that the latter had received a little more attention. No fewer than 168 species and varieties of Foraminifera were discovered by Mr. Chapman in the dredgings sent to him, and if other groups are equally well represented in these seas there must be a rich harvest waiting to be reaped. Incidentally we may note the surprising and very satisfactory fact that of these 168 species and varieties of Foraminifera, from a practically unknown region, only four species and two varieties had to be described as new! Such a record gives one hope that some day our systematic knowledge of the marine fauna will be approximately complete. In the report on the sponges, on the other hand, Prof. Kirk mentions only two species, and of holothurians there were only three.

A large proportion of the collections, both botanical and zoological, has been worked up and reported on

FIG. 2.—Young Sea-lion (*Arctocephalus hookeri*), Carnley Harbour, Auckland Islands. From "The Subantarctic Islands of New Zealand."

by local naturalists, Prof. Benham, Prof. Chilton, Prof. H. B. Kirk, Mr. Edgar Waite, Mr. Henry Suter, Mr. E. V. Hudson, Mr. T. Brown, Mr. T. F. Cheeseman, Dr. L. Cockayne, Mr. R. M. Laing, and Mr. Donald Petrie, many of whom also took part in the expedition. Other collections were sent to specialists in other countries and reported upon by them.

Amongst the more interesting forms obtained, we may note two new species of land nemertines, from Auckland and Enderby Islands, a remarkable addition to this extremely limited group. These are described by Mr. A. D. Darbshire, who contributes some useful notes on the taxonomic value of certain anatomical characters. In addition to the purely systematic reports, we have others of more general interest. Thus Dr. Cockayne contributes a long essay on the ecological botany of the islands, with a number of

beautiful photographic illustrations, and Dr. Chilton gives us an account of the history of the scientific investigation of the islands, and a very useful summary of the biological results of the expedition, especially from the biogeographical point of view.

The results in general appear to support the current view that the existing islands of New Zealand are mere fragments of a very much larger land area, which at one time extended southwards beyond Campbell Island, eastwards beyond Chatham Island and Antipodes Island, and north-westwards towards New Guinea. Thus the fauna and flora are essentially Novæ-Zealandian in aspect, but with a large Antarctic element which may perhaps be accounted for by a former northward extension of the Antarctic continent. The existence of an Antarctic continent has, of course, long been used in explanation of certain striking resemblances between the fauna and flora of New Zealand and those of South America, but, as Dr. Chilton points out, we must also suppose that at some former time the climate of Antarctica was sufficiently mild to allow of the existence of a far more abundant animal and vegetable population than we find there to-day. Such a supposition is justified by the geological observations of recent Antarctic expeditions. Fossil leaves were found near the winter quarters of the *Discovery*, and coal still further south by Shackleton, while the Swedish Antarctic expedition met with abundant fossil plants in rocks of Tertiary age on Seymour Island, indicating a temperate or sub-temperate climate.

In conclusion, we must congratulate the New Zealand naturalists on the performance of a fine piece of work, and at the same time express our regret that they still have to labour under numerous disadvantages. Of these the want of adequate scientific libraries appears to be one of the most serious. The New Zealand Institute, with its various local branches, has for many years past played a most useful part in promoting scientific research in the dominion, and it appears to us that the Government might do well to assist in some scheme whereby the defect referred to might be remedied, and the necessary scientific literature provided, not only for Wellington, which is the headquarters of the New Zealand Institute, but also for those large provincial towns where the principal branches of the institute are situated.

ARTHUR DENDY.

BIRD MIGRATION

OF all the many problems of animated nature awaiting solution, few, if any, have of late received more attention than—perhaps the most mysterious of all—the migration of birds.

Mr. Eagle Clarke and the other painstaking observers working with him have during the last few years learnt and taught us much, but only enough to show that still, as Prof. Newton wrote some twenty years ago, "our ignorance is immense."

What is the propelling power which at the appointed seasons sets the great hosts in motion? It seems now at least probable that almost every bird is in some degree migratory, and that even the robins and thrushes that come to the windows for crumbs in winter are more often than not other birds than those which nested in the garden in the spring.

When and how in the long-past eternity were the great aerial highways from zone to zone first marked out, to last apparently for all time? Our boasted

¹ "Ornithological Notes from a South London Suburb, 1874-1909. A Summary of Thirty-five Years' Observations, with some Facts and Fancies concerning Migration." By F. D. Power. Pp. 60+chart. (London: Henry J. Glaisher, 55-57 Wigmore Street, W.) Price 3s. 6d. net.

Roman roads, Aitken streets and Watling streets are, compared to these, things of yesterday.

How is the knowledge of the chart passed on, without fault or break, from generation to generation? If old birds led the way the matter would be less incomprehensible. But, writes Herr Gätke, as "the *incontestable result*" of fifty years' watch in Heligoland:—

"under normal conditions, the autumn migration is initiated by the young birds from about six or eight weeks after leaving the nest.

"The parents of these young individuals," he adds, "do not follow until one or two months later"!

How and under what physical conditions are the journeys made?

Mr. Pycraft is a writer to whom ornithologists already owe much, and from whom they confidently look for more. His views will always carry weight, but they may change. Just now he thinks it "hardly necessary to attempt to bring rebutting evidence" to confute Herr Gätke's closely-reasoned argument that migration flights must be made at speeds which,

"Through the mists and vapours,
Amid these earthly damps,"

may well seem incredible; but, with atmospheric resistance removed, need seem no longer so.

The veteran ornithologist's dream of "the existence of a special respiratory mechanism, enabling birds to remain in strata of the atmosphere beyond the reach of all other organised beings," may yet prove true. There are things more improbable. Then we shall think nothing of flights at a speed of "a hundred and eighty miles an hour."

"Airy navies grappling in the central blue"

not many months ago seemed impossibilities. Now they seem uncomfortable probabilities.

These are a few only of the questions which have yet to be answered before we can hope to understand what the migration of birds means. The answers are not likely to be given in the lifetime of our generation, if ever. It is only by the patient collation of trustworthy observations, spread over a long series of years, that any general conclusions can be hoped for. We may sow, but others must reap.

A modest and unpretending little volume, lately published, "Ornithological Notes from a South London Suburb, 1874-1909," by Mr. F. D. Power, is a useful contribution to the general stock of knowledge of a fascinating subject. The first chapters of the book, well worth publication though they are, will appeal rather to local than to general readers.

It is interesting to know what birds are to be looked for in one's own neighbourhood, and where and when they have been seen there. But there is not much to be said of thrushes and tits in Surrey or Middlesex which is not to be noted as well in other counties.

There is the usual sad tale to tell—and it is very well told—of wild life crowded out by growing human populations.

The lake in Dulwich Park, for instance, was once, Mr. Power writes, a favourite resting-place for passing ducks. He has seen "on and about this comparatively small sheet of water seven species not observed elsewhere in the district. In one day in October, 1898, there were five scaups and four shovellers on the lake, and the tufted duck nested on the island for three or four years." The common sandpiper was a regular visitor, and the kingfisher not uncommon. Boats have been placed on the water, and "the saddened bird-lover has now little chance of even an early morning note of extra interest."

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On Mitcham Common, once a favourite nesting-place of many small birds, golf balls have taken the place of eggs.

It is in the "Migration Notes," and more especially in a broadsheet table printed at the end, that the chief interest of the volume for ornithologists living beyond the "South London Suburb" will be found, and a very real interest it is.

Mr. Power has, during a long succession of autumn migrations, kept careful records of the forces and direction of the wind and of the size and direction of the flights passing within sight of his garden. In a simple and admirably clear chart, the results of his observations are shown for every day, without a single gap, for the month of October for twenty-five years.

The rather surprising conclusions to which his observations have led him would seem to find at least *prima facie* justification in the facts tabulated. He sums up as follows:—

"It used to be supposed, and by many the idea is still held, that birds come and go with wind favouring them. . . . My observations during these many years have convinced me that migrants travel best and by choice *against* the wind. . . . My experience is [he is speaking of the autumnal migration] that the only *visible* and *sustained* migration in *numbers* is invariably in a N.W., W., or S.W. direction *almost directly against* the wind, even when such approaches a stiff breeze, the birds in their progress meeting the wind on the right or left breast."

The italics are Mr. Power's.

The photograph of "the garden from which the migration notes were taken" does not, certainly, suggest exceptionally favourable opportunities.

His little book, like Alphonse Kerr's delightful "Voyage autour de mon jardin," shows how much is to be seen by "the observing eye" without going far from home.

T. DIGBY PIGOTT.

NEW DISCOVERIES AT KNOSSOS.

ON September 16 a letter appeared in the *Times* from Dr. Arthur Evans, describing the results of his excavations this year at Knossos. All archaeologists will congratulate themselves on the fact that Dr. Evans has passed out of the path of politics, which he had essayed to tread, back into the more peaceful (?) ways of archaeology. For there were many more things that we wanted to know about Knossos, and one of them has been made clear by the work of this season. The great domed pit, the *tholos*, as it seemed to be, over which part of the southern quarter of the palace was built, has been excavated to the bottom, not without danger to the workmen. And it turns out to be a great *tholos*-like reservoir, with a spiral staircase round the inside of it, which breaks off, as in other similar cases, at what must have been the average water-level. The springs that supplied this reservoir are now dry, and no doubt were so before the place was entirely filled up. This was done, as we know from the character of the potsherds found in it, in the first "Middle Minoan" age.

"In other words the reservoir itself belonged to the Early Minoan Age, and was filled in at the time of the construction of the first Palace of which we have any existing remains—the object of the work being to obtain a secure foundation for the South Porch and adjoining parts of the outer wall. The filling materials themselves were probably supplied by the levelling away at this time of the summit of the 'Tell' of Knossos in order to gain the area for the Central Court of the Palace." There was also a smaller reservoir on another part of the mound, "and from the magnitude of the work we may well conclude that some earlier predecessor of the Great Palace already existed on the site that it has since occupied."