

(8) rational fractions; (9) continuation of theory of numbers (Lambert's theorem); (10) irrational functions; (11) arithmetical theory of surds; (12) complex numbers; (13) ratio, proportion, variation; (14) on conditional equations in general (elimination, transformation); (15) variation of a function; (16) equations and functions of first degree (determinants, contour lines); (17) equations of the second degree; (18) general theory of integral functions (Newton's theorem, Lagrange's interpolation formula, maxima and minima); (19) solution of problems; (20) arithmetic, geometric, and allied series; (21) logarithms; (22) theory of interest and annuities. There is a large collection of exercises: with regard to these, after reading the address, we are prepared to find that the author deprecates the idea of a reader's working through all these at the first reading: they are given for the sake of variety, and to be worked at different times of reading. Answers are given at the end. We have put the writer's own words in the forefront, that our readers may be reminded of what he has said in the past and informed of what he has now attempted to do. The result is a work of singular ability and freshness of treatment. It follows no previous leader, it will give rise to shoals, possibly, of imitators, but it will bear boiling down by the "fifth-rate workmen" whom the Professor lashes. It is not a book for our elementary classes, but it will be an excellent work to put into the hands of some of our sixth-form pupils. It is admirably adapted for thoughtful students at our Universities who have not the dread of examinations before their eyes, but can afford to go deeper into the subject than the ordinary run of our students do. The book is excellently printed and is of a handy size. We hope the second part is well advanced.

#### THE MAMMALS OF CENTRAL AMERICA

*Biologia Centrali-Americana. Mammalia.* By Edward R. Alston. With an Introduction by P. L. Sclater, M.A., F.R.S. 4to. (London: R. H. Porter, 1879-82.)

THE progress of various portions of the great work upon the fauna and flora of Central America undertaken by Messrs. Salvin and Godman has been from time to time noted in our columns. Each section of the extensive and almost exhaustive mass of material which the industry and liberality of the projectors and editors of the work have accumulated, has been placed in the hands of some one specially qualified to render them available for the purposes of science. No one could have been found more fitting to undertake the description of the mammals than the late Edward R. Alston, whose lamented and untimely death deprived zoology of one whose careful and conscientious method of work gave promise of a career of great benefit to the progress of the special branch to which he had devoted himself. He was unfortunately unable even to complete the work under review, which owes its finishing touches to the pen of Mr. Sclater.

Compared with the general mammalian fauna of the world, that of the region treated of by Mr. Alston is rather limited. 181 species are enumerated, of which 52 are Bats, and 60 Rodents. Of the *Primates*, 10 species of *Cebidae* and 1 of *Hapalidae* are described, all forms proper to the Neotropical region. Their extension

into Central America is a subject of much interest which has been particularly investigated by Mr. Sclater, whose observations are extended or confirmed by Mr. Alston. One species only (*Ateles vellerosus*) is known to inhabit Mexico, reaching as far north as the 23rd parallel. The *Insectivora* are represented only by 5 small species of *Soricidae*. The *Carnivora* are more numerous. The *Felidae* comprise the southern Jaguar, Ocelot, Margay, Eyra, and Jaguarondi, the widely distributed Puma, and the northern Bay Lynx. The dogs are all northern forms, viz., *Canis lupus*, *C. latrans*, and *Vulpes virginianus*. The *Mustelidae* are well represented by both Neotropical and Nearctic forms. The two North American Bears, *Ursus horribilis* and *U. americanus*, both extend as far as Northern Mexico, and are therefore included within the scope of the work. But the most interesting of the *Carnivora* are the curiously generalised group of *Procyonidae*. Of 8 recognised species of this family, 7 are included in the limits of Central America, the Brazilian *Nasua rufa* being the one exception. Of special interest are the rare and little known *Bassaritis astuta* and *B. sumachristi* (of which a new figure is given), and *Bassaricyon gabbi*. The *Ungulata* are, as is well known, very poorly represented in the actual fauna of the American continent, though so abundant and varied in former ages. Four deer of the genus *Cariacus*, the northern Big-Horn and Prong-buck, two Peccaries and two Tapirs are all that can be mustered as denizens of the Central American region. It should be mentioned that the distinguishing cranial characters of Dow's Tapir are carefully worked out and figured. A fair proportion of the essentially Neotropical Edentates and Marsupials extend beyond the Isthmus of Panama, including the three modifications of the Anteater type, an Armadillo, three Sloths, and seven Opossums.

The Cetacea of the coast are not included in the work, but there is a full notice of the Manatee, containing copious extracts from Dampier's quaint but graphic description of the habits and distribution of the animal in his time. As in so many other cases, the correct scientific designation of this creature is a matter of considerable perplexity. We quite agree with Mr. Alston in keeping *Manatus* for the generic name, but *australis* can hardly be accepted for any of the species at present discriminated. It was originally applied to a combination of the African and American forms, as opposed to *borealis*, the northern Manatee or Rhytina, and if retained should belong to the former, as the African habitat is mentioned first by Gmelin (1788) and Tilesius (1812), and is the only one given by Shaw (1800). Cuvier (1809) first distinguished the African from the American species by their osteological characters, calling them respectively "Lamantin du Senegal" and "Lamantin d'Amérique," which names were subsequently Latinised by Desmarest (1817) into *M. senegalensis* and *M. americanus*. This last name is therefore certainly preferable to *M. australis* for the West Indian animal. In a recent monograph of the genus, Dr. C. Hartlaub (*Zoologische Jahrbuch*, Bd. I.) has carefully investigated the synonymy, and admits two species as inhabitants of the New World, *M. latirostris* (Harlan) and *M. inunguis* (Natterer), *M. americanus* being suppressed as a compound of the two. The Central American form is referred by Hartlaub to *M. latirostris*,

*M. inunguis* being apparently confined to the upper waters of the Amazon and Orinoco; but we cannot say that we are quite satisfied with the supersession of Cuvier's name for that of Harlan.

The work is illustrated by twenty excellent coloured plates by Wolf, Keulemans, and Smit, representing new or little-known species. We cannot conclude our notice without again expressing our admiration for the scientific enthusiasm and public spirit shown by Messrs. Godman and Salvin in the manner in which they are carrying out their great undertaking.

W. H. F.

### PACKARD'S "FIRST LESSONS IN ZOOLOGY"

*First Lessons in Zoology, adapted for Use in Schools.*

By A. S. Packard, M.D., Ph.D., Professor of Zoology and Geology in Brown University. American Science Series, Elementary Course. (New York: Henry Holt and Company, 1886.)

ONE of the principal objects of the American Science Series, we are told, is to supply "authoritative books the principles of which are, so far as is practical, illustrated by familiar American facts." Another "lack" intended to be supplied by the series is that of text-books which "do not at least contradict the latest generalisations." Whatever success Dr. Packard may have attained in the first of these objects, we fear he has not always kept clear of the many pitfalls into which writers of compilations in any branch of science are in these days nearly sure to stumble. Some of his statements are certainly in contradiction to the latest generalisations of zoological science.

On p. 28 we find, in the account of *Millepora*, two forms of zooids, distinguished as "nutritive" and "reproductive." The so-called "reproductive" zooid is nothing of the kind, but simply a tentacle-bearing zooid unprovided with mouth and stomach. Its function is to assist the nutritive or gastro-zooids in obtaining nutrition, by directing small particles of food towards the latter. Of the reproduction of *Millepora* nothing is yet certainly known, but Prof. Moseley has suggested that it may probably give off a free-swimming *Medusa*.

Again our author, in enunciating the differences of animals and plants, states (p. 6) that plants "inhale carbonic acid gas, and exhale oxygen," and that animals do just the reverse. This seductive and oft-repeated antithesis is unfortunately not strictly accurate. Both plants and animals inhale oxygen and exhale carbonic acid gas. But in the case of the chlorophyll-bearing plants this process is obscured by an opposite process, by means of which the carbonic acid gas ( $\text{CO}_2$ ) is broken up into its constituent elements, the carbon (C) is absorbed into the plant, and the oxygen ( $\text{O}_2$ ) is set free. This process is, however, rather a nutritive than a respiratory process.

Speaking of *Amphioxus* (p. 139) Dr. Packard states that the water after passing through the gill-slits "enters the general body-cavity." This is an error: the water enters the *peribranchial* cavity—a perfectly distinct structure of quite different origin. Nor has *Amphioxus* "two eye-spots," but only one.

In the chapter (XXIII.) upon the "Lung-fish" (*scr.* Lung-fishes), the African *Protopterus annectens* seems to have been mixed up with *Polypterus bichir*, which does not belong to this order at all. The former fish is correctly figured (p. 168), but is named *Polypterus* just above, and is stated to be found in the "Nile," which is the case with *Polypterus*, but not with *Protopterus*.

These inaccuracies occur to us as we turn over the leaves of the "First Lessons in Zoology": we fear it would not be difficult to find others. We must also say that the woodcuts are mostly of coarse execution, and not always well drawn. On the other hand, it may be allowed that as great, or greater, faults might be found with every other attempt that has yet been made to supply a school-book of zoology. We are not acquainted with a really satisfactory work of this kind. A good text-book of zoology for beginners has still to be written. In the meanwhile, Dr. Packard's "first lessons," although going rather too deeply into certain portions of the subject, may be usefully employed for this purpose, without fear of teaching much that will have to be unlearned.

### OUR BOOK SHELF

*Russland: Einrichtungen, Sitten, und Gebräuche.* Geschildert von Friedrich Meyer von Waldeck.

*Die Schweiz.* Von Prof. Dr. J. J. Egli. (Leipzig: G. Freytag, 1886.)

THESE volumes are amongst the latest of that encyclopædic work, "Das Wissen der Gegenwart," which has now passed its fiftieth volume. Although, so far as the publication has at present gone, there are more volumes devoted to popular descriptions of countries than to any other, yet general scientific subjects are by no means unrepresented. Thus, volumes have appeared on meteorology; insects, useful and injurious; the sun and planets; light and heat; the fixed stars; the earth and the moon; comets and meteors; electricity and its applications; the nourishment of plants; sound; the ocean, &c., &c. The series is progressing rapidly, we are glad to see, with very short intervals between the successive volumes, from which it is to be presumed that the undertaking is meeting with the success which it deserves amongst the German people, although, we regret to believe, it would ruin any publisher who projected and attempted to carry out a series of this scope and magnitude in this country. In both of the volumes before us the work appears to be done as thoroughly as the space admits. Herr Meyer von Waldeck's book is the second part of a work on Russian laws, customs, and manners, and specially deals with the system of administration, and national defence, the church and clergy, and the grades of society. Prof. Egli's account of Switzerland contains a large amount of information compressed with much skill into a very small space. It is not merely a tourist's book, although the tourist who would not take a more intelligent interest in Switzerland after having read it must know a good deal about the country; it is an excellent account of Switzerland which might be read with instruction even by persons who never look forward to seeing that country. The first paragraph of the first chapter deals with the *Urzeit*, or prehistoric period; the last chapter in the book sketches the history of the St. Gothard railway. The numerous excellent illustrations must add largely to the attractiveness and popularity of the series, which, however, the books well deserve on more substantial grounds.