch range, which may be considered as a spur from the Rocky mountains. It is a range of considerable breadth and altitude, extending from northern Utah nearly to the middle latitude of the state, and descending to the general level of the country on the south and east by a series of plateaus, forming a veritable giant's stairway. The elevation of this range in its highest portion is from 10,000 to 11,000 feet, one or two peaks only reaching an altitude of 12,000 feet. Joining this range in the northern part of Utah is that of the Uinta, which differs from nearly all the ranges of the Cordilleran region by having an east and west trend. It forms the southern limit of the Green River basin, the region upon which the fugitive name "*Great American Desert*" has been latest bestowed, and where it is probable it has at last found a final resting-place.

This range far exceeds the Wahsatch in elevation, a number of its peaks extending skyward nearly 14,000 feet, and its broad, plateau-like summit being for a considerable extent at an elevation of 12,000 feet.

THE GREAT BASIN REGION.

Between the Wahsatch and the Sierra Nevada lies a region which has no drainage into either ocean, the only escape for its surplus waters being by evaporation and by absorption into the soil. This Great Basin is of enormous extent, comprising nearly all of Nevada and large parts of Utah, Wyoming, Idaho, Oregon, and California. Instead of being one great basin, as its name implies, it consists in reality of a number of smaller basins. It is traversed by a series of narrow ranges, which are in general highly continuous, extending sometimes for hundreds of miles, having a general north and south trend. Between these ranges lie narrow, flat valleys floored with detritus from the mountains. The rainfall over this region is so light, and the atmosphere so dry, that there are few living streams within its whole expanse. The little rivulets which trickle down the mountain side in the spring are absorbed in the valleys at their bases, so that each valley in very many cases is a sink for its own waters. On the east and the west sides, however, at the bases respectively of the Wahsatch and the Sierra Nevada, is a lake, or a series of lakes, into which flow considerable bodies of water from these ranges.

On the east is Great Salt lake, having an extent of 2,310 square miles, and receiving drainage from an area of 32,400 square miles, the larger part of which consists of high mountains. The rapidity of evaporation in this dry climate is so great that the lake is kept at approximately the same level despite the liberal contributions made to it by its tributary streams.

The middle portion of the basin, along a line running down eastern Nevada, is more elevated than that of the east or the west side, forming a sort of division, or water-parting, between the two portions. Such of the waters as do not immediately sink flow off toward the Great Salt lake on the one side and the sinks at the base of the Sierras on the other. The latter are known as the Carson lake and sink, Humboldt lake, Mud and Pyramid lakes, forming a line along the western part of Nevada.

Into this system of sinks flow not only the streams from the east slope of the Sierras, but the Humboldt river—a stream which rises in northwestern Utah, and, flowing directly across the trends of numberless ranges, receiving more or less water from them all, reaches the Carson sink scarcely larger than at its head.

A third system of sinks may be mentioned, viz, that lying in central Oregon, of which Harney's lake is the principal one.

THE REGION OF THE PACIFIC.

It remains to give a slight sketch of the ranges of the Pacific division. They consist of the Sierra Nevada of California, the Cascade range of Oregon and Washington territory, and the system of Coast ranges which border the Pacific. These ranges have one very marked feature in common; they are almost precisely parallel throughout to the line of the Pacific coast. Trending in the southern half considerably east of south, they turn at about the parallel of 42° to a course almost directly north.

The great mass of the Cascade range has the form of a volcanic plateau of an elevation very little above the country on its eastern border. At intervals along its crest, however, are stationed high volcanic peaks, ranging from 8,000 to more than 14,000 feet above sea-level. Among these may be mentioned Mount Rainier, in Washington territory, 14,444 feet high; Mount Shasta, 14,442 feet high, in California; and Mount Hood, in Oregon, 11,225 feet in height. In northern California, just south of Mount Shasta, the range is very much broken down, and at this point the Pitt river, the head stream of the Sacramento, has cut its way through the range into California. Beyond this gorge again the range continues, with but slight change in its characteristics, until we have passed the head of Feather river, where its character changes from that of a volcanic range to one of granite and gneissic rocks. With this change comes an increase in elevation, at first gradual, but ultimately attaining enormous proportions about latitude $36^{\circ} 30'$. Here the range has a great breadth, while most of the peaks reach elevations of more than 14,000 feet, and the passes have an elevation of about 12,000 feet. In this region is the highest peak of the Sierras, Mount Whitney, which falls but little short of 15,000 feet, and is the culminating point of this group.

West of the Sierras and the Cascades lies the great valley, extending from Puget sound southward into the lower part of California. It is walled in from the Pacific on the west by the Coast ranges. In Washington territory it is drained by numerous minor streams flowing through the Cascade and the Coast ranges into the Columbia river and Puget sound. In Oregon it comprises the valley of the Willamette and the upper valleys of the Rogue and the Umpqua rivers. In California it comprises the valley of the Sacramento and the San Joaquin. These valleys are separated from one another by cross ranges of mountains, which have the character of spurs sent down by the Cascade range, joining the Coast ranges on the west. The great valley is terminated by the westward trend of the Coast ranges and their junction with the Sierra Nevada in southern California.

Of the Coast ranges little need be said, except that they are of minor elevation compared with the eastern part of the system, ranging from 3,000 to 4,000 feet south of the bay of San Francisco to 5,000 or 6,000 feet in the northern part of the state. They have, however, a very important effect in modifying the climate of the great valley—an effect quite as important as that of the Sierra Nevada and the Cascade ranges upon the climate of the region lying to the east of them. Want of navigability is the characteristic of all the streams which drain the Cordilleras. Instead of vast stretches open to steam navigation, as with the Mississippi and its tributaries, allowing

access to areas 2,000 and 3,000 miles away from its mouth, we have the Colorado, which is of little account for the purposes of navigation, the Columbia, with two portages before the Cascade range is crossed, and the Sacramento and the San Joaquin, navigable for moderate-sized boats for only a few scores of miles. With these exceptions there is no stream of any importance opening access to the interior along the whole Pacific coast. On the other hand, the amount of water-power stored in the streams of the West is fabulous. All the streams fall rapidly through nearly their entire courses, and in and near the mountains there is an abundance of water.

THE APPALACHIAN REGION.

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 Appalachian region. In this portion of our brief *résumé* of the physical features of the United States we shall have to rely mainly on the labors of others, and especially on those of Professor Guyot and of Professor J. P. Leslie, of the Pennsylvania geological survey, who have labored with great zeal and ability in making the topography of our eastern border intelligible.

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, the White, and the 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 followed it northward, while in length, north and south, it would extend entirely across our present territory. The breadth of the ocean separating these masses of land would be not far from a thousand miles.

The Appalachian chain extends from the promontory of Gaspé, in a general southwesterly direction, for a distance of about 1,300 miles, into Alabama, where it dies out, and is buried 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 seaboard, which, in the early history of the United States, seemed to be the whole country, and which is still commercially the most important, and is the seat of our largest cities. The plain is slightly inclined toward the Atlantic, and its elevation above the sea is inconsiderable. In New England it hardly exceeds 300 to 400 feet; but toward 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 at the base of the mountains and a breadth of some 200 miles. The western base of the Appalachian range is a plateau region, which descends gradually toward the great lakes and the tributaries of the Ohio, having a general elevation of a thousand feet or more, but deeply gashed by the streams which traverse it and 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. Professor Guyot calls attention to a conspicuous feature of the most folded portion of the Appalachians, characterizing the chain through its entire length; that 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 Kittatiny valley of Pennsylvania, the great valley of Virginia, and finally, still farther south, the valley of east Tennessee. The chain, or the 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 Appalachian chain 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 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, there 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 toward the northwest.

The most northern division of the three is quite distinct from the one next south, both geographically and geologically. It includes all the mountain groups and ranges north and east of the valleys of the Mohawk and the Hudson rivers, which make a complete break through the system, both vertically and longitudinally, forming the

great natural highway between the east and the west, or between the great lakes and the Atlantic seaboard. This was the first route across the country which was traversed by canal and by 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.

In any geographical treatment of this eastern group of the Appalachians the subdivisions taken will necessarily be rather artificial, for the mass of elevation is very irregular in its development. The most continuous ranges are the White mountains, the Green mountains, and the Adirondacks. Of the first-named group Mount Washington is the culminating point, 6,288 feet high; of the last mentioned, Tahawas, or Mount Marcy, 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 is about 450 miles in length. It is very narrow toward 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, which rarely rises 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 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 of 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 in Pennsylvania, stretches from the Delaware to Maryland, forming a part of the great central valley previously mentioned. It has an elevation of from 200 to 600 feet, and forms a broad, moderately undulating plain, having a width of from 10 to 18 miles. This valley is, beyond doubt, one of the most favored parts of our country, climate, soil, mineral resources, and scenery all combining to make it attractive to settlers.

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 extremely 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 the 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 inclose 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 inclosing 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 passways 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 the 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 rivers 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 further. 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 toward 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 seaboard, 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. The 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 60 miles, and has here a mean height of not more than about 1,000 feet, which is only one-half that of valleys in the high mountain region to the eastward, 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 30 or 40 miles wide, which stretches along between the Cumberland and the Tennessee rivers.

According to Professor Charles H. Hitchcock, the Appalachian system may be divided longitudinally into two great divisions, that of the older metamorphic rocks, and that of more recent formations.

These present marked features to the eye, showing at once a difference in their geological character. The former group occupies, in general, the southeastern part of the system, and is developed to the greatest extent at the northern and southern extremities. Northeast of Pennsylvania it includes practically the whole system, showing its characteristic forms in the Adirondack, the Green, and the White mountains, and in the highlands of Maine.

In Pennsylvania it nearly disappears, being represented only by minor ridges in the southeastern portion of the state, while the other division proportionally increases, comprising nearly the whole complex system of ridges which traverses the state from northeast to southwest, as well as the plateau of western Pennsylvania and southwestern New York.

In Virginia the metamorphic portion of the range is confined to the Blue Ridge, all the balance of the mountain belt being of more recent formations. Farther southward the metamorphic portion broadens, so that in North Carolina, Tennessee, Georgia, and Alabama it comprises all of the mountain region east of the Tennessee river, the metamorphic part of the system being confined to the Cumberland plateau and the outlying ridges in Tennessee and Kentucky. In form these two portions of the range differ markedly; the mountainous metamorphic parts are much less uniform in character, being more cut up into peaks, and the ranges are less continuous.

The more recent portion of the system is made up entirely of small ranges or ridges parallel to one another, extending sometimes for many scores of miles with perfectly uniform summits and unbroken slopes.

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 ridge 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 point 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, Mount St. Anne is the highest, and the elevation 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 on its highest portion, almost exclusively with coniferous trees. 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. Sir William Logan noted in 1863 that over a thousand lakes have already been laid down on the maps of the Canadian portion of the Laurentian mountains, although the region had been as yet only imperfectly explored.

THE GREAT INTERIOR VALLEY.

We have thus rapidly sketched the most striking features of the great ranges of mountains which form the framework of our territory, and have now to say something of the interior regions thus inclosed. The most noticeable facts in regard to this vast area are its slight elevation above 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 Mississippi, we are 1,100 miles from the Gulf, and yet only about 300 feet above the sea-level. At Pittsburgh, the head of the Ohio river proper, we have attained an elevation of only 699 feet. Going in the opposite direction, or following up the tributaries of the Mississippi and of the Missouri, which come in from the west, we have a similar condition of things. One may travel up the Platte or the Kansas for hundreds of miles, rising so gradually and so 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 5 feet to the mile. From St. Paul, which is only 700 feet above the sea, 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 2 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 for their uniformity of elevation above sea-level, and the consequent facilities which they afford for commercial intercourse.

Their combined area is a little more than 90,000 square miles, lake Superior having over 30,000, and lakes 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 the last-named being only about 16 feet, while Superior is only 20 feet higher than Michigan, or 36 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 waters which formerly flowed into that lake to run toward the Gulf of Mexico. Lake Ontario is, indeed, 323 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, no rival in the world.

The level and fertile region of the Mississippi valley is prolonged toward 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.

THE ATLANTIC PLAIN.

East of the Appalachian system, and separating it from the Atlantic, is the strip of country known as the Atlantic plain. This is the portion of the United States first occupied, and it is to-day the most densely-settled portion of the country. In New England this region has a widely varying breadth and rough, irregular surface, while its soil in general is not sufficiently rich to enable the farmers of this region to compete successfully in the production of wheat or corn with those of the Mississippi valley.

The breadth of the Atlantic plain is least about the bay of New York, the ranges of the Appalachian system here reaching nearly to the sea-coast. Southward from this point it increases gradually in breadth, till it reaches its maximum in South Carolina and Georgia. This part, which comprises by far the larger portion of the Atlantic plain, has a very uniform, gentle slope from the foot of the mountains to the sea. The only feature about it which requires notice is the line of separation between the metamorphic formations, extending eastward from the Appalachians, and the recent stratified beds. This line is marked very generally by falls or rapids in the streams

flowing seaward, which are in very many cases the sites of valuable water-powers, and mark the head of navigation in all streams of any considerable size, as in the Potomac at Georgetown, and in the James at Richmond.

The general character of the coast-line may be briefly described. In Maine it is bluff and rocky, with deep water immediately off the shore, which is deeply indented by numerous bays and arms of the sea. These in turn are dotted by hundreds of islands of greater or less size. Proceeding southward, the character of the coast gradually changes from this bluff, rocky nature at first to sandy beaches, as in Massachusetts and on Long Island, with small extents of coast swamp. This character develops farther in New Jersey, so that we have along the whole coast a line of sandy islands or reefs, back of which are coast marshes and swamps. The general character of these is briefly described by Professor Cook in his volume on the geology of New Jersey under the head of "Tide Marshes":

They are of very recent origin, and, in fact, are formed largely within the memory of the present generation. The interval between high-water mark on the shore and the beaches or barriers on the sea-side is mainly occupied by marsh. There are between 250,000 and 300,000 acres of marsh on the coast of New Jersey. The marshes are covered with grass, weeds, or coarse sedge; there is no growth of wood upon them; the upper surface is near the level of high water, the parts near the water-course being high enough not to be covered by ordinary tides, while the parts more remote from the water-course are lower, so as to be always wet. Underneath, the sod which covers them is made of soft earth of various qualities; the depth of this underlying mud is variable; all, however, coming within the extreme depth of 40 feet.

Farther southward the breadth of this swamp section along the coast increases. On the eastern shore of Maryland there is inside of the line of reefs a section, several miles in breadth, of swamp and overflowed land—a paradise for sea-fowl and for the hunter.

In North Carolina the reefs inclose, besides immense swamp regions, large bays or sounds, such as Pamlico and Albemarle. The character of the swamps and reefs of this state is well given by Professor W. C. Kerr (*Geology of North Carolina*, vol. 1, 1875):

The chain of long, linear sand islands called "The Banks", which fringe the entire coast, constitutes a very remarkable feature of the region. Though composed of drifting sands, they form an impregnable barrier to the waves of the Atlantic. They are, in fact, sand dunes of various elevations, from a few feet above tide-level (in many cases broken over by storm tides) to 25 or 30 feet, and sometimes more, as in Killdevil hills, along Currituck sound. The breadth of these islands varies from a few rods to more than 2 miles. The largest of them, and the widest, is known as Hatteras island, the easternmost point of which is the well-known cape Hatteras. These islands are composed partly of flat marshes and partly of swells and ridges of beach-sand, which the wind has heaped in ridges, often far beyond the reach of the highest waves.

As the sand and comminuted shells are rolled back in waves from the beach by the winds, they are in part caught and fixed by straggling tufts of coarse grass, which has the power of continuous growth upward with the rise of the knobs and ridges of sand, and they are in part carried over into the flats and marshes and the shallow sounds beyond, which are thus gradually silting up. The banks are generally covered with low, scrubby thickets of cedar, live-oak, pine, yaupon, myrtle, and a number of smaller shrubby growths.

Swamps, pocosins, and savannas.—There is a large aggregate of territory (between 3,000 and 4,000 square miles), mostly in the counties bordering on the sea and the sounds, known as swamp-lands. They are locally designated "dismals", or "pocosins", of which the Great Dismal swamp, on the borders of North Carolina and Virginia, is a good type. They differ essentially in their characteristic features from an ordinary swamp. They are not alluvial tracts or subject to overflow. On the contrary, they occur on the divides or water-sheds between the rivers and sounds, and are frequently elevated many feet above the adjacent streams, of which they are the sources. Some of them are in large part mere peat swamps or bogs, being characterized by the occurrence of an accumulation of decayed and decaying vegetation, from 1 or 2 to 10 feet deep and even more, which, with the growing plants, acts as a sponge, arresting or retarding the escape of the rain-water, whether by evaporation or efflux. The prominent ingredients are peat and fine sand, in various proportions, and, when of any agricultural value at all, there are also small proportions of clay, iron, lime, and alkalis. The vegetation varies with the character of the soil, and serves, therefore, as an index of its fertility. The prevalent growth of the best swamp soils is black gum, poplar, cypress, ash, and maple. As the soil becomes more peaty, the proportion of cypress increases. Where juniper abounds peat is in excess, and the soil of little value or none. On the best lands there is often besides a rank growth of canes; but such a growth is also often found on soils too peaty to be of any value. Much of the poorest and most worthless tracts of swamp, which are covered with several feet of half-decayed wood and other vegetable matter saturated with water, is occupied by a stunted and scattered growth of bay, swamp pine, and other scrubby vegetation; or, if the drainage be a little better, with a thickety growth of bays, gallberries, and a few other shrubs, with an occasional pine and maple. Most of the large bodies of swamp contain lands belonging to all these descriptions, and inclose, besides, within their boundaries, knolls, hummocks, belts, and ridges, like islands, of firm land, and some of them large areas of barren sandy soil, covered with a tangle of brambles and tufts of sedge, and in the middle of several of them occur fresh-water lakes of considerable extent.

These swamps are, taken as a whole, quite well settled, a large proportion of the inhabitants being colored. This is particularly the case in South Carolina, in which state much of the swampy lower coast region is utilized for rice plantations. The Okefenokee swamp, of Georgia and Florida, is rather an inland swamp, and is described elsewhere. The Everglades of Florida, which appear to offer great difficulties to settlement, are also sketched in another part of this report. The swampy region along the coast extends, with but few minor interruptions, all the way down the Atlantic coast and around the Gulf. It is not, however, so markedly characteristic along the Gulf coast in Alabama and Mississippi as farther west. In Louisiana it has a great breadth, and is almost uninhabitable. In Texas, although the character of the coast continues to be the same, so far as relates to the line of low, sandy, outlying islands, yet the area of the coast swamp becomes very much less, being confined to a small patch about the Sabine lake and narrow strips along a number of the streams. Whether it is due to geological causes or to the lighter rainfall upon this section of the coast is a question which there is not space to discuss here.

The broken, irregular course of the whole Atlantic and Gulf coast affords many excellent harbors, particularly on the New England coast, where the harbors are large, deep, and well sheltered; farther southward the entrances

are narrow and shelving, and are liable to be choked up by sand drifted in by storms. The streams in nearly all cases form bars across their mouths, formed by the detritus brought down from the upper waters.

The Pacific coast, as compared to the Atlantic, is extremely simple. It contains few harbors of any value to navigation. Those of San Diego and San Francisco are the principal and almost the only ones. The coast is in general bluff and rocky, and the water is deep immediately off shore.

DISTRIBUTION OF THE POPULATION IN ACCORDANCE WITH TOPOGRAPHICAL FEATURES.

A general view, then, of the topographical features of the United States shows us four great divisions, which differ from one another materially, not only in the character of the surface, but also, to a greater or less degree, as will hereafter be shown, in climate, in elevation above sea-level, in density of settlement, in the occupations of the inhabitants, and in agricultural production. These great divisions are the Atlantic plain, the Appalachian region, the great interior valley, and the Cordilleran region.

We find the population of these different regions, both as to its aggregate and as to its different elements, very dissimilar, as will appear from the following table:

TABLE XXVIII.

	Percentage of total population.	Percentage of foreign population.	Percentage of colored population.
Cordilleran region	3.28	7.24	2.26
Appalachian region.....	13.38	8.40	7.22
Interior valley.....	53.50	51.02	50.02
Atlantic plain	20.84	32.74	40.50

From the above table it appears that nearly one-third of the population of the country is on the Atlantic plain, more than one-half in the interior valley, while more than three-fourths of the remainder is found in the Appalachian region. The Cordilleran region contains only a little more than 3 per cent. of the total population.

Of the foreign population, we note on the Atlantic plain a decided excess proportionally, in the interior valley a slight diminution from the average, while the Cordilleran region contains more than twice, and the Appalachian region but little more than one-half, its proportion of foreigners. The column relating to the colored population shows an immense excess on the Atlantic plain, being one-third more than its due proportion, while the Appalachian region contains but little more than one-half. The proportion of colored in the interior valley is a little less than the normal ratio, and in the Cordilleran region about two-thirds of that ratio. It may be noted here that even the small proportion of colored in the Cordilleran region consists, not of negro blood, but of Indians and Chinese, who are in this table included in the general term "colored".

These general sections may be subdivided according to certain physical characteristics, as expressed in the following table:

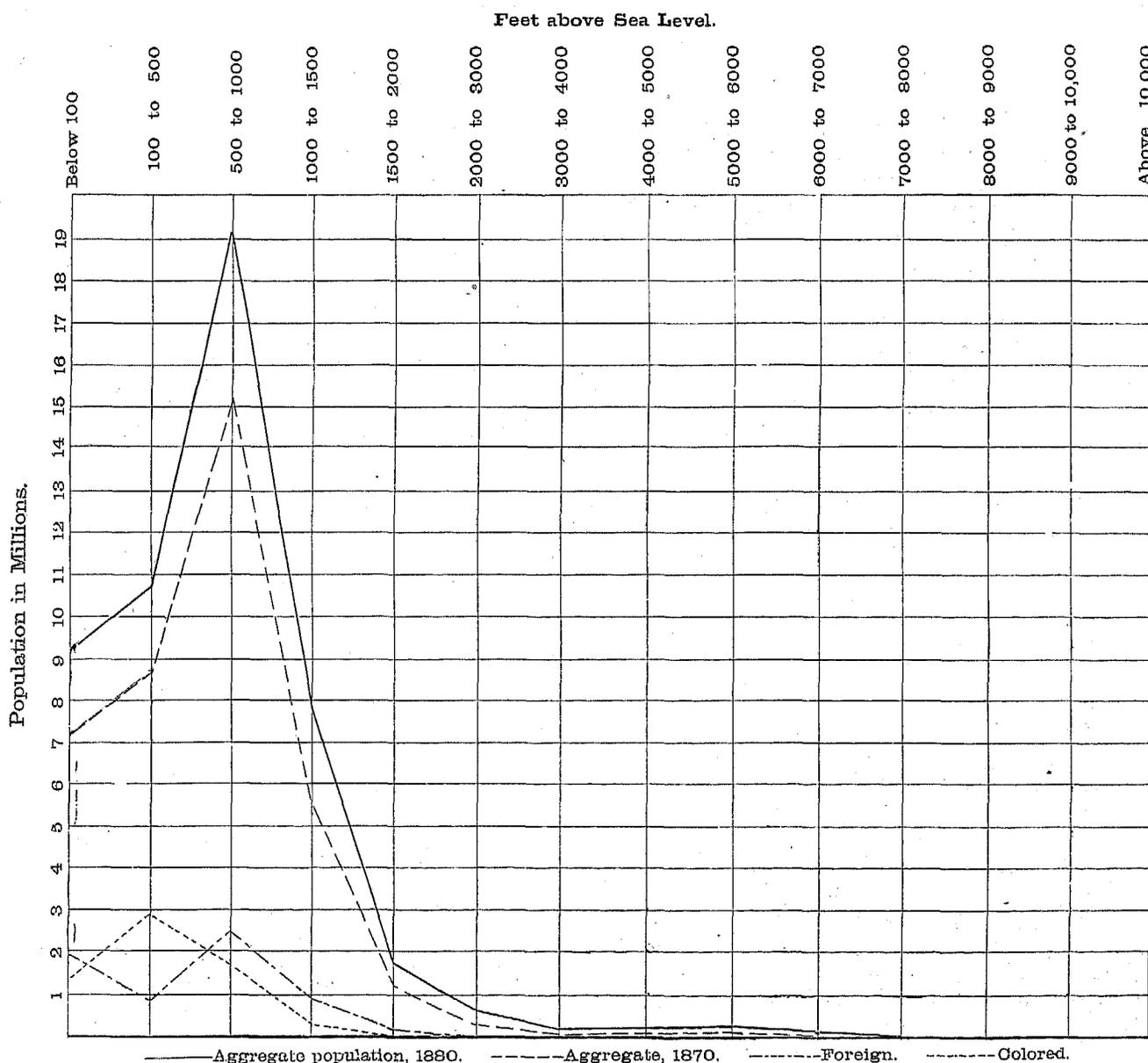
TABLE XXIX.—POPULATION DISTRIBUTED IN ACCORDANCE WITH TOPOGRAPHICAL FEATURES.

Region.	Total.	Percentage of total population.	Foreign.	Percentage of total foreign.	Percentage of foreign to total in this group.	Colored.	Percentage of total colored.	Percentage of colored to total in this group.
Total	50,155,783	100.0	6,679,943	100.00	6,580,793
North Atlantic coast.....	2,616,882	5.2	560,110	8.38	21.40	29,842	0.45	1.14
Middle Atlantic coast.....	4,375,194	8.7	1,009,029	15.11	23.06	517,207	7.86	11.82
South Atlantic coast.....	875,387	1.7	10,063	0.15	1.15	485,430	7.38	55.45
Gulf coast	1,035,851	2.1	91,881	1.33	8.70	448,090	6.81	42.44
Northeast Appalachian region	1,660,226	3.3	278,844	4.17	16.70	10,792	0.16	0.64
Central Appalachian region	2,344,223	4.7	264,066	3.95	11.27	44,474	0.68	1.90
Region of the great lakes.....	3,049,470	6.1	932,345	13.96	30.57	23,064	0.35	0.70
Interior plateau.....	5,716,326	11.4	660,318	9.80	11.55	722,129	10.98	12.63
Southern Appalachian region	2,695,085	5.4	18,449	0.28	0.68	432,318	6.57	16.04
Ohio valley	2,442,792	4.9	243,040	3.65	9.97	138,299	2.10	5.66
Southern interior plateau.....	3,627,478	7.2	15,276	0.23	0.42	1,973,073	20.99	54.30
Mississippi river belt, south	710,268	1.4	12,511	0.19	1.76	458,004	6.96	64.48
Mississippi river belt, north	1,991,362	4.0	442,207	6.62	22.21	78,052	1.19	3.92
Southwest central region	2,932,807	5.8	109,693	1.63	3.74	637,816	9.69	21.75
Central region	4,401,240	8.8	239,905	3.58	5.45	410,880	6.24	9.34
Prairie region	5,722,485	11.4	929,081	13.92	16.24	80,533	1.22	1.41
Missouri river belt	835,445	1.7	106,627	1.60	12.76	63,404	0.96	7.59
Western plains	323,819	0.7	48,163	0.72	14.87	6,219	0.09	1.92
Heavily timbered region of the Northwest	1,122,337	2.2	234,392	3.36	19.99	11,173	0.17	1.09
Cordilleran region	932,311	1.9	255,927	3.83	27.45	6,471	0.10	0.60
Pacific coast	715,789	1.4	227,396	3.40	31.77	3,514	0.05	0.40

In the foregoing table we find the foreign population generally in excess of its normal proportion throughout the northern half of the country, both on the Atlantic plain and in the great valley, while it falls far short of its normal proportion in the southern half of the country. The case is almost precisely reversed with the colored population. The proportion is very small in the northern groups, while in the southern groups, and especially in those along the Atlantic and Gulf coasts, the proportion is very greatly in excess of the ratio throughout the country at large. For instance, the foreign is found largely in excess on the north and middle Atlantic coast, in the northeast and central Appalachian region, and on the interior plateau. The most marked cases of excess of proportion of foreign population, it will be noted, are on the Pacific coast, in the region of the great lakes, in the Cordilleran region, in the northern portion of the Mississippi river belt, in the heavily timbered region of the northwestern states, and upon the north and middle Atlantic coasts; while in the south Atlantic states, the southern Appalachian region, or southern interior plateau, in the Mississippi river belt south, the proportion is very small indeed, being in every case much less than 1 per cent. of the population in the group, while the proportion of foreign to total population throughout the country as a whole is about 13 per cent. With regard to the colored element, we find a great disproportion in excess in the Mississippi river belt south, on the south Atlantic and Gulf coasts, and on the southern end of the interior plateau. The first three of these consist of low land, more or less marshy, possessing a hot, moist climate and a heavy rainfall. For these conditions of surface and climate the negro is admirably fitted.

On the other hand, we find in the northern regions of the country, and in the higher country everywhere, a corresponding scarcity of the colored element. On the Atlantic coast, in the northern and central Appalachian region, and in that of the great lakes and the adjacent heavily timbered country, the proportion of colored is very small.

DISTRIBUTION OF POPULATION IN ELEVATION ABOVE SEA-LEVEL.



The following table is sufficiently explained by its headings. It is to be regarded as only approximate, as the curves of elevation above sea-level cannot be constructed with accuracy in the present state of our knowledge of the relief of the country, and as, in cases of the subdivision of counties by contour lines, it is not possible to divide the population with accuracy.

TABLE XXX.—SHOWING THE DISTRIBUTION OF THE POPULATION IN ELEVATION ABOVE SEA-LEVEL.

Height above sea-level.	Approximate areas, in square miles.	Population.		Population per square mile.		Increase in density, 1870-1880.	Percentage of total population.		Change in percentage of total population, 1870-1880.	Population below each curve.		Percentage of total population below each curve.		Change in percentage of total population below each curve, 1870-1880.
		1870.	1880.	1870.	1880.		1870.	1880.		1870.	1880.	1870.	1880.	
<i>Feet.</i> 0- 100	181,000	7,233,550	9,152,296	39.0	50.5	10.6	18.76	18.25	-0.51	7,233,550	9,152,296	18.76	18.25	-0.51
100- 500	410,000	8,653,603	10,776,284	21.1	26.3	5.2	22.44	21.48	-0.96	15,887,153	19,928,580	41.20	39.73	-1.47
500- 1,000	554,309	15,127,227	19,024,320	27.3	36.7	9.4	39.23	37.93	-1.30	21,014,380	38,952,900	80.43	77.60	-2.77
1,000- 1,500	367,409	5,620,161	7,904,780	15.3	22.4	7.1	14.58	15.76	+1.18	36,634,481	46,857,680	95.01	93.42	-1.59
1,500- 2,000	189,009	1,191,293	1,878,715	6.1	11.1	5.0	3.09	3.75	+0.66	37,825,774	48,736,395	98.10	97.17	-0.93
2,000- 3,000	293,509	360,059	664,923	1.2	2.3	1.1	0.93	1.33	+0.40	38,185,833	49,401,318	99.03	98.50	-0.53
3,000- 4,000	234,000	79,349	128,544	0.3	0.6	0.3	0.21	0.26	+0.05	38,265,182	49,529,862	99.24	98.70	-0.48
4,000- 5,000	282,469	84,319	167,236	0.3	0.6	0.3	0.22	0.33	+0.11	38,349,501	49,697,098	99.46	99.00	-0.37
5,000- 6,000	200,000	135,483	271,317	0.7	1.4	0.7	0.35	0.54	+0.19	38,484,984	49,968,415	99.81	99.03	-0.18
6,000- 7,000	153,000	58,466	94,443	0.4	0.6	0.2	0.15	0.10	+0.04	38,543,450	50,062,858	99.96	99.82	-0.14
7,000- 8,000	78,000	6,304	15,054	0.1	0.2	0.1	0.02	0.03	+0.01	38,549,754	50,077,912	99.98	99.85	-0.13
8,000- 9,000	43,000	7,390	24,947	0.2	0.6	0.4	0.02	0.05	+0.03	38,557,144	50,102,859	100.00	99.90	-0.10
9,000-10,000	24,000	705	26,846	0.0	1.1	1.1	0.00	0.05	+0.05	38,557,849	50,129,705	100.00	99.95	-0.05
Above 10,000	25,000	522	26,078	0.0	1.0	1.0	0.00	0.05	+0.05	38,558,371	50,155,783	100.00	100.00	0.00

It will be noticed that nearly one-fifth of the inhabitants live below 100 feet, *i. e.*, along the immediate seaboard and in the swampy and alluvial regions of the south; more than two-fifths below 500 feet; more than three-fourths below 1,000 feet; while 97 per cent. live below 2,000 feet.

In the area below 500 feet is included nearly all that part of the population which is engaged in manufacturing and in the foreign commerce of the country, and most of that engaged in the culture of cotton, rice, and sugar.

The interval between the 500 and 1,500 foot contours comprises the greater part of the prairie states and the grain-producing states of the Northwest.

East of the 98th meridian the contour of 1,500 feet is practically the upper limit of population, all the country lying above that elevation being mountainous.

The population between 2,000 and 5,000 feet is found mainly on the slope of the great western plains. In this region the belt between 2,000 and 3,000 feet is almost everywhere the debatable ground between the arid region of the Cordilleran plateau and the humid region of the Mississippi valley. Above 3,000 feet irrigation is almost universally necessary for success in agricultural operations.

Between 4,000 and 5,000 feet, and more markedly between 5,000 and 6,000 feet, it will be noticed that the population is decidedly in excess of the grade or grades below it. This is mainly due to the fact that the densest settlement at high altitudes in the Cordilleran region is at the eastern base of the Rocky mountains and in the valleys about the Great Salt lake, which regions lie between 4,000 and 6,000 feet. Of these the extensive settlements at the base of the mountains in Colorado are mainly between 5,000 and 6,000 feet.

Above 6,000 feet the population, which is confined, of course, to the Cordilleran region, is almost entirely engaged in the pursuit of mining, and the greater part of it is located in Colorado, New Mexico, Nevada, and California.

Examining the increase in population in the several divisions during the past decade, there will be noticed a decided increase in the lowest grade, due to the increase in our seaboard towns and cities; also a gain, though not as decided, in the grade of 100 to 500 feet, with a more marked increase between 500 and 1,000 feet.

Between 1,000 and 2,000 feet the increase has been nearly 50 per cent. In this grade the effect of immigration in new and previously unsettled regions appears, as in parts of Texas, Kansas, Nebraska, Dakota, and Minnesota.

Above 2,000 feet the increase, though small numerically, is proportionally very great. Between 4,000 and 6,000 feet it is more than 100 per cent., due mainly to the newly-awakened interest in mining. To this cause may also be largely attributed the increase in population in the higher altitudes.

A computation, based upon the facts here submitted, shows that the mean elevation of the population above the sea is about 700 feet.

The mean elevation of the surface of the United States has been estimated at 2,600 feet.

The following table exhibits the distribution of the foreign and the colored elements of the population in elevation above sea-level:



LEGEND.

- Sea level to 100 feet
- 100 - 500
- 500 - 1000
- 1000 - 1500
- 1500 - 2000
- 2000 - 3000
- 3000 - 4000
- 4000 - 6000
- 6000 - 10,000
- above 10,000

NOTE: Areas below Sea Level are too small to be represented properly

HYPOMETRIC SKETCH
OF THE
UNITED STATES
Prepared to illustrate the corresponding distribution of the population
at the date of the Tenth Census
HENRY GANNETT E.M.
1880.



TABLE XXXI.

Feet.	Foreign.	Percentage of total foreign.	Proportion of foreign to total in group.	Colored.	Percentage of total colored.	Proportion of colored to total in group.
Below 100	1,891,247	28.31	20.66	1,466,233	22.28	16.02
100- 500	942,196	14.10	8.74	2,958,864	44.95	27.45
500- 1,000	2,469,816	36.97	12.98	1,704,158	25.90	8.96
1,000- 1,500	934,178	13.08	11.82	354,013	5.38	4.48
1,500- 2,000	183,850	2.78	9.80	59,556	0.90	3.17
2,000- 3,000	94,218	1.41	14.17	24,983	0.38	3.76
3,000- 4,000	15,357	0.23	11.96	8,172	0.12	0.36
4,000- 5,000	49,932	0.75	29.86	1,314	0.02	0.79
5,000- 6,000	55,159	0.83	20.33	1,676	0.03	0.62
6,000- 7,000	19,112	0.29	20.24	729	0.01	0.77
7,000- 8,000	2,423	0.04	16.10			
8,000- 9,000	6,792	0.10	27.23	454	0.01	1.82
9,000-10,000	5,775	0.09	21.51	311	0.01	1.16
Above 10,000	7,888	0.12	30.25	330	0.01	1.27
	6,679,943	100.00		6,580,793	100.00	

There is to be noted in the above table not only the general distribution of foreign and colored numerically, but the ratio of their number in each hypsometric group to that of the total population. In regard to the foreign population, it appears that its grouping hypsometrically corresponds to that of the total population to a far greater extent than is the case with the colored population.

DISTRIBUTION OF POPULATION BY DRAINAGE BASINS.

Table XXXII shows, first, the approximate areas, in square miles, of the drainage basins of the different sections of the coast and of the principal rivers of the country; second, the total number of inhabitants within those drainage basins, according to the census of 1870; third, the number of inhabitants per square mile in each subdivision; fourth, the population of 1880; fifth, the corresponding density of population.

The drainage areas are classified primarily by the two oceans and the Great Basin; second, by sections of the coast; third, by the principal rivers, the rivers of each section of the coast being arranged under that section, and those of branches of a river being placed under the main river.

The primary divisions are set at the margin of the page. Under each primary division its secondary divisions are placed, being indented one space. Under each of these secondary divisions the tertiary divisions are placed, and so on, the subdivisions of a drainage basin being in every case indented within that of the stream comprising them. The New England coast comprises the area and population of the basins of the several rivers given beneath it, and, in addition to these, the area and population of the minor streams, and of the immediate coast from the eastern border of Maine to the Hudson river.

The Middle Atlantic coast comprises, beside the basins of the rivers under it, in like manner the basins of the minor streams and of the coast itself as far as the mouth of the Potomac, including this stream.

The South Atlantic coast, in like manner, comprises the country from the Potomac southward to Florida.

The Gulf of Mexico, commencing with the peninsula of Florida, embraces the coast and the whole Mississippi valley to the mouth of the Rio Grande, including the latter stream.

The populations of the various subdivisions were obtained by using the county as a unit, subdividing the counties into tenths in cases where they lie partly in one basin and partly in another. Of course, in making these divisions of counties, population, and not area, was considered.

The areas of the different river basins were measured approximately from maps, and were finally adjusted to suit a total area of the United States (which had been determined with great care) of 3,025,600 square miles, exclusive of Alaska.

The table shows that, of the total population of the United States in 1880, 97.14 per cent. live on the Atlantic slope, 0.45 per cent. in the Great Basin, and 2.41 per cent. on the Pacific slope.

Of those living on the Atlantic slope, the following proportions are in the various sections :

	Per cent.
New England coast	7.5
Middle Atlantic coast	18.4
South Atlantic coast	8.2
Great lakes	11.3
Gulf of Mexico (exclusive of Mississippi river)	8.2
Mississippi river	43.5
Total	97.1

TABLE XXXII.—DISTRIBUTION OF POPULATION BY DRAINAGE BASINS.

Drainage basins.	Approximate area square miles.	Population, 1870.	Population per square mile, 1870.	Population, 1880.	Population per square mile, 1880.
ATLANTIC OCEAN	2, 178, 210	37, 716, 183	17.3	48, 717, 293	22.4
NEW ENGLAND COAST	61, 830	3, 265, 126	52.8	3, 788, 334	61.2
St. John's river	7, 800	31, 550	3.9	42, 250	5.3
Penobscot river	8, 934	115, 444	12.9	111, 318	12.4
Kennebec river	11, 415	190, 688	16.7	198, 197	17.3
Merrimac river	4, 864	393, 693	80.9	450, 704	92.6
Connecticut river	11, 269	570, 537	50.6	637, 175	56.5
Housatonic river	1, 674	116, 531	69.6	130, 777	78.1
MIDDLE ATLANTIC COAST	83, 020	7, 705, 798	92.8	9, 240, 897	111.3
Hudson river	13, 248	1, 963, 775	148.2	2, 280, 359	172.1
Delaware river	11, 362	1, 094, 024	149.1	1, 999, 021	176.0
Susquehanna river	27, 655	1, 458, 777	52.3	1, 715, 009	62.0
Potomac river	14, 479	659, 989	45.5	778, 090	53.7
SOUTH ATLANTIC COAST	132, 040	3, 129, 800	23.7	4, 114, 563	31.2
James river	9, 634	306, 140	31.6	371, 030	38.3
Cape Fear river	8, 310	189, 009	22.7	236, 111	28.4
Neuse river	5, 209	173, 850	32.8	225, 446	42.5
Pedee river	17, 098	360, 028	21.0	494, 393	28.9
Roanoke river	9, 237	306, 417	33.1	402, 882	43.0
Santee river	14, 696	381, 337	25.9	516, 073	35.1
Savannah river	11, 402	278, 352	24.4	389, 281	34.1
Altamaha river	14, 109	307, 772	21.8	412, 235	29.2
GREAT LAKES	175, 340	4, 396, 359	25.1	5, 084, 147	32.4
St. Lawrence river	13, 636	431, 319	31.6	441, 142	32.3
Lake Ontario	12, 378	892, 266	72.1	968, 289	78.3
Lake Erie	17, 207	1, 224, 963	71.1	1, 542, 754	89.6
Lake Huron	18, 839	415, 202	22.0	611, 611	32.4
Lake Michigan	45, 876	1, 393, 016	30.3	1, 990, 186	43.3
Lake Superior	17, 830	35, 714	2.0	55, 701	3.1
Red river of the North	48, 204	3, 879	0.1	74, 404	1.6
GULF OF MEXICO	1, 725, 980	19, 219, 100	11.1	25, 881, 117	14.9
Peninsula of Florida	48, 900	115, 930	2.3	167, 583	3.4
Apalachicola river	18, 918	400, 719	21.1	496, 390	26.2
Mobile river	43, 436	923, 850	21.2	1, 190, 585	27.4
Tombigbee river	18, 896	373, 397	19.7	436, 019	23.0
Alabama river	23, 820	539, 000	22.6	694, 002	29.1
Pascagoula river	8, 980	70, 197	7.8	102, 306	11.3
Pearl river	8, 964	121, 672	13.5	160, 405	17.8
Sabine river	20, 440	158, 576	7.7	236, 045	11.5
Trinity river	17, 960	126, 033	7.0	304, 844	16.9
Brazos river	69, 646	174, 406	2.9	372, 214	6.2
Colorado river of Texas	41, 220	65, 865	1.5	143, 161	3.0
Nueces river	18, 944	8, 688	0.4	20, 801	1.1
San Antonio river	16, 352	66, 164	4.0	115, 120	7.0
Rio Grande	128, 792	96, 487	0.7	141, 030	1.1
Mississippi river	1, 240, 039	16, 431, 855	13.2	21, 821, 254	17.5
Yazoo river	13, 936	255, 890	18.3	374, 542	26.8
Illinois river	37, 558	1, 178, 063	31.5	1, 347, 123	35.8
Rock river	9, 792	470, 932	48.1	485, 578	49.5
Wisconsin river	11, 520	159, 561	13.8	199, 850	17.3
Chippewa river	8, 892	40, 740	4.5	79, 412	8.9
St. Croix River	7, 164	29, 560	4.1	56, 841	7.9
Minnesota river	13, 428	100, 561	7.4	193, 557	14.4
Cedar river	7, 416	291, 114	39.2	374, 587	50.5
Des Moines river	14, 652	237, 077	16.1	340, 840	23.3
Ohio river	201, 720	7, 841, 519	38.8	9, 597, 980	47.4
Tennessee river	43, 897	983, 579	22.4	1, 243, 774	28.3
Cumberland river	18, 573	515, 471	27.7	628, 508	33.8
Kentucky river	6, 380	196, 947	30.8	246, 427	38.6
Green river (of Kentucky)	7, 800	266, 522	34.1	336, 967	43.2
Licking river	3, 658	178, 743	48.3	221, 477	60.5
Kanawha river	11, 630	186, 694	16.0	270, 182	23.2
Monongahela river	7, 318	321, 898	43.9	413, 294	56.4
Allegheny river	11, 437	511, 114	44.6	627, 384	54.8
Miami river	3, 636	338, 711	93.1	398, 783	109.6
Scioto river	6, 480	222, 846	49.8	383, 816	59.2
Muskingum river	8, 016	444, 040	55.3	500, 746	62.4
Wabash river	31, 505	1, 447, 359	45.9	1, 714, 612	54.4
Big Sandy river	5, 915	68, 705	11.6	109, 402	18.4

DISTRIBUTION OF POPULATION IN ACCORDANCE WITH TEMPERATURE. LV

TABLE XXXII.—DISTRIBUTION OF POPULATION BY DRAINAGE BASINS—Continued.

Drainage basins.	Approximate area, square miles.	Population, 1870.	Population per square mile, 1870.	Population, 1880.	Population per square mile, 1880.
ATLANTIC OCEAN—Continued.					
GULF OF MEXICO—Continued.					
Mississippi river—Continued.					
Missouri river	519,000	1,440,770	2.7	2,720,476	5.2
Big Sioux river	8,416	6,173	0.7	61,019	7.2
Yellowstone river	71,747	734	0.0	4,387	0.1
Platte river	90,011	69,174	0.7	265,107	2.9
Kansas river	54,180	161,840	2.9	577,634	10.6
Osage river	10,548	170,540	16.1	232,195	22.0
Arkansas river	185,671	613,672	3.3	1,273,853	6.8
Cimarron river	16,632	427	0.0	1,392	0.1
Canadian river	41,652	17,081	0.4	22,552	0.5
White river	29,556	291,030	9.1	461,369	15.6
Red river of Louisiana	80,970	455,554	5.6	728,025	8.1
Washita	20,764	184,142	8.8	276,230	13.3
St. Francis river	7,884	68,203	8.6	169,658	13.9
GREAT BASIN					
Great Salt lake	32,400	79,827	2.4	134,692	4.1
Humboldt river	32,148	28,084	0.8	45,148	1.4
PACIFIC OCEAN					
Colorado river of the West	255,049	23,263	0.1	87,897	0.3
Green river	47,222	3,595	0.0	12,010	0.3
Grand river	26,472	113	0.0	14,093	0.5
Colorado Chiquito river	29,268	1,382	0.0	3,969	0.1
Gila river	68,623	10,043	0.1	39,327	0.6
Sacramento river	58,824	213,789	3.6	289,856	4.9
San Joaquin river	29,952	63,304	2.1	83,834	2.7
Klamath river	14,660	14,285	0.9	20,827	1.4
Columbia river	216,537	105,558	0.5	220,011	1.0
Willamette river	11,700	53,122	4.6	83,353	7.1
Snake river	103,835	19,407	0.1	59,997	0.6
Clark's fork	63,291	8,150	0.1	16,029	0.2

DISTRIBUTION OF POPULATION IN ACCORDANCE WITH TEMPERATURE.

Our country extends from the tropics north across the temperate zone, and from sea-level to an elevation of over 14,000 feet, an elevation which carries with it an arctic climate. The mean annual temperature ranges over more than 40° F., while the extremes of recorded temperature run from 55° below zero up to a maximum above 115°. The mean temperature of the hottest month of the year, July, ranges from below 60° to above 90°, while the mean temperature of the coldest month ranges from zero to more than 65°. Were the country a plain, the mean temperature of the year would be almost purely a question of latitude; a difference of elevation, however, especially when it takes the form of a mountain range, causes a deflection southward of the isothermals, an abrupt rise of about 300 feet of elevation implying a decrease of annual temperature of one degree. Thus we find that the Appalachian system causes a very marked deflection to the southward of the isothermals. On the plains, however, where the upward slope is very gradual, it is to be noted that the elevation causes little or no deflection southward of the lines of temperature, the plains and plateaus generally having a mean annual temperature nearly or quite as high as points in the same latitude in the Mississippi valley or on the Atlantic coast. The temperature of the great western plains and plateaus is, however, modified locally to a marked extent by the exposure to west and northwest winds, which have an unbroken sweep in some places for hundreds of miles, acquiring tremendous force. Attention should be called here to the well-known fact that the climate of central Montana, including most of the settlements on the upper Missouri, is abnormally warm. It lies at a comparatively low elevation, being only 3,000 to 4,000 feet above sea-level, and is sheltered from the fierce westerly winds by the Missouri range, while the northerly winds, to which it is exposed, come from the moister plains of the Saskatchewan.

The two maps showing the mean temperature of the warmest month, July, and the mean temperature of the coldest month, January, illustrate, though only to a limited extent, the range of temperature in different sections of the country. The former shows a comparatively limited number of grades, running from 60° to 90°, the lines following approximately the parallels of latitude, except where deflected by mountain masses. The influence of the coast in averaging the climate is distinctly perceptible on this map. There is apparently a northward movement of the temperature lines in the Cordilleran region, showing that in the summer the temperature is abnormally high in this arid section. These characteristics are illustrated conversely by the January map, which also shows the influence of the sea and other large bodies of water, while in the Cordilleran region the temperature lines are borne southward by the aridity and consequently extreme character of the climate. The fourth of these temperature maps, showing a generalization from the highest recorded readings of the thermometer, coupled with the fifth map,

which shows a similar generalization with regard to the minimum temperature, illustrates the extreme range of the thermometer in different parts of the country. In the former we see a belt running along the sea-coast from Maine to Texas, where the thermometer never rises above 100°, while within it is a region, stretching from New York southward along the Atlantic plain and the lower Mississippi valley, where the maximum reaches 105°, thus illustrating in the clearest manner the effect of the sea in averaging the temperature. The same thing is illustrated, though not so markedly, upon the map of minimum temperatures.

The fourth map shows also another peculiar characteristic, viz, the fact that as we pass up the slope of the plains the maximum temperature increases, not on a parallel, as in the case of the mean annual temperature, but approximately on a contour or on a meridian, being apparently proportional to the aridity of the atmosphere and the amount of rainfall. This characteristic is, to a certain extent, disguised in the heart of the Cordilleran region by reason of the great diversity of surface which is encountered there, but in general it holds good throughout.

The map showing minimum temperatures is not so clear on these points. Its lines follow parallels more nearly; but there is a marked deflection toward the southwest as we pass westward from the Mississippi valley. The characteristics of this map are still further concealed by the effect of the details of topography in the Cordilleran region. A marked change in temperature, as well as in rainfall, takes place at the crest line of the Sierra Nevada and the Cascade range. This change is not particularly apparent in the mean annual temperature, but on the map showing the temperature of July and January it is quite apparent, being shown by the slight difference between these maps. At the bay of San Francisco the difference between the mean temperature of July and that of January is but 10°. This effect is still more marked in the last two maps, where, in the Mississippi valley, the range between maximum and minimum averages 110°, and in the Cordilleran region 125°. On the Pacific coast it decreases to only 60°, showing that this section of the country enjoys by far the most uniform climate as regards temperature.

The material for these temperature and rainfall maps was drawn mainly from "Temperature Tables" and "Rainfall Tables" prepared by Professor Charles A. Schott, and published by the Smithsonian Institution. The map of mean annual temperature was compiled, very largely, directly from Mr. Schott's admirable chart in the first of the above-mentioned volumes. The rainfall maps were prepared previous to the publication of the last edition of the Smithsonian "Rainfall Tables", and, as much new material had been collected in addition to that published in the first edition, the maps were plotted from original sources.

Table XXXIII shows the distribution of population in accordance with the mean annual temperature by groups of 5° each. It will be seen that no less than 98 per cent. of the total population lives between 40° and 70° F. of mean annual temperature, leaving a very small proportion to be distributed among the other sections. Of these groups, those having a temperature above 55° contain the entire cotton region; those above 70°, the sugar and rice regions; while between 50° and 60° is comprised most of the tobacco region. The prairie region of the Mississippi valley lies almost entirely below 55°, while the great wheat region of Minnesota and Dakota is mainly below 40° of mean annual temperature.

The hottest part of the country is, naturally, the southern end of Florida, while southern Texas and southwestern Arizona come next in degree of temperature.

The greatest percentage of gain in population since 1870 is found in the extreme temperatures north and south. The greatest absolute gains are, of course, found in the medium temperatures, class 50° to 55° having made the greatest gain in density of population. There is a slight relative increase in the lowest class, a decrease in the two classes between 40° and 55°, while in the higher temperatures there has been a slight corresponding increase.

A rough computation shows that the mean annual temperature of the country is about 53° F., to which the location of the population almost precisely corresponds, differing from it by only a fraction of a degree.

DEPARTMENT OF THE INTERIOR



The great body of foreign population is found between 40° and 55°, where more than 87 per cent. of the foreign born are located, while in case of the colored more than 93 per cent. are found between 50° and 70° of mean annual temperature.

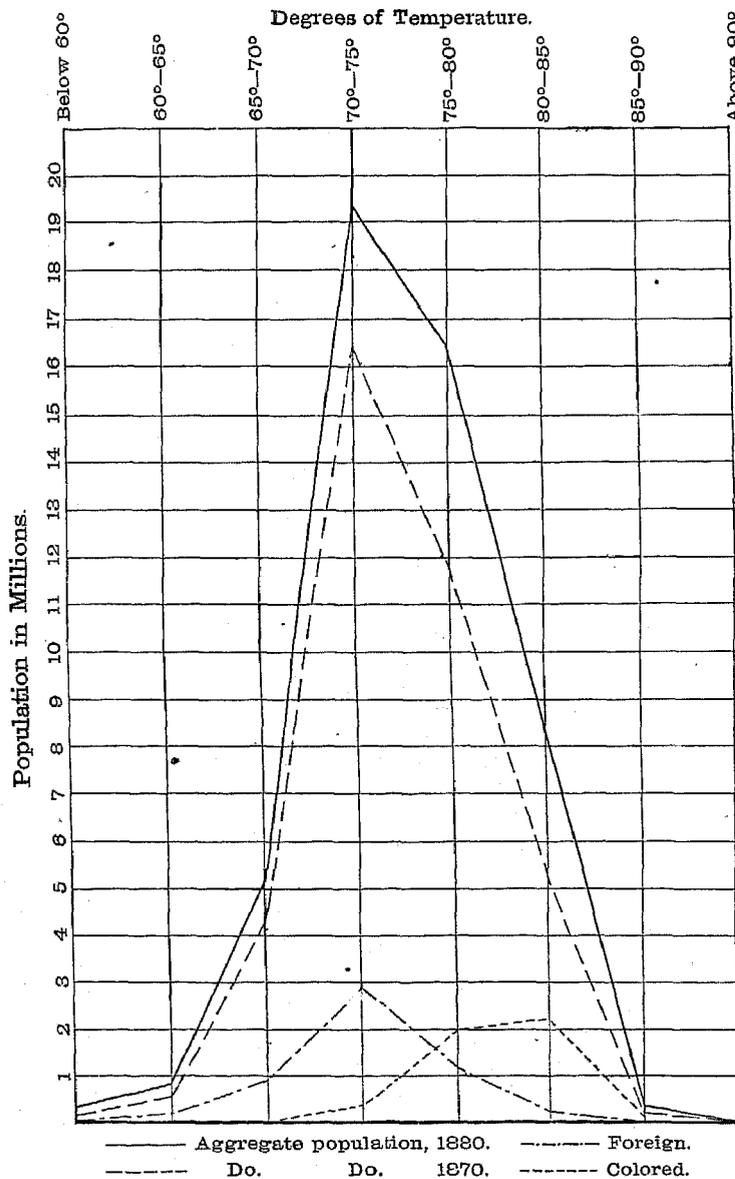
Table XXXIV shows the distribution of the population in 1870 and 1880 into groups of 5° each, classified according to the mean temperature of the hottest month; that is, July.

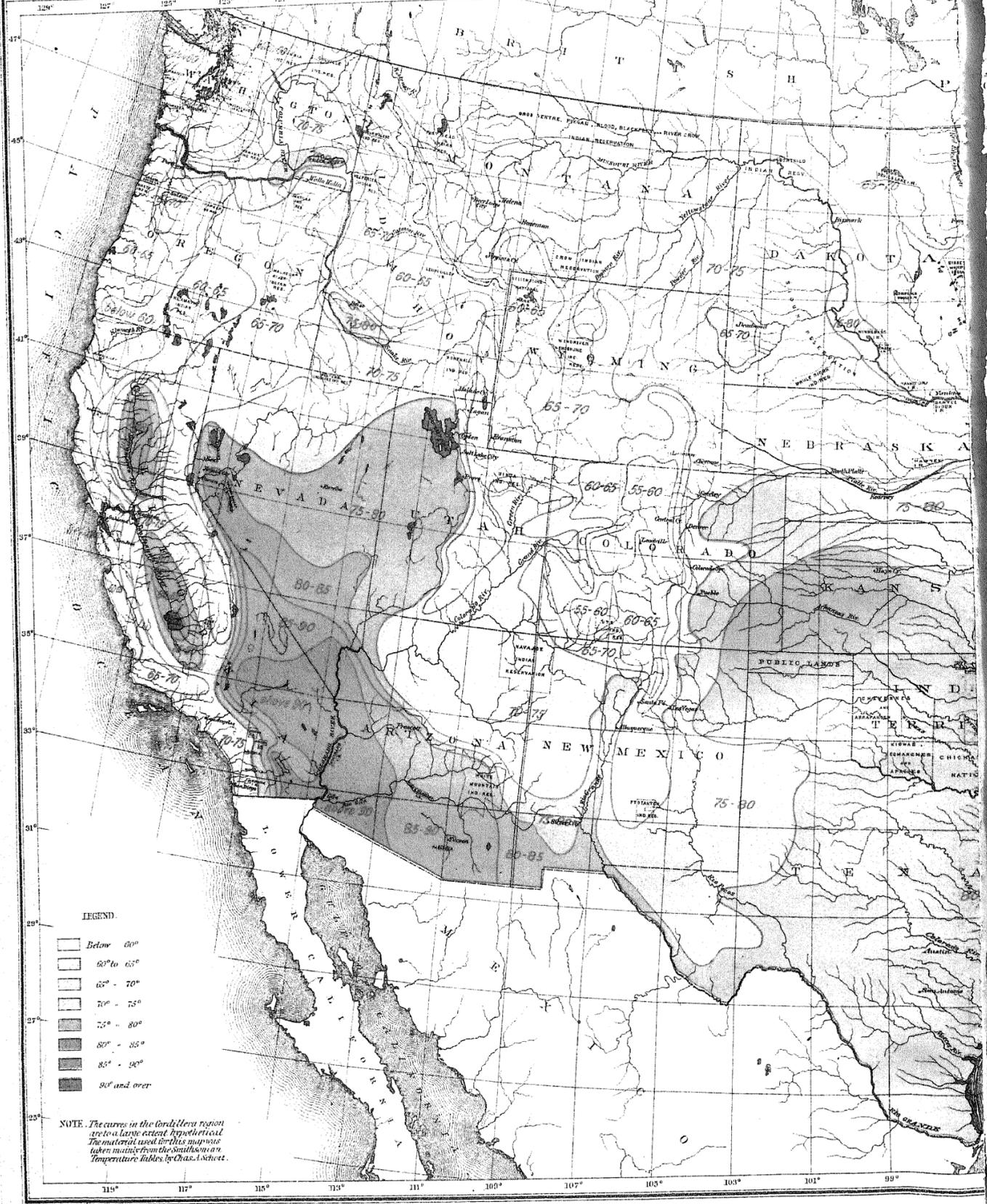
It will be seen that 97 per cent. of the population live within a range of 20°; that is, from 65° to 85°, leaving only a scattering fringe outside.

The greatest density of the population is between 70° and 80°, where it reaches about 25 to the square mile. This section includes the middle belt of the country in an east and west direction, and comprises nearly every large city.

Examining the regions of the country which fall within the individual classes, it is found that the cotton region is comprised in the two groups between 75° and 85°. The sugar and rice districts lie between 80° and 85°. The classes from 75° to 85° appear to comprise all the country which is liable to epidemics of yellow fever. The prairie regions are found between 70° and 80°; the wheat sections of Minnesota and Dakota between 65° and 70°. The extreme of heat is found in the arid regions of southwestern Arizona and southeastern California, where the range is between 85° and 90°, and the coldest regions are found in the northern part of New England and northern Michigan, Wisconsin, and Minnesota, and the high mountain region of the Cordilleras.

DISTRIBUTION OF POPULATION IN ACCORDANCE WITH THE MEAN TEMPERATURE OF JULY.





LEGEND.

- Below 60°
- 60° to 65°
- 65° - 70°
- 70° - 75°
- 75° - 80°
- 80° - 85°
- 85° - 90°
- 90° and over

NOTE. The curves in the Cordilleran region are to a large extent hypothetical. The materials used for this map were taken mainly from the Smithsonian Temperature tables by Chas. A. Schott.

MAP OF THE
UNITED STATES
 SHOWING THE DISTRIBUTION OF THE LINES OF THE
MEAN TEMPERATURE OF JULY.
 Prepared to illustrate the corresponding distribution of the population
 at the date of the tenth Census
 BY
HENRY GANNETT, E.M.
 1880.





- LEGEND.
- Below 10°
 - 10° to 20°
 - 20° - 30°
 - 30° - 40°
 - 40° - 50°
 - 50° - 60°
 - 60 and over

NOTE. The curves in the North-Western region are to a large extent hypothetical. The material used for this map was taken mainly from the Smithsonian air temperature tables by Chas. Lockyer.

MAP OF THE
 UNITED STATES
 SHOWING THE DISTRIBUTION OF THE LINES OF THE
 MEAN TEMPERATURE OF JANUARY
 Prepared to illustrate the correspondence of the population
 at the date of the tenth Census.
 HENRY GANNETT, F. M.
 1880.

