BENTHOS OF THE EAST AND WEST COASTS OF AFRICA AND OF THE POLAR REGIONS.

in polar areas, may be held to have produced a more rapid modification of species in tropical waters than would take place in the colder waters towards the poles, so that it may be urged that these faunas on the east and west coasts of Africa, notwithstanding their very distinct character, have not been separated from each other for so long a time as the polar faunas which more closely resemble each other. When we remember, however, that in the case of America the separation of the Atlantic and Pacific marine faunas is not so complete at the Isthmus of Panama as on either side of Africa, it may be assumed that the separation of marine faunas in the case of Africa is of much greater antiquity, possibly extending back to a time when there was a nearly universal climate all over the ocean. In the preceding extracts from Dr. Allman's Report[1] three different species of *Grammaria* are described from the Antarctic or Great Southern Ocean, each occurring in depths less than 100 fathoms in the same latitudes, but in widely different longitudes, viz., *Grammaria insignis* from Marion Island, *Grammaria stentor* from Kerguelen, *Grammaria magellanica* from Fuegia. A number of similar examples might be given from other widely separate points among Antarctic Islands and land-masses where a genus is represented by a different species in each area. This seems to show that these small land-masses in the Antarctic and Great Southern Ocean have been separated from each other for a sufficiently long time to have admitted of specific variations arising even in the cold Antarctic waters, and is consequently opposed to the view of a widely extended Antarctic continent, connecting all the other continents by their southern extremities, in recent geological times,[2] for, with such a wide extension of land in the southern ocean, we would rather look for very many circumpolar species, as in the northern hemisphere, where continuous coast lines have probably existed for immense periods of time in arctic and boreal latitudes.

CONTINENTAL LAND-MASSES AND THE DISTRIBUTION OF MARINE ORGANISMS.

The distribution of the great continental land-masses appears, from what has been stated, and from other facts that might be adduced, to have a great influence on the distribution of marine organisms, both in shallow water and in the deep sea. It is abundantly evident that the land of the continents has been most unstable, and can in no way be regarded as permanent, during the course of geological history. Not only has the land been repeatedly torn down by denuding and disintegrating agencies, but the various strata have been repeatedly shoved above and depressed below the sea-level by those internal forces called into play chiefly by the contraction of the internal nucleus of the globe, from loss of internal heat through radiation into space. We may assume that the materials of the original crust were somewhat homogeneous in composition. The destructive and reconstructive processes here indicated, together with the action of organisms, have brought about

[1] See page 1443 *ante*.

[2] The Chatham Islands: their relation to a former Southern Continent, by Henry O. Forbes, *Royal Geographical Society, Supplementary Papers*, vol. iii., p. 607, 1893.