

ology properly so-called, while parts iii. and iv. will be devoted to the exposition of special questions and to the principles and use of instruments. A glance at the first volume of Klossovsky's "Meteorology" shows at once that it is the outcome of a long and useful career. In fact, the first meteorological labours of the author date from the year 1882, and from that time Klossovsky has not ceased to devote all his efforts to teaching at the Odessa University, and to the organisation and direction of the network of meteorological stations in the south of Russia.

Klossovsky's manual, far from being simply a work of compilation—the most complete of any now extant—is distinguished by its originality and by the wealth of the author's critical views. In many parts of the work we meet with pages where certain connections between meteorological data and those of other sciences are admirably described; e.g. at p. 179 and following pages the calorific economy of the human body is discussed. Further, original observations are met with for the first time; thus, at p. 273, the results of the actinometric observations made by Savelieff at Kiev. Again, the whole chapters devoted to solar radiation and to the study of earth temperature are interesting to read.

In no other treatise are the questions relating to underground temperature expounded in so complete a manner. The discussion of the results of the author's observations on the temperature at different depths in soil covered with grass and otherwise is especially noteworthy. On p. 334 there is a table giving for each month of the year the temperature at depths of 0.60 m. and 1.20 m. in forest and field adjoining. The forest diminishes the annual amplitude; the differences (field—forest) are  $+3.0^{\circ}$  C. and  $+2.7^{\circ}$  for the means of July,  $-0.4^{\circ}$  at a depth of 60 cm. and  $-0.2^{\circ}$  at 1.20 m. in January.

One of the characteristics of Klossovsky's work is the care with which the most recent advances have been taken into consideration; e.g. at p. 512 observations made in January, 1907, are noted, and at p. 606 the results of unmanned balloon ascents at Uccle up to April 11, 1907, are included. The titles of the chapters in this first volume are:—Composition of the atmosphere; physical properties; water in the atmosphere; the oceans; solar radiation; terrestrial radiation; earth temperature; increase of heat with depth; ocean temperatures; temperature of the lower strata of the atmosphere; atmospheric pressure; formation of hydrometeors; temperature and pressure in the upper atmosphere; abnormal departures. H. A.

*An Introduction to the Study of Integral Equations.* (Cambridge Tracts in Mathematics and Mathematical Physics.) By M. Bôcher. Pp. vi+72. (Cambridge: University Press, 1909.) Price 2s. 6d. net.

ONE main problem discussed in this tract is the following: let  $f(x)$  and  $K(x, \xi)$  be known functions, it is required to determine the function  $u(x)$  so as to satisfy the equation

$$u(x) = f(x) + \int_a^b K(x, \xi)u(\xi)d\xi.$$

Prof. Bôcher shows, mainly after Fredholm, that under certain conditions of a very general kind, a solution exists, and may actually be put into the explicit form

$$u = f(x) + D^{-1} \int_a^b D(x, \xi)f(\xi)d\xi,$$

where  $D$  is a determinate function of  $a, b$ , and  $D(x, \xi)$  a determinate function of  $a, b, x, \xi$ . That it should be possible to prove this in a simple, and at the same time rigorous manner is a good illustration of the

NO. 2080, VOL. 81]

increasing power of modern function-theory. Prof. Bôcher's exposition is very good; he begins by a heuristic discussion, which in a way resembles the ordinary method of successive approximations. Having thus been led to a certain expression as a presumptive solution, he proceeds to verify the fact that it is one.

Other workers in the same field who receive due attention are Abel, Liouville, Hilbert, Schmidt, and Volterra; and there are various subsidiary or supplementary articles of great interest.

As No. 10 of the "Cambridge Tracts in Mathematics and Mathematical Physics," Prof. Bôcher's work thoroughly helps to fulfil the object of the series; it is brief, self-contained, and stimulating, while giving sufficient reference to original sources.

*The Scaly-winged. A Book on Butterflies and Moths for Beginners.* By R. B. Henderson. Pp. xii+115. (London: Christophers, n.d.) Price 1s. net.

THE study of entomology is always extending its range, as shown by the numerous books which continue to be published especially relating to the order Lepidoptera, or butterflies and moths, which always seems to be the most popular of all, probably because many insects included in it are attractive in appearance, and easy to collect. The study is pursued systematically in several of our great public schools, and Mr. Henderson informs us in his preface that "the entomological, like most of the other sections of the Natural History Society of Rugby School, is entered by examination," and that as he did not find a suitable book for beginners to use in preparation for such an examination, he has compiled one for the purpose.

The various chapters deal with insects in general, and the Scaly-Winged in particular; metamorphosis; Psyche (imago); the Sister States (difference between butterflies and moths); bionomics: the place of Lepidoptera in the scheme of nature; the museum; appendix: note on the vision of insects; and list of some useful books for consultation, Furneaux's "Butterflies and Moths" being specially recommended. There are twenty-two useful text-illustrations of structure and apparatus, and the instructions for collecting and preservation in the chapter on the museum are particularly good.

*Fossil Plants. Sixty Photographs illustrating the Flora of the Coal-measures.* By E. A. Newell Arber. Pp. 75. Gowans's Nature Books, No. 21. (London: Gowans and Gray, Ltd, 1909.) Price 6d. net.

It is not often that anything has been done to popularise the study of the plants of the past, a subject of which the "educated layman" is, as a rule, profoundly ignorant. This neat little volume, with its beautiful photographic illustrations of some of the most important coal-plants (club-mosses, ferns and fern-like seed-plants, horsetails, sphenophylls, and early gymnosperms) is well calculated to rouse an interest in the flora of so many million years ago. The great majority of the photographs are from casts and impressions, showing the external aspect of the fossils, and these are all admirable; we have never seen a better collection. Some of the few microphotographs of sections, illustrating the internal structure, are equally good, though in one or two cases clearer examples might have been selected. The short explanatory notes (scarcely a dozen pages in all) are, as the name of the author guarantees, thoroughly sound and up to date; they are just enough to whet the reader's appetite for more, which is all that can be expected or desired of a sixpenny nature picture-book.