

every sense justified, and both Editor and Authors have placed zoological students under a great obligation by bringing within easy reach, and with marvellous completeness, all the essential facts concerning a group which has always ranked as one of the most difficult of comprehension. This book, we may safely say, as yet knows no rival.

It is beautifully and profusely illustrated and remarkably free from misprints. The only one which we have detected, so far, is on page 9, where constructed appears for constricted.

W. P. PYCRAFT.

*A Monograph of Christmas Island.* Physical Features and Geology by CHARLES W. ANDREWS, B.A.; with Descriptions of the Fauna and Flora by numerous Contributors. Printed for the Trustees of the British Museum. London, 1900.

THIS is a book of remarkable interest, and one of more than ordinary scientific value. It is an embodiment of the results of a ten-months' stay on Christmas Island by Mr. Andrews during 1897-98; and the Trustees of the British Museum, in publishing these results, have conferred a great and lasting benefit upon students of natural science.

Our thanks, however, are not alone due to the Trustees. "It seemed highly desirable," writes Sir John Murray in an Introductory Preface, "that this interesting island—which was evidently an up-raised coral atoll—should be carefully examined and described by a competent naturalist and geologist before being opened up by Europeans for agricultural and commercial purposes. Accordingly it was arranged with the Trustees of the British Museum that Mr. C. W. Andrews, B.Sc., F.G.S., of the Geological Department, should be granted leave to carry out this exploration. I undertook to pay all the expenses and to present a complete set of all specimens procured to the National Collection."

The physical features and geology have been written by Mr. Andrews. The zoology has been worked out by various specialists, most of whom are members of the Museum staff. Their work has been well done. Comparisons are odious, so we refrain from comment in this direction. Field-notes by Mr. Andrews are often appended to the descriptions of species, and some of these notes are of extreme interest. Perhaps one of the most vivid of these descriptions is that of the frigate-bird. "About the beginning of January," he writes, "the adult males begin to acquire the remarkable pouch of scarlet skin beneath their throat. This they can inflate till it is nearly as large as the rest of the body, and a dozen or more of these birds sitting in a tree with outstretched drooping wings and this great scarlet bladder under their heads are a most remarkable sight. When a hen bird approaches the tree the males utter a peculiar cry, a sort of 'wow-wow-wow-wow,' and clatter their beaks like castanets, at the same time shaking the wings. When they take to flight



the air is allowed to escape from the pouch, but occasionally they might be seen flying with it partly inflated."

There is a point concerning this pouch of very great interest. It is a secondary sexual character, developed during the breeding-season, but so far we have no information concerning its nature or the mechanism by which it is inflated and deflated. From an examination of spirit-specimens we believe that it will be found to be nothing more than a widening of the œsophagus, filled through the anterior nares, and held inflated by occlusion of the œsophagus by means of a sphincter at the back of the mouth.

One of the commonest mammals of the island is *Mus Maclearii*. "It occurred in swarms. During the day nothing is to be seen of it, but soon after sunset numbers may be seen running about in all directions, and the whole forest is filled with its peculiar querulous squeaking and the noise of frequent fights. . . . . As may be imagined, they are a great nuisance, entering the tents or shelters, running over the sleepers, and upsetting everything in their search for food. They seem to eat anything, and destroy any boots or skins incautiously left within their reach."

"One of the chief objects of the expedition to Christmas Island was to find out whether its structure would throw any light upon the vexed question of the nature of the foundation of atolls."

This exceedingly difficult question is most ably and lucidly handled in the concluding part of this volume.

The occurrence in an oceanic island of thick beds of lower and middle Tertiary limestone is a point of extreme interest and importance, and the demonstration of this fact forms one of the many important results obtained by Mr. Andrews. "Perhaps the most remarkable of the rocks of Christmas Island are the thick deposits of nearly pure phosphate of lime which cap several of the higher hills. This substance is probably derived from ancient (? Pliocene) guano-beds formed on the low islets which existed before the first elevation of the island, and is the insoluble residue of beds of limestone altered by this guano."

Space forbids that we should extend this notice further; enough, it is hoped, has been said to show how admirably this work has been carried out and how fruitful have been its results.

We entirely agree with Sir John Murray, who, in his Introductory Note, says, "It will, I think, be admitted that in the present elaborate report we have the best account of a true oceanic island that has ever been published."

The illustrations, which are numerous, are, on the whole, very good. The text-figures, however, and one or two of the plates are about as badly reproduced as could well be. W. P. PYCRAFT.



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