in the Auckland Islands (77A) points conclusively to the fact of greater glaciation in Stewart Island and southern New Zealand generally, especially if such were the result of a colder climate. Even were this glaciation correllated with a general rise of the land-surface—and this is the more probable explanation—a general but not a total glaciation would ensue. That the lands in question have never, since their plant-colonisation long ago, at the periods of former northern and southern land-extension, been altogether buried by ice is certain, since in that case the endemic (subantarctic) genera would be non-existent; nor could they have been populated as they now are, considering the diverse affinities of the species, by wind-carriage, bird-carriage, &c., alone.* But, on the other hand, there may have been glaciation sufficient to much reduce the land-surface available for plant-life, and so increase the struggle for existence amongst the plants—a conjecture which an analysis of the present floras seems to demand in order to explain some difficult points in distribution (see section on history of flora).

Within quite recent times the land-surface of Stewart Island became much smaller than it had previously been. The inland dunes point conclusively to a strait having existed in comparatively recent times, when the island would be cut into several portions. Also the quite shallow Paterson Inlet and Port Pegasus could hardly have originated otherwise than as river-valleys when the land was higher, but which, with its sinking, were gradually invaded by the sea. The flat land along the eastern coast-line also points plainly to a depression of the surface below the level of the sea, followed by a slight subsequent elevation. At its smallest, Stewart Island would consist of the Mount Anglem island, the Ruggedy island, perhaps Rakiahua island, and a high triangular wedge of land to the south; while at its greatest extent, at an earlier period, it would reach to beyond Ruapuke, be joined to the South Island, and probably extend to the Auckland and Campbell Islands.

Quite a small elevation of Foveaux Strait would at the present time connect Stewart Island with the mainland and with all its outlying islands, since the sea is very shallow, 21 fathoms being the greatest depth along the cable-line, for instance (chart, Sheet XI). Possibly such connection has taken place more than once, the bulk of the present plants having arrived during such earlier connection. At an earlier geological period there was probably much greater expansion still in the New Zealand area; but with that we are not at present concerned.

The Table Hill Range and its continuation southwards is comparatively level on its summit, and near its rounded highest portion flat stones lie on the surface, and flattened rock, reminding one of parts of Central Otago, crops out. Perhaps it is the remains of much higher land now weathered to a narrow plateau.

The rivers are numerous, but of course small, and the principal ones flow in an easterly direction. The Freshwater, Rakiahua, Toitoi, Lords, and Kopeka are the largest.

The soil is very peaty and boggy in many places, but in others there is much clay, especially as subsoil, arising from the soft granitic rock, and the deposit of peat is not great.

E. CLIMATE.

The meteorological station is situated on the island of Ulva, in Paterson Inlet, and it is self-evident that such a position can give little estimate of the general climate of a wind-swept and mountainous land; in short, the records are quite likely to be misleading.

Generally speaking, there must be a considerable rainfall at all seasons, and also, as may even be seen from the appended table, a great number of rainy days. The sky is also both before and after rain frequently overcast for a considerable period. Westerly gales are common, the wind blowing with excessive violence. There are no extremes of cold and heat, and near sea-level the amount of frost must be slight, judging from the presence of *Pelargoniums* at midwinter in the gardens and from the testimony of the inhabitants. The summer heat is probably less than at similar levels in the south of the South Island,† and I should say rarely reaches 70° Fahr. The north-east portion of the island has undoubtedly less rain and wind and more sunshine than the south, the west, or the higher levels. When it blew so furiously on Mount Anglem as to make it almost impossible to stand upright on the exposed subalpine meadow, at Half-moon Bay there was a calm day. The higher country is frequently enveloped in cloud when the lower is clear and the sun shining. The presence of the yellow-pine association in the south and west also points conclusively to a greater rainfall and number of rainy days. Indeed, the climate of the south and the mountains may be considered subantarctic, approaching that of the Auckland Islands. In the settled district near Half-moon Bay the weather is probably much the same as that of the Southland Plain, though probably the winter is milder.

In winter the snow lies for some time on Mount Anglem, but there is no general covering of the mountains with snow for any length of time, nor do I think the cold will ever fall below 15° Fahr. at the utmost, while probably it is usually much less. *In short, the popular idea of a cold climate in Stewart Island is altogether false.*

The following table gives statistics regarding the rainfall and number of rainy days on the scenic reserve of Ulva; other climatic details are given in the body of the report:—

* Since my writing the above, Professor James Park, F.G.S., has put forth a theory of total glaciation for New Zealand south of Cook Strait, and an extension northwards of "the polar ice-sheet," New Zealand north of Cook Strait alone remaining free from ice ("The Geology of the Queenstown Subdivision"; Bull. No. 7, n.s., N.Z. Geolog. Survey, pp. 40–43; 1909). In such a case the subantarctic genera *Pleurophyllum* and *Stilbocarpa*, and a host of species now confined to the southern and subantarctic floristic provinces, would have been forced to migrate in front of the advancing ice-sheet to the North Island. Yet at the present time of such plants we find there not a trace, while *Pleurophyllum* during the suppositional retreat of ice and plants did not take up its abode in the well-suited alpine region of the South Island or even Stewart Island, but returned to its original home in the Aucklands, &c., and so too with other endemic plants of the subantarctic province, especially *Azorella Selago* of Macquarie Island! Such a happening seems beyond the bounds of possibility, nor can any theories of glaciation be at variance with the facts of plant distribution.

† During the summer it is rare that a fire indoors, at any rate in the evening, is out of place.