

## THE ANTARCTIC CONTINENT IN THE QUATERNARY.

The Antarctic Continent appears to have been enlarged during the Pleistocene to the wide limits it had in Permian time, and to have thus renewed its connection with southern Africa, Madagascar, the Mauritius group or Mascarene Islands, and Australia, and probably also with South America. At the same time, Australia was enlarged eastward to New Zealand and beyond to the Chatham Islands, as well as northward along the islands in the New Zealand line; or else it derived a connection with these islands through extension of the Antarctic Continent. As shown on the Bathymetric chart, following page 20, the joining of Chatham Island to New Zealand would require an elevation of only 800 feet; and one of 1200 would unite northeastern Australia to New Caledonia; and one of 500, Australia to New Guinea.

The evidence of these connections is based chiefly on the near identity in some species of Birds and other animals of these widely distant lands. The genus *Aphanapteryx* (related to that of the Rails), known for some years from Mauritius (east of Madagascar), has been found by H. O. Forbes to have had a species on one of the Chatham Islands, — distant from Mauritius over 120° in latitude; and the two species, *A. Brœcki* of Mauritius, and *A. Hawkinsii* of the Chatham Islands, are scarcely distinguishable. Several species of New Zealand Birds were found by Forbes on Chatham Island; among them the *Kea*, a Parrot "that changed its diet in recent years, forsaking fruits, and now kills sheep by eating through their backs to their vital organs"; the flightless Woodhen, *Ocydromus Australis*, the Owl, *Glaucidium Novi-Zelandiæ*, and also a Hawk and Swan.

Further, Australia had, in Quaternary time, a *Dromornis*, closely related to the gigantic *Dinornis* of New Zealand and the *Æpyornis* of Madagascar. Moreover, Africa has the related Ostrich; and southern South America has afforded remains of a great flightless bird of Ostrich affinities. The Penguins, also flightless birds, range from South America to South Africa, Australia, New Zealand, and the Antarctic Islands. Similar facts occur among Edentates, Amphibians, and Plants.

Forbes, in view of the facts, concludes that the land of the Antarctic circle had, in late geological time, a large extension, admitting of migration between the continents and with the adjoining or adjoined islands. He remarks, also, on the glaciated condition of such a continent in a Glacial period, and its effects in producing cold or glacial conditions in the southern hemisphere.

Forbes's paper is contained in the *Proceedings of the Geographical Society of London*, October, 1892, and in the *Geological Magazine* for May, 1893; and he has another paper on the subject of zoölogical character in the *Magazine of Natural History*, July, 1893.