know and love their environment and to feel their kinship with the life of the world in body and spirit. Out of this work greater uniformity and better correlation will proceed naturally.

For pioneer conditions must pass. I once had a teacher of arithmetic who had a failing for the duodecimal system; that system had its beauties and its educational utilities also; but it has had to go. As it is no longer permissible to pasture one's cow on the common or to pick strawberries in any fence row, the time is sure to come when it will not be permissible for any teacher to teach what he pleases and when he pleases, according to the exigencies of his situation, the limitations of his knowledge or the prevailing fashion of his university. But it is this very freedom that allows the development of the possibilities of the subject; elimination will come later. May it be natural elimination, and not the forced kind that education suffers when 'men of violence take it by force.'

What is best for life is not completeness, for that is unattainable; not so much great knowledge, as a little knowledge rightly attained with an appetite for more. One danger in programs is that knowledge will be the chief end sought. But another and perhaps even greater danger is that they will be arranged from the standpoint of the specialist without due regard to the standpoint of the learner. How often has it been forgotten already that we had fingers before forceps, eyes before lenses, lenses before microscopes, jack-knives before scalpels, scalpels before microtomes. I have never found a truer statement of this matter than the following one from Professor J. Arthur Thompson: 'A circuitous course of study followed with natural eagerness will lead to better results than the most logical programs, if that take no root in the life of the student.'

I can not help feeling that science teaching, while it has earned its place, has fallen far short of accomplishing that public good for which we may reasonably hope: the diffusion of honesty and directness of method and respect for the simple truth; the abandonment of dogmatism and superstition. Perhaps it is because of the essential conservatism of human nature; perhaps it is because this teaching starts too late and finds scant lodgment in soil already stocked with the notions of an unscientific age; perhaps it is because that teaching is not yet direct and forceful enough to take hold upon the life and to touch the springs of conduct. But ultimate failure in these respects would rest especially upon biology, because of the intimate relations it bears to the life of the people.

James G. Needham.

SCIENTIFIC BOOKS.

REPORTS OF THE BELGIAN ANTARCTIC EXPEDITION.

Résultats du Voyage du S. Y. Belgica, en 1897–8–9, sous le commandement de A. de Gerlache de Gomery. Rapports Scientifiques, publiés aux frais du Gouvernement Belge, sous la direction de la Commission de la Belgica. Anvers, J. E. Buschmann. 1901 (et seq.). 4to, with plates and text-figures.

After the return of the Antarctic expedition on the Belgica, in December, 1899, by royal mandate a commission was appointed under the presidency of General Brialmont to supervise the publication of the scientific results. It is proposed to issue these in ten quarto volumes, the edition to be of 500 copies, exclusive of separate copies of the several papers, which, being issued with individual pagination, dates and covers, may appear as promptly as possible after preparation; the assembling into volumes being a subsequent arrangement.

Quite a number of these papers have already appeared, so that it seems desirable to give our readers some idea of what has been accomplished, although considerations of space will restrict our comment to the utmost limit of brevity on the present occasion. In a gen-

eral way it may be said that the manner in which the several papers are printed and illustrated is most satisfactory. The extremely barren nature of the region in which the party explored, renders many of the papers very short, but the possession of any well-founded results from this inhospitable region is a boon for which we are permanently indebted to the heroism of the explorers and the liberality of the Belgian government.

The date of issue of the several parts, as noted on the second page of each memoir, being often different from that appearing on the cover, we have cited the former in the following synopsis of the parts which have, so far, reached us.

'Astronomie, Etude des chronométres'; I., Méthodes et conclusions. G. LECOINTE (62 pp., 5 pl., 1901). II., Journal (131 pp., 1 pl., 1901).

'Météorologie. Aurores Australes.' H. ARCTOWSKI (64 pp., 2 pl., 1901).

Sixty-one auroras were observed during thirteen months. The maximum frequency was near the equinoxes, the diurnal maximum between ten and eleven P.M. A 26-day period was also plainly marked. The general characteristics were remarkably similar to those of boreal auroras, notwithstanding the great difference of the surroundings. Particularly intense displays were usually coincident with similar displays recorded simultaneously in the arctic observatories, and were observed to coincide with the appearance of sunspots.

'La neige et la givre.' A. DOBROWOLSKI (19 pp., 1903).

This memoir is chiefly devoted to a study of the forms and structure of snowflakes and hailstones.

'Observations des nuages.' A. DOBROWOLSKI (158 pp., 1902).

The observations taken are minute and full, but were much interfered with during the winter months by fog.

Phénoménes optiques de l'Atmosphére.' H. ARCTOWSKI (47 pp., 1902).

A journal of the parhelia, paraselenia, phenomena of refraction, luminous clouds, etc.

'Océanographie. Rapport sur les densités de l'eau de mer.' H. ARCTOWSKI (22 pp., 1 pl., 1901).

'Détermination de la densité de l'eau de mer.' J. THOULET (29 pp., 1 pl., 1901).

A journal and discussion of the observations and a review of methods of observation in general.

'Botany. Lichens.' Ed. A. WAINO (46 pp., 4 pl., 1903).

Fifty-five Antarctic species were collected, of which 38 per cent. are also Arctic or north European, 53 per cent. new or endemic, and only 19 per cent. common to the Magellanic region or South America, a somewhat unexpected conclusion.

'Mousses.' J. CARDOT (48 pp., 14 pl.) and 'Hépatiques.' F. STEPHANI (6 pp., 1901).

Cardot gives a general review of Magellanic bryology which will be most useful for students of mosses. A second section of the memoir is devoted to the Antarctic mosses. Many of these are finely developed, yet all except two were found to be absolutely sterile, and it is probable that fruit is produced in this region only under exceptional conditions. The species are usually associated, apparently for protection. The three endemic liverworts hide among the mosses. Twenty-seven species of mosses were noticed, of which fifteen are new. Nine of the known species are common to the Arctic regions and the new forms are generally closely related to analogous Arctic species. There is very little in common between the Magellanic and Antarctic mosses, the latter much more nearly resemble those of the boreal flora. This relationship is curiously opposed to the conditions which appear in the fauna, which has hardly any trace of bipolarity. There is in the Antarctic only one phanerogam, a grass, *Aira antarctica*, which has been found in widely separated localities.

'Zoologie. Spongiares.' E. TOPSENT (pp. 54, 6 pl., 1901).

Twenty-six species were obtained in Antarctic waters, eight monaxonids and five hexactinellids, are new. There is no indication of bipolarity in the sponge fauna, which extends to the southernmost position attained.

'Actiniares.' O. Carlgren (pp. 7, 1 pl., 1903).

'Madréporaires.' E. von Marenzeller (pp. 8, 1 pl.).

Caryophyllia was obtained in latitude 71° 09′ S., *Desmophyllum* in 71° 18′, and a new species, *Errina gracilis,* in 71° 19′. The '*Edwardsia*' stages of actinians were obtained in the tow net as far south as 71° 15′, and are described and figured.

'Seesterne.' H. Ludwig (pp. 72, 7 pl., 1903).

A detailed account of the starfishes, with much anatomy and full bibliography. Twenty species are described, eleven of which and one genus (*Belgicella*) are new and mostly deep-water forms; they were obtained to latitude 71° 24′ S. There are no bipolar species but eight are found in Magellanic waters.

'Echinides et Ophiures.' R. Koehler (pp. 42, 8 pl., 1901).

There are eight echini and fourteen brittle stars. The Antarctic fauna is a special one, not closely related to Magellanic or Arctic faunas, and has no bipolar species.

'Brachiopodes.' L. Joubin (pp. 13, 2 pl., 1901).

Two new *Rhynchonellæ, R. racovitskæ* and *R. gerlachei,* and *Crania Lecointei* n. sp., were obtained south of latitude 70° S. The fauna, as in the case of the echini, seems distinct from any other, but most of the few specimens obtained were immature or imperfect.

'Copépodes.' W. Giesbrecht (pp. 49, 13 pl., 1902).

Some thirty species, of which about half were new, and one new genus, were obtained. Twenty per cent. of the species are common to the Arctic region, or bipolar. This memoir has involved much labor and is profuse in detail.

'Acariens libres.' E. Trouessart (pp. 19, 2 pl., 1903); three Antarctic species; 'Acariens parasites,' G. Neumann (pp. 6); ('Aragniés et faucheurs,' E. Simon (pp. 7).

These papers are devoted to Magellanic forms, no Antarctic species are cited.

'Myriapodes.' C. Attems (pp. 5, 1 pl., 1902). Three Magellanic species noted. Includes also 'Collemboles.' V. Willem.

Six species treated, of which three are Antarctic, five new genera are proposed. Two of the Antarctic genera have no known close relatives elsewhere, the other, *Isotoma,* is cosmopolite. The Antarctic species have the eyes of reduced size and number, and the author thinks this may be due to the dim light of this cloudy region, and the tendency to adopt for protection a subterranean situs.

'Seals.' G. E. H. Barrett-Hamilton (pp. 20, 1 pl., 1901).

The species of the region were already known to science though imperfectly. The collections of the expedition enable the author to add important osteological and other data on the rare Ross and Weddell seals.

'Cetacea.' E. G. Racovitza (pp. 142, 4 pl., 1902).

The outfit of the *Belgica* unfortunately comprised none of the equipment needed for taking large whales, though the region abounds with the humpback, finback and other species. The true right whale (*Balæna*) is not found in the Antarctic, though it has been erroneously reported there. The author made the most of his opportunities, however, and obtained interesting photographs of the whales in different positions in the water, and many notes, in the discussion of which he settles several doubtful questions and throws light on others. He has inspected the literature of the Antarctic for references to cetacea and has tabulated the results.

'Amphineures, Gastropodes et Lamellibranchs,' P. Pelseneer (pp. 85, 9 pl., 1903); 'Cephalopodes,' L. Joubin (pp. 4).

Professor Pelseneer enumerates a few Magellanic species separately, and divides the Antarctic species into littoral, of which there are three species; fundicolar, of which there are twenty-nine, and pelagic, of which there are five. A few of the species were already known, as abyssal shells, but twenty-seven of the fundicolar species are described as new, and one is given a new generic name. Only four of the species belong to genera not found in the north polar or subtemperate regions, though the species are distinct. Of the two abyssal species previously named, one reaches the Azores, and one Prince Edward Island, in the North Atlantic. There are two forms

which are essentially Magellanic, and all three of the littoral species are related to the Magellanic fauna. The examination of the anatomy of the various forms preserved afforded opportunity for morphological notes of interest, especially those bearing on the relations of *Modiolarca, Philobrya,* etc. The cephalopods were represented only by beaks of cuttlefish found in the stomachs of seals and penguins more or less demoralized by digestive fluids and incapable of identification.

These brief indications will show how much this series of memoirs is likely to add to our knowledge of the Antarctic regions, and how much science is indebted to the intrepidity of the explorers and observers on board the *Belgica.*

W. H. DALL.

SCIENTIFIC JOURNALS AND ARTICLES.

WITH the March issue the *Bulletin of the Michigan Ornithological Club* (quarterly) enters upon its fifth volume. The issue opens with the account of 'The Discovery of the Breeding Area of Kirtland's Warbler,' by Norman A. Wood, which is practically a full life history of this race species with an account of its breeding habits. The article is illustrated by a frontispiece showing the male and female beside a nest; a photo of the egg and other views showing the nesting situation and nature of the country (Oscoda County, Mich.). Chas. C. Adams follows with an article on the 'Migration Route of Kirtland's Warbler,' which is illustrated by three maps. Under the head of Michigan Ornithologists is given a full-page plate of A. H. Griffith, director of the Detroit Museum of Art. Professor Walter B. Barrows, of the Michigan Agricultural College, announces 'A Forthcoming Bulletin on Michigan Birds' to be published by the agricultural college, and requests information from students in the state. Space is given to the Michigan Audubon Society which was organized February 27, 1904, as an auxiliary to the Michigan Ornithological Club, for the protection of birds in the state.

SOCIETIES AND ACADEMIES.

EXPERIMENTAL PSYCHOLOGY.

A MEETING of experimental psychologists was held at Cornell University, April 4 and 5. The session of Monday morning was opened by Professor L. Witmer with a paper on the 'Laboratory Investigation of Backward Children.' This was followed by a discussion of various phases of the reaction experiment, in the course of which the following papers were read: Professor C. H. Judd, 'Analysis of Movements made in Simple and Complex Reactions'; Dr. G. M. Whipple, 'The Simple Reaction as a Test of Mental Ability'; Professor C. E. Seashore (read in absence), "The Psychological Term 'Observer.'" Professor Witmer also spoke on 'Shortest Reaction Values,' and upon the 'Difference between Sensory and Muscular Reactions.' At the afternoon session, Professor Judd read a paper on 'Eye Movements studied by Photography, with Special Reference to the Müller-Lyer, Poggendorff and Zöllner Figures'; Mr. H. C. Stevens outlined a 'Study of Attention by the Method of Expression'; and Dr. J. W. Baird spoke upon recent investigations in perimetry.

The session of Tuesday morning was opened by Professor E. C. Sanford, with a report of Dr. Kuhlmann's experiments upon idiots. Mr. C. E. Ferree emphasized the importance of adaptation in fluctuations of the visual attention, and Professor W. B. Pillsbury discussed the 'Influence of Closing Eyes upon Attention Waves.' At the afternoon session Professor Pillsbury read a paper on 'An Apparatus for Investigating Torsion during Eye Movement, with some Results'; Professor Judd spoke upon the 'Imitation of Tones, With and Without Distraction'; Professor Sanford demonstrated a novel form of color mixer, and Mr. G. H. Sabine a 'Speed Regulator for the von Frey Limen Gauge.' The remainder of the afternoon was devoted to a business meeting, and to an inspection of the psychological laboratory. At an evening session, held in the psycho-educational laboratory, Dr. Whipple spoke upon 'Some Difficulties in the Use of the *A*-Test,' and demonstrated an apparatus for determining the relative legibility of the small letters.

The following papers were read by title: Dr. J. W. Baird, 'Convergence and Accommodation in the Perception of Depth'; Miss M. Castro (paper introduced by Professor J. R.