

and referable perhaps to the Miocene tertiary epoch. Tuffs and limestones containing marine shells and corals occur at S. Vicente on the northern coast, where they rise to the height of more than 1200 feet above the sea. They bear testimony to an upheaval to that amount, at least, since the commencement of volcanic action in those parts.

The pebbles in these marine beds are well rounded and polished, strongly contrasting in that respect with the angular fragments of similar varieties of volcanic rocks so frequent in the superimposed tuffs and agglomerates formed above the level of the sea.

The length of Madeira from east to west is about 30 miles, its breadth from north to south being 12 miles. The annexed section, fig. 653, drawn up on a true scale of heights and horizontal distances from the observations of Mr. Hartung and myself, will enable the reader to comprehend some of the points in which, geologically considered, Madeira resembles or varies from Palma. In the central region, at *A*, as well as in the adjoining region on each side of it, are seen, as in the centre of Palma, a great number of dikes penetrating through a vast accumulation of ejectamenta, *c*. Here also, as in Palma, we observe as we recede from the centre that the dikes decrease in number, and beds of scorix, lapilli, agglomerate, and tuff begin to alternate with stony lavas, *d d*, until at the distance of a mile or more from the central axis of the volcanic mass, below *f h* and *e g*, consists almost exclusively of streams or sheets of basalt, with some red partings of ochreous clay or laterite, probably ancient soils. The darker lines indicate the predominance of these lavas which have flowed on the surface, and which, besides basalt, consist of various kinds of trap, and in some places of trachyte. The lighter tint, *e*, expresses an accumulation of scorix, agglomerate, and other materials, such as may have been piled up in the open air, in or around the chief orifices of eruption, and between volcanic cones.

The Pico Torres, *A*, more than 6000 feet high, is one of many central peaks, composed of ejected materials. By the union of the foundations of many similar peaks, ridges or mountain crests are formed, from which the tops of vertical dikes project like turrets above the weathered surface of the softer beds of tuff and scorix. Hence the broken and picturesque outline, giving a singular and romantic character to the scenery of the highest part of Madeira. North of *A* is seen Pico Ruivo (*B*), the most elevated peak in the island, yet exceeding by a few feet only the height of Pico Torres. It is similar in composition, but its uppermost part, 400 feet high, retains a more perfectly conical form, and has a dike at its summit with streams of scoriaceous lava adhering to its steep flanks. There are a great many such peaks east and west of *A*, which seem to be the ruins of cones of eruption, the materials of some at least having been arranged with a quâ-quâ-versal dip. Among these is Pico Grande, *c*, fig. 655, now half-buried under more modern lavas which have flowed round it. It is perhaps owing to the juxtaposition of such a multitude of cones or points of eruption, and the interference of their