isothermal of 52o is, to the west of the Appalachians, nearly coincident in position with the Ohio river as far as Cincinnati, and thence follows an undulating course, with a nearly westerly­general direction, through Indiana, Illinois, northern Missouri, and along the northern boundary of Kansas to the border of Colorado, where it is suddenly deflected and runs with a nearly southerly course for a distance of fully 500 miles along the eastern base of the Rocky Mountains. Those portions of the country which lie between the isothermals of 44° and 52° are New England, with the exception of Maine and the northern part of New Hamp­shire and Vermont ; New York, excluding the extreme north-eastern corner (the Adirondack region); the Appalachian plateau region on the borders of New York and Pennsylvania; nearly all Ohio; two-thirds of Indiana and Illinois; nearly all Michigan and Iowa; southern Wisconsin; south-eastern Minnesota; nearly all Nebraska; and the southern half of Dakota. The isothermal of 40° passes through the centre of Maine, cuts off the extreme northern end of New Hampshire and Vermont, then passes out of the United States, re-entering at the west end of Lake Superior, passing through the centre of Minnesota, making a large loop to the south in eastern Dakota and then trending north-westwardly until it passes beyond the boundary line of the United States in 107° W. long.

Within the Cordilleran region, or west of the 105th meridian, the position of the isothermals is largely dependent on that of the mountain ranges, which rise high enough profoundly to influence the climate, though it is only at a few points, especially round the summits of the lofty volcanic cones near the Pacific coast, that they reach the region of perpetual snow. This deficiency of lasting accumulations of snow, however, is in very considerable part due to the smallness of the precipitation. Observations of temperature on the higher ranges are extremely deficient. On Mr Schott’s temperature chart (Plate IX.) the isothermal of 44°, which, as already mentioned, east of the Cordilleran region nearly coincides with the northern boundary of the country, encloses within a great southerly-reaching loop the whole of the higher portion of the Rocky Mountains, extending as far south as the 34th parallel, or to about the position in latitude of the isothermal of 60o in the eastern division of the country. The crest of the Sierra Nevada, Cascade, and Blue Mountain ranges is also within the curve of 44°. The highest portion of the Rocky Mountains, as far south as 39° N. lat,, is laid down as having a mean temperature lower than 36° F. The whole of the Great Basin and the Columbian plateau is indicated as having a considerably higher temperature than the dominating system of ranges which enclose it on the east and west. Con­siderable bodies of snow remain on the summits of the ranges during a large part of the year, at least as far south as 39° N. lat. In the plateau region of Arizona, Utah, and Nevada the decline of the ranges, the generally lessening elevation of the region, and the facility of access which the topographical conditions allow to the heated air from the south give a high temperature, and the isothermals form irregularly concentric loops extending from the head of the Gulf of California northwards. The isothermal of 52° reaches as far north as Virginia City, in lat. 39°, and that of 72° extends to Fort Mohave, in lat. 35°.

In strong contrast with the Eastern division, we find in the region bordering on the Pacific a very marked tendency to a parallelism of the isothermals with the trend of the coast ; consequently, a very moderate change in the mean annual temperature may be met with over a large range of latitude. The character of the isothermals here is greatly modified by the position of the two parallel ranges, the Coast Mountains and the Sierra Nevada, which enclose valleys of great extent but of low altitude. In general the temperature of the Pacific coast-belt is much more uniform and higher than that of the Atlantic side of the United States. The isothermal of 60° runs nearly parallel with the coast, and not far distant from it, from the southern line of California north through nearly three degrees of latitude. The isothermal of 52° approaches San Francisco in lat. 37° 48', and keeps near the coast to as far north as lat. 47°. A higher mean temperature than 48o prevails over the region adjacent to Puget Sound, at the northern boundary of the country, in lat. 49°, while the mean temperature of the northern part of Maine, between the parallels of 45° and 47°, is below 40°. Thus it may be said with truth that near the Pacific coast we have a difference of only 12° in mean temperature in a range of over sixteen degrees of latitude. And if we pass from the immediate vicinity of the coast in lat. 35° into the San Joaquin and Sacramento valleys, we may range over five degrees of latitude and keep in a region of which the mean temperature is not below 60° and nowhere much higher. The causes of this are the proximity of the great area of water from which the prevailing winds blow, the modification which the temperature of this ocean undergoes near the American coast by the Asiatic coast current and the northern or Arctic coast current, and the position of the mountain ranges near the coast. Uniformity of climate along the edges of the land is still further aided by the peculiar nature of the currents along this coast. The influence of the warm Asiatic current—the Kuro-Siwo—is dis­tinctly felt in raising the temperature as far south as the northern border of California, while farther south the cold Arctic current, which apparently emerges from under the warm current, makes its cooling presence felt along the coast nearly or quite as far as the southern boundary of the country.

The isothermals for the summer months (June, July, and August) are much more irregular than those of the year, especially in the Eastern division. The powerful heating influence of the Gulf of Mexico, swept over in summer by southerly winds, makes itself extremely apparent in the summer isothermals, which bend to the north-west in a most remarkable manner, that of 72° reaching as far as the centre of Dakota, or beyond lat. 45°. A mean summer temperature of 80° and upwards prevails over Florida, a consider­able portion of the Gulf States, and nearly all Texas. The belt adjacent to the Ohio, extending north as far as the Great Lakes, south along the Appalachian tableland into Tennessee and the north-western corner of Georgia, and west through Iowa, Nebraska, and northern Kansas, lies between the summer isothermals of 68° and 76°. The summer isothermals along the Pacific coast are much less considerably changed in position and character from their mean annual character than they are on the Atlantic side, for reasons which have been already given, while the irregularity and com­plexity of the summer curves in the Cordilleran region generally would be very distinctly noticed if the data were at hand and could be exhibited with some detail. An extraordinarily high temperature prevails in summer in the southern portion of the Great Basin and in the Arizona plateau region, the isothermal of 88° surrounding with its northerly-reaching loop a large area in the lower valley of the Colorado river and extending north as far as lat. 35°. The winter (December, January, February) isothermals in the Eastern division have more of the regularity of the annual curves than have those of the summer. The winter isothermal of 52° coincides very nearly with the mean annual curve of 68°, keeping near and closely parallel to the Gulf of Mexico. The winter isothermal of 32° runs from Cape Cod across Long Island to New York city, and across New Jersey, thence making a large loop to the south so as to surround the Appalachians, and, after ascending northerly again on the west side of that range to near the Ohio, passing through Indiana, Illinois, Missouri, and Kansas, thence descending in a south-westerly direction and sweeping around the Rocky Mountains, and through the centre of the Great Basin in a very irregular course. On the Pacific coast the form of the winter curves closely resembles that of the yearly isothermals. The winter curve of 52° very closely coincides with that of 60° for the year, and the winter curve of 40° runs from near San Francisco, closely parallel to the coast and at a little distance from it, as far as Cape Flattery, or through a distance of over ten degrees of latitude.

The irregular, non-periodic fluctuations of the temperature are of great interest, and without knowing what these are one would form a very false idea of the real character of the climate. It does not appear that these fluctuations greatly affect the general salubrity of the country, but they have a marked effect on the character of the vegetation, as well as on the methods of cultivation. The occasional occurrence of very low temperatures in low southerly latitudes where the mean winter temperature is quite high is one of the most striking phenomena in the climate. Savannah, as Hann remarks, has a mean winter temperature the same as that of London and Cadiz, although this latter city lies 4½° farther north. But the vegetation of the two regions is essentially different, because frosts do not occur in that part of the Spanish peninsula. Orange trees are liable to become entirely frozen everywhere in the United States except in southern Florida; this is not the case in Spain. The cotton plant is a perennial in the south of Spain, while, on the other hand, the stem and branches are killed every year by frost in the United States, so that the fields have to be annually replanted.

The following table (IV. ), from data arranged by Hann, gives an idea of the range of temperature in various parts of the country :—

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Mean Mont | hly Range. | Mean Yearly |
|  | Latitude. | Winter. | Summer. | Extremes. |
|  | o ' | o | o | o |
| Fort Sully | *44 39* | 103∙5 | 90∙1 | -25∙2 108∙7 |
| Fort Snelling | 44 53 | 93∙2 | 70∙3 | -25∙2 93∙0 |
| St Louis  New York | 38 37  40 42 | 90∙3  79∙0 | 73∙2  71∙2 | — 5∙3 99∙7  0∙7 93 0 |
| Macon | 33 46 | 80∙2 | 59∙7 | 18∙3 97∙2 |
| Charleston | 32 45 | 73∙4 | 52∙3 | 24 1 92∙7 |
| New Orleans | 30 0 | 78∙6 | 55∙6 | 23∙2 96∙2 |

The region of lowest winter temperature is that along the eastern border of the Rocky Mountains in the northern portion of the country, where the temperature not unfrequently sinks so low as to freeze mercury. The lowest temperatures observed in this region, as given by Schott, are—at Fort Sanders, in Wyoming, - 50° ; Fort Ellis, Montana, - 53°. A temperature low enough to freeze mercury is occasionally observed in Wisconsin and Michigan, and on the borders of Canada and New York. The hottest region