

by tracing out the geographical boundaries of some of these, that the reader may be aware of the magnificent scale on which the agency of subterranean fire is now simultaneously developed. Over the whole of the vast tracts alluded to, active volcanic vents are distributed at intervals, and most commonly arranged in a linear direction. Throughout the intermediate spaces there is often abundant evidence that the subterranean fire is at work continuously, for the ground is convulsed from time to time by earthquakes; gaseous vapours, especially carbonic acid gas, are disengaged plentifully from the soil; springs often issue at a very high temperature, and their waters are usually impregnated with the same mineral matters as are discharged by volcanos during eruptions.

VOLCANIC REGIONS.

Region of the Andes. — Of these great regions, that of the Andes of South America is one of the best defined, extending from the southward of Chili to the northward of Quito, from about lat. 43° S. to about 2° N. of the equator. In this range, however, comprehending forty-five degrees of latitude, there is an alternation on a grand scale of districts of active with those of extinct volcanos, or which, if not spent, have at least been dormant for the last three centuries. How long an interval of rest may entitle us to consider a volcano as entirely extinct is not easily determined; but we know that in Ischia there intervened between two consecutive eruptions a pause of seventeen centuries; and the discovery of America is an event of far too recent a date to allow us even to conjecture whether different portions of the Andes, nearly the whole of which are subject to earthquakes, may not experience alternately a cessation and renewal of eruptions.

The first line of active vents which have been seen in eruption in the Andes extends from lat. $43^{\circ} 28'$ S., or, from Yantales, opposite the isle of Chiloe, to Coquimbo, in lat. 30° S.; to these thirteen degrees of latitude succeed more than eight degrees, in which no recent volcanic eruptions have been observed. We then come to the volcanos of Bolivia and Peru, reaching six degrees from S. to N., or from lat. 21° S. to lat. 15° S. Between the Peruvian volcanos and those of Quito, another space intervenes of no less than fourteen degrees of latitude, said to be free from volcanic action so far as yet known. The volcanos of Quito then succeed, beginning about 100 geographical miles south of the equator, and continuing for about 130 miles north of the line, when there occurs another undisturbed interval of more than six degrees of latitude, after which we arrive at the volcanos of Guatemala or Central America, north of the Isthmus of Panama.*

Having thus traced out the line from south to north, I may first

* At the end of Von Buch's Description of the Canary Islands (Paris ed. 1836) will be found a valuable sketch of the position and characteristic phenomena of the principal volcanos of the

globe, compiled with great care and critical discrimination; a source of information of which I have largely availed myself.