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THE CULMINATING POINT OF THE NORTH AMERICAN CONTINENT.[1]

AMONG the objects for which the expedition recently organized under the auspices of the Academy of Natural Sciences of Philadelphia was despatched to Mexico was the determination of the physical features of the giant volcanoes of the South, with special reference to a study of the vertical distribution of animal and vegetable forms. While prosecuting our observations in this direction, I took the opportunity, in company with one or more of my associates, of scaling the four loftiest summits of the land; namely, the peak of Orizaba, Popocatepetl, Ixtaccihuatl, and the Nevado de Toluca. This gave me the advantage of making personal comparisons between the life that existed in different regions of "cloud-land," at the same time that it offered me the opportunity of more closely investigating the geological features of some of the most gigantic volcanic mountains known to us. Numerous measurements of altitude were made during the ascents, and, in the higher regions, always with the same instrument. This was a registered aneroid, tested and corrected at Philadelphia (immediately before the starting, and shortly after the return of the expedition) at the sea-level of Vera Cruz, and in the Central Meteorological Observatory of the City of Mexico, at an elevation of 7,403 feet. To the officers of the latter institution I am indebted for the privilege of making comparisons with the standard mercurial column.

The results of our measurements show a striking accord in some instances with those obtained from earlier measurements, while in other cases they exhibit marked divergence. The fact that all the summits were ascended within a period of three weeks, were measured with the same instrument, and during a period of atmospheric equability and stability which is offered to an unusual degree by a tropical dry season, renders the possibility of errors of any magnitude almost *nil*. At any rate, such errors as may have crept in will probably not affect a general comparative result. The points of important difference are: (1) the highest summit of Mexico is not, as is commonly supposed, Popocatepetl, but the peak of Orizaba (Citlaltepetl, the "Star Mountain"), which rises 700 feet higher (18,200 feet); (2) Ixtaccihuatl, the familiar "White Woman" of the plain of Anahuac, is but a few hundred feet (about 550) lower than Popocatepetl.

The peak of Orizaba was ascended on the 6th and 7th of April, Popocatepetl on the 16th and 17th of the same month, the Nevado de Toluca on the 21st, and Ixtaccihuatl on the 26th and 27th.

The restoration of the peak of Orizaba to the first place among Mexican mountains, and its increased altitude, open up the interesting question as to what constitutes the culminating point of the North American continent. The only other mountain that need be considered in this connection is St. Elias, situated approximately on the 141st meridian of west longitude, and whose summit is claimed for both the possessions of Great Britain and the United States (Alaska). The measurements of this mountain depart so widely from one another, however, that we are not yet in a position to affirm, even within limits of a thousand feet or considerably more, how nearly it approaches in height the Mexican volcanoes. We are probably justified in dismissing without further examination the measurement made by La Pérouse in 1786, which gave for the peak less than 13,000 feet; and seemingly not much more reliable is the datum (14,970 feet) which appears in Capt. Denham's chart from 1853 to 1856, and is copied into the British Admiralty chart of 1872 (Humboldt's *Cosmos*, v. p. 419, Otté's edition; Dall, *Report of the United States Coast and Geodetic Survey for* 1875, p. 159). This latter figure (4,562 metres) is adopted by Petermann in his general map of North America prepared for Stieler's "Hand-Atlas" (1878–81). Malespina in 1791 determined the height, by means of angles taken from near the position of Port Mulgrave, to be 5,441 metres, or 17,851 feet; and the equivalent of this figure has been copied into the Russian hydrographic charts (1847). Tebenkoff reduces this amount by somewhat over 900 feet.

No carefully conducted measurements of the mountain appear to have been made between the date of the publication of Tebenkoff's chart (1849) and 1874, when Mr. Dall, under the direction of the United States Coast Survey, surveyed a considerable portion of the Alaskan region.[1] This investigator found four different values for the height of the mountain as measured from four points respectively 69, 127, 132, and 167 miles distant: these are 19,464, 18,350, 19,956, and 18,033 feet. Mr. Dall dismisses all of these as having little value, except the measurement of 19,464 feet, made from Port Mulgrave. It is difficult to reconcile the

[1] From the Proceedings of the Academy of Natural Sciences of Philadelphia.

[1] Mr. Dall, in his report above referred to (p. 159), quotes from Leopold von Buch an additional measurement of the mountain, namely, 16,758 feet. Grewingk (Verhandl Russ.-Kaiser. Mineralg. Gesellsch., 1848-49 [1850], p. 99) gives the same figure, referring likewise to Buch (Canar. Inseln, p. 390); and a further reference appears in Davidson's Coast Pilot of Alaska, 1869, p. 142, note (16,754 feet, according to Grewingk). But this figure is manifestly Malespina's measurement given in French feet, which resolved is equal to 17,860 feet; and Grewingk himself quotes Malespina's measurement (5,441 metres) on p. 404 of his report. Humboldt (*op. cit.* v. p. 252) credits the measurement of 17,855 feet to Quadra and Galeano; but, as these observers were associated with Malespina, it is more than probable that the data here given are those which have been generally attributed to Malespina. Humboldt intimates that the measurement is perhaps one-fifteenth too great; but whether this assertion rests on certain facts contained in Malespina's manuscripts, which the great German traveller found among the Archives of Mexico (p. 419), or not, is not stated.