australis (Dog Island, Centre Island, Auckland Islands, Antipodes Island, and Chatham Island). Of course, both these plants may occur on Stewart Island itself, just as does in one or two spots, easily passed over, the subantarctic grass *Poa foliosa*, a plant of the Auckland, Campbell, Macquarie, Snares, mutton-bird islands, and the Solanders. The important point here is rather the occurrence of the *Urtica* on Dog Island, which is so low that in any general recent depression it would have been submerged, and, with a rising of the land, either have received this plant from Centre Island (twenty-two miles distant), or from some nearer part of the mainland where it is now extinct. But, of course, further research may show the above plant to occur either on the mainland, Stewart Island, or both.

(*c.*) *Attempted Explanation of Some of Foregoing Difficulties.*

Twenty-five years ago, Mr. T. Kirk (Kirk, 55, p. 225) called attention to the absence of some of the plants before mentioned, but attempted no explanation, stating merely, "The absence of many species of general distribution is most remarkable, but in most cases not easy to be accounted for." But more is now known as to the distribution of species and their ecological requirements than when those words were written, and an explanation may be attempted.

Taking, first, the crucial case of the southern beeches (*Nothofagus*), this genus, which is confined to southern South America, Tasmania, eastern Australia, and New Zealand—a characteristic subantarctic genus, in fact—is also absent in the New Zealand subantarctic province, notwithstanding had there been land-connection with South America this would probably have been part of the connecting "bridge," and that the genus lived on the antarctic continent the fossils collected by the Swedish Expedition have proved.* But if we examine the distribution of *Nothofagus* in New Zealand itself we find many wide gaps in its occurrence from its northern to its southern limit. The Otira Valley, in Westland, is quite without an example of the genus, yet it is the sole tree of the vast forests on the east side of the dividing range. In the neighbouring Teremakau Valley *Nothofagus* forms pure colonies, but is not a constituent of the general forest. On the other hand, in the forest of the West Coast Sounds it is mixed abundantly with the taxads. In the southern part of the Longwood Forest it is dominant at high levels, but absent in the lower forest. On the Bluff Hill it does not occur at all, although *N. Menziesii* is found in south-east Otago (Petrie, 73, p. 573).† Bearing facts such as the above in mind, it is quite possible, then, that, land-connection notwithstanding, *Nothofagus* has never occurred on Stewart Island, or, on the other hand, that *it and the other absent genera have been less well-adapted to the Stewart Island conditions than the present commonest members of the vegetation, and so have gradually been wiped out,* or were not able to obtain a firm footing in the first instance.

The great abundance of the yellow-pine (*Dacrydium intermedium*) in the south and west of the island shows how change in soil-conditions (this the result of a different rainfall) can replace one tree-association by another.

The presence of plants in any isolated district, which one would reasonably expect to be common, in only extremely limited numbers, has always seemed to me strong evidence of the gradual disappearance of such owing to some climatic or other change, especially reduction of land-surface, increasing the struggle for existence, and favouring some plant better suited to the conditions (Cockayne, 17A, p. 316). Stewart Island supplies the following additional examples, if we accept at some period a much smaller land-surface than its maximum as demanded by the geological evidence :—

(i.) *Cordyline australis* (the cabbage-tree).—This, the physiognomic plant *par excellence* of lowland New Zealand, is only known at one spot—viz., in the Freshwater Valley, where there are but a few trees. It is quite easy to see that it could not tolerate the forest conditions, and possibly the wind-factor is too powerful, yet it is hard to believe that the plants now present are not the sole survivors of much larger numbers.

(ii.) *Plagianthus betulinus* (the ribbonwood).—This extremely common New Zealand tree would seem well suited for the forest outskirts, and yet there are only known a few trees in the Rakiahua Valley and a tree or two on the south side of Paterson Inlet, near Hapuatuna.

(iii.) *Dacrydium laxifolium* (the pigmy pine).—This common bog and wet-meadow plant of the Southern Alps would be expected as an important constituent of the subalpine boggy meadow formation, and yet it is confined to the ancient dunes of the Rakiahua and Freshwater Valleys.

(iv.) *Olearia ilicifolia* (the native holly) and *O. avicenniaefolia* (the mountain akeake).—Any New Zealand botanist would expect to encounter these, especially the former, in the subalpine scrub, and yet they are absent in that formation, occurring merely as rare lowland plants.

(v.) *Senecio elaeagnifolius*.—This shrub, so abundant in the subalpine scrub of New Zealand generally, although common in that formation on Table Hill, and as a lowland plant on the banks of the Rakiahua River, is absent on Mount Anglem, which is not only the highest mountain, but the nearest to the mainland.

(vi.) *Podocarpus dacrydioides* (the white-pine).—This very common forest-tree, which elsewhere affects the wettest forests, is confined to a few places in the forest near the North Arm of Paterson Inlet, and along the Freshwater Valley. *When in course of time these trees die, a future observer would have no reason to think the species had ever been on the island.*

(vii.) *Podocarpus spicatus* (the black-pine).—This is even a more striking and crucial case than the last. Only a few living specimens are known in Stewart Island of this common tree of the adjacent

* Dusen, P., "Die tertiare Flora der Seymour-Insel"; Wiss. Erg. d. Schwed. Südpol. Exped., 1908.

† Still greater gaps could be shown if the distribution of *Nothofagus* in the northern floristic province were considered.