

This great desert is 100 miles wide, and on the west is again abruptly terminated by the lofty snow-clad range of the Sierra Nevadas, 500 miles distant from the Rockies, and rivalling the latter in elevation, as they exceed them in the grandeur and diversity of their scenery. Their greatest altitude is upon the eastern side, where they form an abrupt wall facing the Great Basin, and rise to a height of 14,000 feet. But to the west the slope is more gradual, descending slowly to the low land of California, which, however, is again separated from the Pacific by the chain of the Coast and Cascade ranges.

From the description of the physical features of the Cordilleran system the lecturer passed on to sketch its geological history, which is truly wonderful.

It was first pointed out that, alike in the Rockies, the Wahsatch and the Sierra Nevada ranges the core of the mountains is composed of the most ancient or Archæan rocks, and that these, prior to Cambrian times, formed a sort of semi-continent in the far west, the land being mostly of a mountainous character, and involving peaks and precipices miles in height, which, in magnitude, are now only rivalled by the topography of the moon.

In the Palæozoic ages which succeeded the Archæan, this lofty western land mass would seem to have slowly subsided until about 30,000 feet of sedimentary beds, of marine origin, had been deposited upon it, burying all but its highest summits. The immensely long period of time required for such deposition seems to have been unattended with any greater physical disturbances, but from its close and onward the evidences of such disturbances are frequent and upon a scale of unequalled magnitude. Thus, at the close of the Carboniferous period, or end of the Palæozoic ages, we find a movement occurring by which western Nevada, with portions of Oregon, previously dry, sink far below the sea level, while, simultaneously, eastern Nevada, western Utah and Idaho rise above it. The movements occurred along lines of fault, one of which, now forming the eastern wall of the Sierras, is 300 miles long, and marks a dislocation by which the Nevada country has been relatively dropped 3,000 to 10,000 feet.

The next great movement was at the close of the Jurassic era, and after 20,000 feet more of sedimentary beds had been deposited over the areas which were in a position to receive them. Again we find a change in the disposition of land and water. The Oregon-Nevada basin now disappears by the rising of its bed, and simultaneously the Pacific coast subsided beneath the waves. So in the early Cretaceous or chalk era there was a renewal of disturbance, in this instance so violent that over an area embracing thousands of square miles the rocks were so shaken and shattered that the fragments produced do not on an average exceed a hen's egg in size. The Coast and Cascade ranges also date their beginnings from this time.

Still later, at the close of the Cretaceous, came other movements resulting in the partial subsidence of the Coast Range, reducing it to a chain of islands, while east of the Wahsatch and thence to the Rockies the land rose from 30,000 to 40,000 feet, thus completing the "Pacific slope," at the same time that to the eastward of the Rockies the region of the Great Plains became for the first time dry, and, by the disappearance of the old Inter-American ocean, eastern and western America became united into one great continental land mass.

From this time onward we find no further depression of the west below the sea level. There were, however, frequent movements and a continuation of the old system of dislocation, further breaking up the surface, while in the hollows thus formed were produced a series of great inland lakes, bordered by extensive forests, whose shades gave shelter to vast numbers of gigantic mammals and other forms of life. But in time this condition also passed away. The lakes were drained off as the mountains rose—aridity followed upon excessive humidity—the rivers dried up or became shrunken to narrow defiles, like that of the Colorado, and indescribable deserts began to take the place of what before had been a region of universal verdure. At the same time, along the lines of fracture, great floods of lava welled up from below, to spread in molten torrents over vast areas, and helping still further to make uninhabitable the already sterile wastes.

But, with this disappearance of all that would tend to make the surface suitable for tillage and for man's habitation, came also the storing of the fissured rocks with mineral veins, making the region the most productive mineral region in the world. For, from the same region, up to the year 1880, there had been removed, in gold, lead, silver and quicksilver, a total product of not less than 2,000 millions of dollars. The lead and silver are chiefly found along the line of the old Wahsatch fault—a fault by which the western half of the chain had been dropped some 40,000 feet, while the gold belt of California lies along the western flank of the Sierra Nevada, where a similar displacement of many thousands of feet has been shown to have taken place. Lastly, the great quicksilver deposits, without which the gold could hardly have been discovered, lie nearer to the coast, and undoubtedly owe their origin to the powerful movements and accompanying igneous phenomena by which the latter had been affected.

The lecture closed with some further comparisons in the character of the movements distinguishing the three great mountain systems of the continent, and the belief was expressed that, as regards the Rocky Mountain system, these movements were still in progress, and that volcanic outbursts, upon an extensive scale, might at any moment renew in that region the events which at no distant period marked its history.