

THURSDAY, SEPTEMBER 26, 1889.

THE TERTIARY FLORA OF AUSTRALIA.

*Contributions to the Tertiary Flora of Australia.* By C. von Ettingshausen. Memoirs of the Geological Survey of New South Wales. (Sydney: Charles Potter, 1888.)

THE work consists of translations from the German originals of two memoirs, published respectively in 1883 and 1886, with explanatory notes on the geology by the Survey officers. Ettingshausen's contribution consists of about 170 pages of "exact determinations of fossils" and a few pages of theoretical considerations and tabulated lists. In these we are informed that the "Tertiary floras" formed one universal flora, which spread over all lands outside the tropics, and "that in this flora all the elements of the different floras of the world are found combined" (p. 3). The "Tertiary period," from this point of view, consists of sub-periods of uniform conditions, susceptible of exact classification and correlation, with an orderly beginning and definite close. From another point of view it is a period of the world's history, so stupendous, so broken and diversified, that we can never hope to reconstruct a complete history from its imperfect records, and to marshal its secrets into exact order. Embraced in its vast folds are sediments, perhaps coeval with our chalk, beginning when much that is now land was the abyssal depths of ocean, and enduring while continents and seas slowly changed their places. Its episodes were the joining hands of widely severed lands and the parting of them again asunder into isolated tracts, until at last it saw the existing continents settling into their present form. So enormous was its duration, that its "newer" periods sufficed to raise and scarp the loftiest mountain ranges of the world; and its close to submerge and re-elevate again and again, to trim, alter, and finally cut into separate islands the insignificant portion of the globe we inhabit as Great Britain. During all which time, floras as distinctive as any of those now existing were swayed hither and thither by the changing climatic conditions accompanying the oscillations of land and water—here picking up recruits on their passage, and there deserted by the worn out; here coalescing with distinct hosts who struggled and thinned, or swelled, each other's ranks, and there dwindling in numbers as stations or habitats became submerged and broken up. As well might we try to arrive at a complete history of the feuds and migrations of Palæolithic man, as of the floras of the "Tertiary period," for at most each country can but contribute a few isolated facts regarding the floras that have passed over it. Thus, though we possess a broken record in the Isle of Wight of 3000 feet of Tertiaries, mostly deposited under conditions extremely favourable to the preservation of plants, this has, in the island, yielded an adequate idea of its forest vegetation for about 6 inches of its thickness. Nevertheless, remains of floras are repeatedly sandwiched in our Eocenes. These begin abruptly, with nothing leading up to them; and if we go to Ireland and Scotland we can supplement them with

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other 3000 feet of volcanic rocks with still older floras sandwiched among them, but affording no beginning to the "Tertiary formation." And our series ends abruptly, leaving an enormous gap of most critical time unrepresented between Oligocene and Pliocene, yet having revealed flora after flora as utterly distinct from each other as those of the antipodes, and with scarce any elements in common. Thus, however such conditions may have obtained in Carboniferous times, this theory of a uniform flora or fauna spreading, during the Tertiaries, over both hemispheres, from the limits of vegetation to the confines of the tropics, is altogether outside practical science, and simply leads to affinities being discovered between imperfectly preserved common types of vegetable organisms, where none such perhaps exist.

With regard to the 170 pages of "exact determinations of fossils," though no species-makers are so prolific as palæo-phytologists, our author certainly bids fair to beat the record, for *sp. nov.* is attached to as many of the fragments as the limits of the collection would well allow. The three ferns and three monocotyledons are negative, if unsatisfactory, but there would have been one less belonging "undoubtedly to the Monocotyledones," had not a stray Carboniferous specimen been included in the consignment. The single Cycad is a *sp. nov.*, bearing "a remarkable and specific relation" to a North Greenland fossil. The Coniferæ are determined on very poor material, but most are considered as at least allied to Australian forms; yet *Sequoia* is imported when the native *Athrotaxis* would better meet the case. A new genus, *Heterocladiscos*, is actually founded on some insignificant cupressineous foliage only, and another, *Pseudopinus*, is certainly curious if its supposed fruits are cones and not catkins. Of the some 150 new dicotyledons, the vast bulk would be classed as indeterminate fragments by any reasonably cautious palæontologist. The less characterized of these figure as the exotics to Australia, whilst the most satisfactory are found among the Proteaceæ and other Australian forms as *Boronia*, *Eucalyptus*, species of *Piper*, *Ceratopetalum*, &c. Many of the species are founded on single fragments, sometimes without base or tip, and unless the plates do them injustice, with scarcely any visible venation or character.

We cannot judge of the difficulties of collecting, but it certainly appears that if it is worth while to publish anything on fossil plants at the Government expense, it would be worth while to gather proper material for it. When broken specimens of leaves are obtainable, entire ones can as a rule be extracted, and when these are to hand, though exotic genera may well have flourished in Australia as in Europe in bygone ages, it will be surprising if more of them cannot be matched with plants nearer their own home.

J. STARKIE GARDNER.

OUR BOOK SHELF.

*Useful Rules and Tables.* By William J. M. Rankine. Seventh Edition, revised by W. J. Millar, C.E. (London: C. Griffin and Co., 1889.)

THIS is the seventh edition of a work which at the present day is almost indispensable to engineers in general. The increase and development of mathematics,

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