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 262.4 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 sentineled 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

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* 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°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, Yuintah, 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 southwesterly 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 northwest.

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 unequaled 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.