WILEY

Review: Sand-Dunes of New Zealand

Author(s): H. J. Llewellyn Beadnell

Review by: H. J. Llewellyn Beadnell

Source: *The Geographical Journal*, Vol. 36, No. 1 (Jul., 1910), pp. 92-93

Published by: geographicalj

Stable URL: <http://www.jstor.org/stable/1777676>

Accessed: 01-05-2016 00:34 UTC

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at

<http://about.jstor.org/terms>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Wiley, The Royal Geographical Society (with the Institute of British Geographers) are collaborating with JSTOR to digitize, preserve and extend access to The Geographical Journal

this group offers two very distinct elements—a primitive and original one represented mostly by lower plants with the exception of two early types of higher plants—Pringlea and Lyallia, which their extraordinary adaptability has saved from destruction, and the recent migrated element of flowering plants which have mostly come from South America. The study of the fauna reveals the same contrast. The succession of a once milder climate, as evidenced in the coal measures, followed by one or more glacial extensions, as shown on the basalts, seems to account for this. The ice has not yet retreated very far, since Bouvet island is still glaciated. In point of climate, Kerguelen does not differ widely from Cape Horn. Its flora, which exhibits decided affinities with Prince Edward, Heard, and Crozet islands, only offers remote connections with Fuegia and Auckland island. Yet it seems fairly established that the bulk of its more recent flora is due to colonization from South America. Distance only, and the absence of fertilizing animals, limited the number of colonists which came over by the means now available. The various members of the Kerguelen group certainly show a pre-glacial common stock. But the divergencies evinced by the older elements preclude the idea of a union since the Cretaceous.

The Prince Edward, Crozet, and Macdonald groups display a vegetation very similar to that of Kerguelen. South Georgia is known to differ from the latter in that it has the Tussock grass (*Poa flabellata*) instead of the Azorella. On Falkland islands the place of the *Azorella selago* is taken by *Azorella glebaria*, the Balsam bog, besides the Tussock grass.

Reviewing the question of a former land connection between New Zealand and Fuegia, Prof. Schenck believes that the existence of a mild and uniform climate over the Antarctic regions in pre-Tertiary and Tertiary times, as evidenced by the various geological finds in Antarctic islands, suffices to account for the intermigration of floras through the agency of winds, ocean currents, birds, etc., without resorting to the hypothesis of a continuous land bridge. In the case of the islands south of New Zealand, the professor also agrees with Schimper, as *versus* Cockayne, that there is no necessity to assume a former connection among them, far less with Kerguelen, to account satisfactorily for the present biological relationships.

M. H.

SAND-DUNES OF NEW ZEALAND.

'Report on the Sand Dunes of New Zealand.' By L. Cockayne, PH.D. Issued by the Department of Lands, Wellington, New Zealand. 1909.

Dr. Cockayne has made important contributions to our knowledge of the botany of New Zealand, and his present report on the subject of sand-dunes and their reclamation will be specially welcomed by those who have had to contend with the encroachments of blown sand in different parts of the world. He has been ably assisted by Mr. R. Speight, B.Sc., the lecturer on geology in Canterbury College, by whom the section on the origin and material of dune sand is contributed.

The coastal dunes of New Zealand cover an area of some 314,000 acres, nearly nine-tenths of which are situated in the North Island, in the provinces of Auckland and Wellington. These sand-hills, almost wholly composed of material formed by the action of the waves on the margin of the land, blown inland from the foreshore, form a natural and valuable barrier against the encroachments of the sea. The necessity for a proper control of the dunes is, however, recognized as a national concern, since every year, owing to their steady advance inland, considerable tracts of valuable grazing land are being added to the already immense area occupied by shifting sands.

The importance of the dune question has been recognized for some time, as is

shown by the Sand Drift Act of 1907, not, however, yet put into force. The New Zealand Government hope, as a result of the detailed study now being undertaken by the Department of Lands, not only to arrest the advance of the dunes inland, but to reclaim by afforestation a large portion of the belt of country already covered by the sand. The success which has attended the afforestation of dune-belts in France and Germany justifies the expectation that equally valuable results would follow dune-reclamation in New Zealand, if carried out on similar scientific lines, modified, of course, to suit local climatic conditions.

In the account of the formation of coastal dunes the author points out how the dry sand of the foreshore is blown inland by every sea-breeze, and piled up to form a continuous ridge following the contour of the shore-line, the sand then becoming fixed by such plants as *Scirpus frondosus* and *Spinifex hirsutus*. The foredune along certain parts of the coast is of such regularity as to resemble an artificial structure. Behind the foredune is found a belt of country, of varying width, occupied by chains of sand-hills of irregular form, separated by basin-like hollows of greater or lesser extent. Owing to the absence of any one definitely prevailing wind, the sand-hills usually form a bewildering maze, the ridges lying in various directions.

In discussing the formation of dunes the author refers to the proved variation in the velocity of the wind over smooth and over uneven ground. We should doubt, however, if it is correct to assume an increased velocity where the wind is compressed in passing between two objects, such as adjacent mounds, though its erosive power may be augmented. The author appears to agree with the theory which accounts for the movement of dunes by the continual movement of grains up the windward slope and their deposition on the leeward slope (p. 12), though in a later paragraph (p. 13) he seems to ascribe the ridge of the lee face to wind eddies.

Some writers have considered the present instability of the dunes to be due entirely to the presence of man. This extreme view can easily be shown to be incorrect, though it is clear that man and his flocks, by destroying the original scrub and exposing the underlying sand, have in many places set large masses of sand in motion which had previously been more or less fixed.

The last portion of the paper is devoted to a critical study of the flora inhabiting the dune area. The report contains several pages of excellent illustrations, and also a most useful bibliography of works bearing on the subject.

H. J. LLEWELLYN BEADNELL.

POLAR REGIONS.

THE FIRST CHARCOT EXPEDITION.

'Expedition antarctique française (1903-1905) commandée' par le Dr. Jean Charcot.
Documents scientifiques. Paris: Masson et Cie. 1908.

The publication of the results of Dr. Charcot's first expedition is now almost complete. Among the recently published volumes, that of most geographical interest is Dr. Gourdon's report on the physical geography, glaciology, and petrology. Dr. Gourdon accepts the view that south of 62° S. the snow-line is at sea-level. This has been challenged by M. Arctowski, who contends that in the more outlying parts of Graham Land and vicinity it is not always the case. A number of low-lying areas free from ice occur there. No doubt heavy gales have a considerable effect in sweeping such exposed and unprotected areas free from snow, and Dr. Gourdon's suggestion that birds are not without their effect is probably a sound one. Birds deposit rock-particles, organic matter, etc., which by absorbing solar heat become no inconsiderable agents in melting, during early summer, any winter