Review: Water-Waves

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Illustrations. 7s. 6d.) Though written from an absolutely opposite standpoint, this volume is at least as redolent as that just noticed of the strange atmosphere of the Pacific. We have here a writer imbued with a deep sense of the responsibility of the white man—not the missionary only, but the administrator and the trader—towards the native races (whether indigenous or Indian immigrant) under their protection. He recognizes to the full the necessity for the industrial and spiritual cultivation of the colony, and though the book bears on every page the hallmark of the mission, the former consideration is in no way subordinated to the latter; indeed, the foundation of an industrial institute is the earnest of the author's own practical endeavours. The volume includes a clear physical survey of the archipelago, and the author has studied the history of its people to good purpose.

'Empire Builders in Australia.' By Edith Ralph. (London: Fisher Unwin. 1911. Pp. viii., 252. *Map.* 5s.) This is a history of exploration and early colonization in Australia, starting with Captain Cook, and carrying the story as far as the establishment of representative government. It is of a popular character, though the absence of the usual appeal through the medium of coloured illustration comes as something of a relief. Moreover, there is more evidence than in some other works of this sort, of careful research into original sources, the results of which appear in many small details which add intimacy and intelligibility to the narrative, and there is a bibliography which might with advantage have been extended.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

WATER-WAVES.

'Waves of the Sea and other water-waves.' By Vaughan Cornish, B.Sc. London: T. Fisher Unwin. 1910. *Sketch-maps and Illustrations.* 10s. net.

In this work Dr. Cornish deals at some length and in a readable and popular way with water-waves of all known kinds, from the smallest ripple which dells the face of a pond to the storm-waves of the open ocean.

A large amount of valuable information has been collected together, and every care appears to have been taken to include only reliable data; which is particularly difficult when dealing with the subject of waves, owing to the tendency to exaggerate dimensions. The book is well illustrated by photographs taken by the author, and is divided into three parts.

In Part I. "The size and speed of deep-sea waves" is dealt with, and the relations between wave length and period, wave length and fetch, height and fetch, are fully discussed; also the relation existing between the velocity of the wind and the height and velocity of the waves produced. In dealing with the recorded dimensions of waves, Dr. Cornish has been face to face with the difficulty arising from the absence of any accurate method of measuring such dimensions. In the absence of such he has had to compare carefully the information derived from many different sources, and obtained by different methods; he has also made the measurements himself, using the best method available, and thus has arrived at conclusions which must carry considerable weight. He concludes from the records examined that the largest waves in ordinary North Atlantic storms attain a height of 43 feet, and in exceptional storms, both here and in the South Indian ocean, attain and perhaps surpass 45 feet in height.

The swell which sometimes is seen to roll in on a shore owing to a storm at sea is dealt with in an interesting way; examples are given showing how,
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by timing the intervals between the breakers as they strike the shore and the period during which the swell continues to roll in, an approximate idea may be obtained as to the distance away of the storm and its extent.

Attention is directed to the frequent occurrence of two or more sets of waves of different height and length at the same time and place, and it is shown that it is usual to have smaller waves superimposed on long swells during storms, with the result that a sort of composite wave is produced; and when the crest of the smaller wave happens to coincide with that of the longer swell the effect is to produce a wave of greater height than those immediately preceding or following. As this happens at regular intervals, depending on the relative dimensions of the waves of the two groups, it is no doubt the true foundation for the popular belief that every seventh wave striking the shore is an exceptionally big one.

The relation between wind velocity and wave dimensions is shown to be approximately constant; the velocity of the wind in miles per hour being about 2.05 times the height of the wave in feet. The velocity attained by the waves is shown to be always a little less than that of the wind producing them.

In Part II. the action of sea waves in transporting sand and shingle is considered. Dr. Cornish believes that wave agitation is effective in moving fine material as far as the edge of the continental shelf—that is, to about 100 fathoms. The laws governing the action of the sea upon its bed are dealt with soundly and in considerable detail. The determining effect of wave action on the direction of shingle transport is fully recognized; also the profound effect of what may be termed “opportunity” in determining the direction of movement of beach material. Dr. Cornish has considered this latter from the point of view of both wave and tidal action.

Part III. is devoted to stationary and progressive waves in rivers, and gives most interesting accounts of such waves under different circumstances.

The book is a valuable contribution to our knowledge of waves, and should be useful to all whose work or study brings them into contact with the sea.

J. S. O.

METEOROLOGY.

‘Meteorology, Practical and Applied.’ By Sir John Moore. Pp. 492. London: Rebman. 1910. *Diagrams and Illustrations.* 10s. 6d. net.

We are quite sure that Sir John Moore has succeeded in his object of making this second revised and enlarged edition of his book “a worthy exponent of modern meteorology.” The work is finely illustrated, especially in regard to meteorological instruments, and as a general book of reference it must rank high. It only remains for us to draw attention to a few points as they have struck us in perusing the volume.

In discussing, on p. 369, the question of the effect of snow accumulations upon climate as studied by Dr. Alexander Woeikof, the author says, “Again, the air over a snow-covered surface will become extremely cold—first, because the snow cuts off from it the warmth of the ground; and secondly, because dry feathery snow is a good radiator of heat. Then, as there is but little dust in the air over a snow-covered country upon which the solar rays can act, these rays will be unable by themselves to thaw a deep snow covering.” How, then, is it that the winter snow does melt in the northern parts of Europe, Asia, and North America? The reasoning, as it stands, is, we think, not sufficiently clear, for we are ignorant of any physical principle which would justify the assumption that the presence of dust is requisite for the heat of the sun to melt a covering of snow.