Tertiary formations, so far as recognized, are purely marine, and, like the marine Upper Cretaceous of the black prairie region, are the direct geographical continuation of the formations of the other Gulf States. They occupy the coast plain, in bands approximately concentric with the shore of the Gulf of Mexico, and represent the sediments of its receding waters. The alleged occurrence of the fresh-water Miocene, the Loup river group (m), upon the Llano Estacado has not been demonstrated. Quaternary (q) and other recent alluvial deposits occur along the coast and the upper terraces of the three older river systems as far west as the eastern border of the central region. This is attested by the character of the de­posits, accompanied by well-authenticated remains of the elephant and mastodon. These Quaternary soils are mostly the redeposited detritus of the strata of the eastern escarpment of the Llano Estacado, which is carried down by the “red rises.” The surface features of the central region are the result of sub-aerial denudation. The black prairie is protected from this destructive erosive process by the tenacious character of its soil ; and the coast plain is covered by a luxuriant forest growth, and is constantly extending eastward by the recession of the shore line. The final emergence of the State began in Middle Cretaceous time, and was connected with the same movements that brought up the Rocky Mountain system. The strata of Texas, except the Palæozoic groups, are soft, and yield readily to disintegration. A few eruptive sheets are found in the trans-Pecos region and along the lower Rio Grande, being remnants of the eastern edge of the great eruptive area of the Rocky Moun­tain region. Granitic masses occur, as extrusions from the pre­Cambrian, in the central and trans-Pecos Palæozoic deposits.

The eastern ranges of the Rocky Mountain system are deflected towards the Gulf of Mexico after passing south of 33o N. lat., and take a south-easterly course through Texas into Mexico, the trend of their axes being generally parallel to the direction of the Rio Grande and its principal tributaries. The only true mountains in Texas are situated west of the Pecos, with the exception of a few foot-hills *(lomitas)* which re-enter the State from Mexico near Eagle Pass and follow the river to an undetermined point below Laredo. The principal ranges are the Guadalupe, Limpia, Chinali, Los Chisos, Organ, and Franklin Mountains. They are composed of older rocks, in most places ; the later formations have been washed away, except where protected by eruptive flows. The most eastern and northern of these mountains are usually the highest. Guadalupe Peak is 9000 feet ; Limpia Peak and the crest of the Chinalis, from 3500 to 8000 feet ; Eagle Mountains, 7000 ; aud the intervening valleys from 3500 to 5000 feet. The low buttes of the central region are miscalled mountains upon most maps. There are several well-defined escarpments extending for long distances, approximately north and south The step of the first of these, from Austin to Eagle Pass, is from 200 to 500 feet high, and is the result of an elevation at the close of the early Cretaceous period. Near the 100th meridian another escarpment occurs, and along the eastern and southern borders of the Staked Plain still another. The western part of the coast plain has a few low hills. The rest of the State has no notable prominences.

The mineral resources of Texas have not been mapped or studied, and hence the State ranks last in mineral products. The trans- Pecos region is rich in silver and lead ores ; but the State owns the mineral rights of nearly all the land, and has hitherto declined to open them to development. Only one mine is worked here. Silver and gold have also been discovered and mined in Llano and Mason counties, but without successful results. Gold occurs throughout the marine limestones of the lowest (Texas) group of the Cretaceous, but not in sufficient quantity for profitable extraction. Rich but not abundant copper ores occur in the drift of the gypsum country. Iron ore is found in the Tertiary of eastern Texas, and is profitably reduced in a few charcoal furnaces by the aid of convict labour. At present these are remote from coal and suitable means of trans­portation. Magnetic iron ore occurs in the pre-Cambrian rocks of Mason county, and recent analyses show it to be equal in quality to the best Swedish ores. It is in great abundance, but remote from means of transportation and fuel. Ores of iron (sphæro-siderite) occur in the central Carboniferous formation, but their commercial value is unknown. The non-metals occur in great abundance in different portions of the State, including salt, gypsum, magnesium sulphate, natural cements, kaolin, and other clays. The unutilized beds of massive gypsum are, with the exception of those of the Sahara and the Andes, the purest and most extensive in the world. Salt is gathered from lacustral deposits or mined at El Paso, Colorado City, and along the lower Gulf coast for local use. The coals of the central Carboniferous area have been worked to some extent, but are generally of inferior quality, having from 50 to 70 per cent. of ash. Very recent discoveries of better quality have been reported. Tertiary fibrous lignite, of light specific gravity, is found in great abundance all along the junction of the coast plain and black prairie regions. It is worked to a small extent, but has no commercial value. The most important coal area is the semi-bituminous lignite belt of the trans-Pecos and lower Rio Grande regions, which is the direct geographical continuation of the late Cretaceous coals of New Mexico and Colorado. It is worked at Eagle Pass and Santa Toma, near Laredo. The beauti­ful marbles and other ornamental stones of the State are untouched, with the exception of the Llano county granite.

The amount and regularity of the rainfall decreases inland, the mean annual varying from 52∙3 inches at Galveston to 13 at El Paso in the extreme west and 23 at Mobeetie in the extreme north. The subjoined table gives the mean temperature and rainfall of certain representative localities :—

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Mean | Precipitation |  | in | Inches. |
| Station. | Altitude in ft. | Mean Annual Temp. | Spring. | Summer. | Autumn. | Winter. | Annual. |
| *Coast Plain.* |  | . |  |  |  |  |  |
| Gilmer |  |  | 13∙36 | 9∙93 | 11∙57 | 10∙93 | 45∙79 |
| Galveston |  | 70∙02 |  |  |  |  | 52∙30 |
| Indianola |  | 70∙01 |  |  |  |  | 38∙72 |
| Palestine |  | 65∙ |  |  |  |  | 47∙00 |
| *Black Prairie Region.* |  |  |  |  |  |  |  |
| Denison | 800 | 64∙03 |  |  |  |  | 40∙50 |
| Austin | 650 | 67∙84 | 8∙61 | 7∙94 | 10∙74 | 6∙23 | 33∙52 |
| San Antonio | 600 | 63∙09 | 6∙77 | 8∙91 | 9∙30 | 6∙32 | 31∙30 |
| *Central Region.* |  |  |  |  |  |  |  |
| Fort Belknap | 1600 |  | 6∙41 | 9∙44 | 8∙34 | 3∙86 | 28∙50 |
| ,, Chadburne | 2020 |  | 5∙77 | 6∙53 | 7∙06 | 3∙52 | 22∙88 |
| ,, Griffin |  |  | 4∙95 | 6∙25 | 6∙14 | 4Ί7 | 21∙51 |
| „ Clark | 1000 |  | 4∙14 | 7∙57 | 6∙55 | 4∙35 | 22∙61 |
| „ Duncan |  |  | 3∙56 | 8∙60 | 6∙54 | 2∙63 | 21∙33 |
| „ Inge | 845 |  | 5∙38 | 9∙67 | 6∙88 | 3∙53 | 25∙46 |
| ,, Mason | 1200 |  | 6∙36 | 10∙44 | 8∙22 | 3∙96 | 28∙98 |
| ,, Makavet | 2060 |  | 5∙40 | 671 | 7∙18 | 4∙22 | 23∙51 |
| *Plains Region.* |  |  |  |  |  |  |  |
| Fort Elliott |  | 54∙6 |  |  |  |  | 23∙90 |
| „ Concho |  | 63∙6 |  |  |  |  | 30∙90 |
| *Trans-Pecos Region.* |  |  |  |  |  |  |  |
| El Paso | 3830 | 63∙2 |  |  |  |  | 13∙00 |
| Fort Stockton | 4950 | 62∙8 |  |  |  |  | 20∙00 |
| „ Davis | 4700 | 59∙8 |  |  |  |  | 20∙38 |

The coast plain and the black prairie regions have abundant rain­fall for agricultural purposes. It decreases, however, to the west, and varies greatly in different years, sometimes being ample ; but in 1885-86 it did not average 10 inches. The precipitation is also very sudden, seldom lasting more than a few minutes at a time. Only 52 per cent. of the 20 inches of rainfall in the central region and west of it falls in the agricultural season, one-half being in summer and the remainder in autumn, so that it is equivalent to only 15 inches in regions where the rainfall occurs in more pro­pitious seasons. This condition is, however, especially favourable for grazing. There are few statistics of the plains region ; but the rainfall along its eastern escarpment is slightly greater and more regular than that of the central region. The temperature varies greatly throughout the State, both in extremes and means. Fort Ringgold on the lower Rio Grande is the hottest point in the United States, except Key West, Fla. Its mean temperature is 73∙4° Fahr. ; that of El Paso is 63o, and of Mobeetie 54∙6°. The prevalent winds are southerly and south-easterly, and blow constantly across the State, without which its summers would be unendurable. The Rio Grande valley is not subject to frosts. Snow seldom falls south of Galveston aud Austin. In the Panhandle the winters are severe.

The arboreal flora of Louisiana and Arkansas extends into north­eastern Texas, conformable with the coast plain, where, immediately south of the Colorado river the great pine belt of the Atlantic and Gulf coasts terminates. The flora of the great plains region, principally consisting of nutritious grasses, enters the north-western portion of the State and extends south to the 32d parallel and east to the 101st meridian. The peculiar plants of the Rocky Moun­tain plateaus penetrate into the trans-Pecos region, while the north Mexican flora is found along the Rio Grande. The central region is a transition ground where these floras find representation generally in deteriorated and dwarfed species. In the coast plain occur the long and short leaf pine, with many species of oak and hickory. The black prairie region is destitute of trees, except scattered individuals of live oak and the mesquite bush (*Prosopis glandulosa*)*.* The broad river valleys of this region, however, are well-timbered with pecan, cypress, cottonwood, and several species of oak, and have a vigorous growth of smaller shrubs. West of the black prairie region the dwarfed, stunted trees are of little value except for fuel. The river valleys have the same character of trees as further east, but the rocky highlands are covered with scraggy bushes (chaparral) of oak, juniper, and cedar. The summits of the Guadalupe and Limpia ranges, in the trans-Pecos region, are clothed with forests of the yellow (*Pinus ponderosa*)*,* flexible (P. *flexilis),* and nut pine *(P. edulis),* all of which attain great size. Many smaller trees grow on these mountains. The valleys and several of the ranges in the last-named region, however, are desti­tute of trees. The entire Rio Grande valley, from El Paso to Brownsville, grows many species of cactus and other prickly, cori­aceous shrubs. The grasses of the State are especially numerous in species, and are found most luxuriantly on the prairies of the lower