

The Madeiran group consists of the main island Madeira, Porto Santo, thirty miles distant from it and the rocks called Desertas about fifteen. Now these islets, closely as they are situated, not only differ materially in their Floras from the mainland, but from one another, in species, varieties and even in genera. In the interiors there are trees and shrubs that are allied to American, African and Asiatic plants; as these plants are also found in the Canaries and Azores, they have been called the Atlantic types. The mountains of Madeira ascend six thousand feet high, plants become fewer and fewer in ascent, and there are few or any of those boreal or arctic plants that we always find on the mountains of continents. Great Britain has a continental Flora; it contains twice as many flowering plants as the Madeiran group, and almost all are identical with those of continental Europe, and as soon as we ascend two thousand feet on the mountains a replacement by boreal types is seen to commence. So all over Europe; no area of the same extent presents a similar assemblage of Asiatic and American plants, peculiar varieties, species and genera as the Madeiran groups nor so many peculiar plants represented by so very few specimens; nowhere do we find the rocky islets on the coast of a continent to be tenanted by numerous singular genera, species and varieties which are to be found nowhere else on the surface of the globe. It is the rare and local plants that are isolated as genera and in geographic distribution that specially arrest our attention. Were these almost unique isolated individuals created as complete, highly specialized organisms, or are they modifications of allied plants, owing their strange forms and special attributes to centrifugal variation operating through countless ages? And however they have originated, what is their destiny? Are they the first of their several races, destined to increase and become as common and widely spread as they are now rare and circumscribed; or the last of their races, which, but for the curiosity of the modern botanist, would have passed away like countless other forms of animal and vegetable life leaving no record? These plants are believed to be, like the savages which in many cases have been so long the sole witnesses of their existence, the last representatives of their several races. How did this come about? Dr. Hooker believes that the principal cause of the rarity or extinction of old species is the subsidence which they have all experienced. The sinking reduces the number of spots suitable to the habits of the plants, it accelerates the struggle for existence which must terminate in the more hardy or more prolific displacing the less hardy or less prolific, and it reduces both the number and kinds of winged insects

upon whose agency the fertilization of so many plants depend; winged insects are blown out to sea or lost, and it is well ascertained that winged insects are much fewer on small islands than on continents. The seeds of plants are likewise blown upon the waters and lost. But there is likewise the agency of man. Four hundred years have made a great change on the vegetation of the island, which when first discovered was covered with wood, whence its Portuguese name Madeira. The first settlers found the forests impenetrable, set fire to them, and the conflagration lasted seven years. Cultivation and the introduction of European trees followed. Who can tell how many peculiar plants perished in the flames or have been elbowed out by the more vigorous introduced plants? With regard to Porto Santo, in about the year 1418, a mother rabbit and her brood were landed, and increased so rapidly that they not only consumed the native vegetation, but the cultivated, and actually drove the settlers from the island.

The Canary Islands are 300 miles further south than the Madeiras, and they are much nearer the African coast, but they contain very few African plants. There are one thousand native plants and fully a third of them are peculiar to the Canaries, and forty of these are Madeiran shrubs or trees not found in Europe. There are mountains eleven thousand feet high, but no alpine plants. There are some rocky islets that emerge scarcely one hundred feet above the surface of the Atlantic, midway between Madeira and the Canaries, the Salvages, but they do not contain African, but Madeiran and Canary plants.

Next we have the Azores, five hundred miles from Madeira. They are seven hundred and forty miles distant from Portugal, ten hundred and thirty-five from the nearest American land, Newfoundland, but nearly twice that distance from the American States in the same latitude as the Azores. The Canaries have one thousand plants, the Azores have only three hundred and fifty. Of these, thirty are Atlantic types, common to the Azores and Madeira, or the Canaries. There are scarcely any boreal plants. The common ling or heather, *Calluna vulgaris* grows here. The Azores are far removed from Europe, and much nearer to America than either Madeira or the Canaries; yet the Azores contain scarcely any American plants.

The Cape de Verd Islands, eight miles south of the Canaries show a Flora resembling that of Madeira and the Canaries, but with more African species.

St. Helena is twelve hundred miles from Africa, eighteen hundred from America, and six hundred from Ascension. When discovered three hundred and sixty years ago it was entirely cov-

ered with forests, the trees drooping over the tremendous precipices that overhang the sea. Now all is changed, five sixths of the island are utterly barren, and the vegetation that now exists consists chiefly of introduced European, American, African and Australian plants. The indigenous vegetation was destroyed by goats, introduced in 1513, which in seventy years had increased to thousands, forming flocks a mile in length. In 1810 the forests were completely destroyed, the goats having eaten the young plants and barked the old ones. The goats were then destroyed. Plants were introduced from England and the Cape, Australia and America, and speedily overran the place, extinguishing the native vegetation. From an old herbarium formed before the goats had entirely eaten up the St. Helena Flora it is ascertained that there were forty-four species of plants on the island; of these forty were peculiar to St. Helena. The botany of St. Helena resembles none other in the peculiarity of its indigenous vegetation. It is estimated that probably one hundred St. Helena plants have thus disappeared from the *Systema Naturae* since the first introduction of goats on the Island.

Ascension is much smaller than St. Helena and six hundred miles north west of it. St. Helena has been called a barren rock, but it is a paradise compared with Ascension, which consists simply of a scorched mass of volcanic matter, in part resembling bottle glass, and in part coke and cinders. There are plants however, a purslane, a grass and an euphorbia, whilst the green peak eight hundred feet high is clothed with a carpet of ferns.

Kerguelen's land, the Isle of Desolation, is in the South Indian Ocean, in the latitude of Cornwall, and within the northern limit of floating icebergs. It is 2170 miles from South Africa, 4130 from Cape Horn, and 3800 from New Zealand. Cook described it thus: "Perhaps no place hitherto discovered in either hemisphere under the same parallel of latitude, affords so scanty a field for the naturalist as this barren spot; for he might assuredly have added ten degrees to its own latitude in the southern hemisphere, and upwards of twenty in the northern, as the limits upon which such a paucity of species exist." But Cook spoke as a general observer, not as a botanist, and his account falls far short of the truth, for Spitzbergen thirty degrees nearer the Pole, boasts of five times as many flowering plants as Desolation Island. All the plants of Kerguelen's land are perennial, and the most remarkable one is a cochlearia resembling a cabbage. It is allied to no other plant in the southern hemisphere, and tells no tale as to the origin or affinities of the Kerguelen's