

the Golden Gate—is only one mile wide in its narrowest part. The region thus enclosed, computing it from the divide, or water-shed, of the enclosing mountain ranges, is 520 miles in length, and it has an average breadth of 110 miles. This gives an approximate area of 57,200 square miles, as stated by U. S. Irrigation Commissioners, their estimates having been made on the basis of the State Geological Survey maps. The drainage of this entire area reaches the sea through the Golden Gate. But before noticing the lakes and rivers which belong to the Great Valley, it will be desirable to give some idea of the mountain ranges in which these rivers take their rise; and it should be added in justice, that nearly all that is known of the detailed structure and elevation of the mountain chains of California is due to the work of the Geological Survey.

The Sierra Nevada, or Snowy Range, of California is, on the whole, the largest and most interesting chain of mountains within the limits of the United States. Its scenery is attractive, and in some respects quite unique; its vegetation is unsurpassed in grandeur, unless it be by that of the Australian forests; its mining resources are large, and have been the direct cause of the rapid peopling of the Pacific side of the continent and of the building up of eleven States and Territories in what was before almost an unknown region. In general altitude, the Sierra Nevada does not much excel some of the ranges of the Rocky Mountains proper, although it has one summit higher than any yet ascertained to exist in the United States, not including, however, the Alaskan territory. The length of the chain, from Mount San Jacinto to Mount Shasta, is about 600 miles; but, on some accounts, it would be more proper to consider the Sierra as beginning at the Tahicchi Pass and terminating at Lassen's Peak, in which case its length would be about 430 miles. The breadth of this great mass of mountains varies from 75 to 100 miles; and it narrows towards the north, while its altitude also declines in the same direction. The slope of the range is everywhere long and gradual on the west, and short and precipitous to the east, in which latter direction, of course, the general level of the Great Basin is attained, and this is from 4000 to 5000 feet above the sea. The highest part of the range is between the parallels of $36^{\circ} 30'$ and $37^{\circ} 30'$; here the passes are about 12,000 feet in elevation above the sea-level, and the peaks range from 13,000 to 14,886 feet in altitude, the culminating point, Mount Whitney, being about 600 feet higher than any peak yet measured in the Rocky Mountains. From this peak, going north, the range declines gradually, and at the point where the Central Pacific Railroad crosses it the summit is only 7000 feet above the sea; this is in latitude $39^{\circ} 20'$. The slope of the Sierra in the central part of the State opposite Sacramento is about 100 feet to the mile, the range being there seventy miles in breadth between the valley and the crest; farther south, opposite Visalia, the average rise is as much as 240 feet to the mile, up to the summit of the passes, and 300 feet to the peaks. In this part of the range, the slope on the east is very abrupt, being as much as 1000 feet to the mile from the summit to the level of Owen's Valley, a descent of about 10,000 feet. The western side of the Sierra Nevada is furrowed by extremely deep and precipitous gorges, or cañons, as they are universally called in California. These are narrow at the bottom, where there is usually barely room for the river to run at an ordinary stage of water; their sides slope upwards at a very steep angle, often as much as 30° ; and they are sunk from 1 to 3000 feet, or even more, below the general level. These cañons become more and more marked features of the range as we proceed north in the Sierra; and where the volcanic formations have spread themselves uniformly

over the flanks of the mountains, so as to form a smooth and almost level surface, as is the case over an extensive area, the contrast between the deep and precipitous cañons and the plain-like region, with its gentle slope to the west, in which they have been excavated, is a very marked one.

The Coast Ranges form a large mass of mountains, almost as broad as the Sierra, but much inferior to it in elevation, and at the same time more complicated in details. The Sierra Nevada is essentially one range or chain, with great simplicity of structure. It is only here and there that, along the crest or near it, a double line of summits exists, with deep longitudinal valleys between, which are occasionally occupied by lakes, as in the case of Lake Tahoe; while the Coast Ranges, on the other hand, are made up of numerous broken and indistinct chains, each of which usually has a distinct name, the different groups of ranges having, however, on the whole a well-marked parallelism with the coast. Near the Bay of San Francisco the culminating summits are about 4000 feet in altitude; to the north and south of the bay the elevation of the ranges increases. Monte Diablo, twenty-eight miles distant from San Francisco in a north-north-easterly direction, is 3856 feet in height, and forms a well-known land-mark, being, from its somewhat isolated position on the north, a very conspicuous object over much of the central portion of the state. The view from its summit is remarkably comprehensive, as is that from Mount St Helena, at the head of Napa Valley, sixty miles north of San Francisco, and 4343 feet in height.

The flanks of the Coast Ranges on the western side of the Great Valley are very scantily provided with forests, and there is not a single stream on that side permanent enough to reach either the Sacramento or San Joaquin throughout the entire year. The only streams which carry water in summer on the west side of the Sacramento Valley are Puta, Cache, and Stoney creeks, and these all disappear during the dry season, soon after leaving the foot-hills. On the western side, however, the conditions are greatly changed. The rain-fall, almost entirely cut off on the eastern slope of the Coast Ranges, becomes considerable on the western side of the more elevated Sierra, and numerous large rivers are fed from the melting snow during the summer, although, towards the close of the dry season, the body of water which they carry has usually become very much diminished. The streams tributary to the Sacramento on the east side are—the Feather, Yuba, American, Consumnes, Mokelumne, and several other smaller ones. The Feather has the largest drainage area of any river having its source in the Sierra. It runs for a long distance parallel with the Sacramento, receiving on the east all the drainage which would otherwise run into that river. There are no lakes in the Sacramento division of the Great Valley; but at its southern extremity there are several, one of which is of large size, having an area of not less than 700 square miles. This is Tulare Lake, which, together with Kern and Buena Vista lakes, receives the drainage of the southern part of the Sierra, by the Kern, Kaweah, King's, and other smaller streams. Tulare Lake is quite shallow, being only 40 feet deep; its banks are low and reedy (hence the name, Tulare, a place of reeds or tules), and in wet seasons it overflows them, and becomes greatly extended in area. At such times the excess of the drainage passes off into the San Joaquin; but in dry seasons the evaporation is so great that there is no discharge in that direction. The northern branch of the San Joaquin heads in the grand group of summits of which Mounts Maclure, Lyell, and Ritter are the culminating points; the southern rises on the north side of Mount Goddard. The united stream issues from the mountains at Millerton; and, after gaining the centre of the valley, it turns and runs at right