

ganic matter of manure, and the desirability of incorporating highly nitrogenous materials in composts add to the importance of preventing any loss of the element.

In a series of compost mixtures prepared and stored in the greenhouse it was found that loss of nitrogen to the atmosphere was prevented when powdered sulfur was included in the mixture at the rate of two pounds sulfur per hundred pounds of the mixture (dry basis).

A compost of six parts Florida soft phosphate, three parts dry soil, two parts cottonseed meal and one part dried stable manure, when kept at optimum moisture content for seven months in glass jars lightly covered, had lost, principally through ammonification, 60 per cent. of the original total nitrogen present. Ammonia nitrogen varied irregularly from the original 0.075 per cent. to 0.149 per cent. at the end of seven months. A sample obtained after six months and analyzed without drying showed a loss of 32.8 per cent. of the original nitrogen. After carefully drying this sample at low temperature the nitrogen content was further reduced from 1.193 per cent. to 0.809 per cent. (dry basis). The ammonia nitrogen of the moist sample was 0.346 per cent. and in the sample after drying showed 0.134 per cent.; ammonification proceeded rapidly during the first stages of drying.

When sulfur was included in the compost at the rate of two pounds per hundred of mixture the original nitrogen content was 1.535 per cent., and after seven months it was found as 1.567 per cent. In this mixture the ammonia nitrogen had increased regularly from 0.065 per cent. in the initial sampling to 0.767 per cent. in the ninth and final sampling, indicating that the conserving action of the added material was due to sulfonation rather than to the retarding of ammonification.

The practical significance of course is in the possibility of checking the enormous losses of a valuable form of nitrogen by a simple expedient.

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### SCIENTIFIC BOOKS

*External Insect Anatomy. A Guide to the Study of Insect Anatomy and an Introduction to Systematic Entomology.* By ALEX D. MACGILLIVRAY. Scarab Co., Urbana, Ill. 1923. X + 388 pp.

THIS text, which, in the words of the author, has been prepared to meet "the needs of students," deals wholly with descriptive, external anatomy of insects.

The introductory chapter opens with a brief histor-

ical account, followed by a synopsis of the Hexapod orders, a section on the technical nomenclature of orientation, and a section of miscellaneous definitions. Chapter two treats of the fixed parts of the head, twelve pages being devoted to a general discussion of the vertex, front, ocelli, clypeus, labrum, occiput and other parts of the head structure. Then come detailed descriptions of external features of the heads and tentoria of twelve representative species of the principal orders. The movable parts of the head are considered in the 82 pages of Chapter 3. This part is divided into eight sections dealing with the compound eyes, antennae, mandibles, maxillae, labium, the Hymenopterous maxillae and labia, the pharynx and Dipterous mouth parts. Under each section the general features of the appendages are first explained, after which detailed descriptions are given of these parts in a number of insects.

In Chapters 4 and 5, which deal with the external structure of thorax and abdomen, respectively, there follows, after a preliminary account, descriptions of the thoracic and abdominal sclerites and abdominal appendages of a few species belonging to the orders Orthoptera and Coleoptera, and in the case of the abdomen, of the Lepidoptera and Diptera also. The legs and the wings are minutely described in Chapters 6 and 7. The Comstock-Needham system of naming the wing veins is closely followed. Of the 142 text figures, all but eleven are of the wing venation. The concluding pages of the book are devoted to a list of the species described and to an index of 20 pages with accented and syllabicated technical terms.

Though intended by the author as a text-book for students' use, to the reviewer it seems that its greatest field of usefulness will be to systematists and teachers of insect morphology, for, as the author says, "a thorough knowledge of the external anatomy of insects is fundamental to their taxonomy." There is no gainsaying the statement that a uniform terminology covering all insect orders for the sclerites and appendages of the body is highly desirable. With increasing activity in systematic entomology and the discovery of new taxonomic characters the need for a more extensive, but at the same time uniform, terminology, is felt. In this book there is rendered accessible to the entomologist for the first time in many years an account in English on the comparative external anatomy of insects, with clear-cut definitions and many illustrative examples. The attempt to reconcile the systems of nomenclature of the morphologist and of the systematist is most praiseworthy.

Whether the book will be accepted as a text by many teachers of entomology remains to be seen. If adopted, the teacher must of necessity make a judicious selection of the material as there is much

more offered than can be given in the time usually allotted to such a course. The work as here outlined is unquestionably not intended for the casual student who first enters upon the study of entomology as a part of a liberal education. But, on the other hand, if an entomological student's interest can not survive the rigorous drill demanded of him by the course outlined in Dr. MacGillivray's text, then he probably has not the making of an entomologist in him.

In the opinion of the reviewer, there are more new terms proposed than appear absolutely essential, some of them replacing older ones, without any apparent justification. Thus, the term *alacardo* is applied to a part which already has two other names. And so with many others. It is true, as the author says, that names of parts of animals are not subject to rules of biological nomenclature; nevertheless, an arbitrary change of a well-established term is sure to cause confusion. Furthermore, the fact that hybrid combinations of Latin and Greek terms abound does not warrant the erection of others of a similar nature. The use of the plural form *ocellae* to designate simple or adaptive ocelli is particularly objectionable on both philological and practical grounds. It is rather doubtful also if the various mutations, *ocellalae*, *ocellanae*, *ocellarae* and *ocellasae*, to designate the several types of simple eyes, will find acceptance. It is not clear why *mesowing* and *metawing* are more appropriate than the words *fore wing* and *hind wing*. This list might be greatly extended. These faults, however, are trivial and need not interfere with the usefulness of the work.

The most serious defect is the lack of adequate illustrations. Suitable detailed diagrams of the parts of head, thorax and abdomen of a number of representative insects would greatly have enhanced the value of the book as a reference text. The fear that students would make an illegitimate use of such figures is groundless, since the illustrations might have been made representative of forms not in common use in the laboratories.

The work is a notable contribution to insect anatomy; and while in some cases there are homologies suggested upon which specialists do not agree, as, for example, that of the clypeus and front of the Cicada, nevertheless it is, on the whole, a safe guide for entomologists to follow and it should prove of greatest value to students, teachers and systematists alike.

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*The Rhind Mathematical Papyrus. Introduction, Transcription, Translation and Commentary.* By T. ERIC PEET, Brunner Professor of Egyptology in the University of Liverpool. The University Press

of Liverpool, Limited. London, Hodder & Stoughton, Limited, 1923. Folio, 1 + 136 pp., with 24 plates. Price, 63 shillings.

No lover of the history of mathematics as an integral part of the general history of the slow intellectual development of mankind can fail to welcome with keen delight the new translation of the Rhind Mathematical Papyrus, with very full notes by Professor T. Eric Peet, of the University of Liverpool. This papyrus, by far the most important of the papyri of Egypt which treat of their mathematical processes, was discovered in a building near the Ramesseum about the year 1858, and coming into the possession of a Mr. Rhind, from whom its name is derived, is now in the British Museum.

A translation into German was made in 1877 by Professor August Eisenlohr, assisted by Dr. Cantor, which, for the state of knowledge of Egyptology of that date, must be considered as a remarkable production. This translation, however, is now entirely out of date and has many small errors. During the past fifty years our knowledge of the Egyptian language has very greatly increased. Hence, a new translation and commentary have long been a desideratum.

The early pages of the scholarly work before us contain a naccount of previous studies of the Rhine papyrus, a description of the papyrus, including a discussion of its date, and an account of its contents and of documents available for the study of Egyptian mathematics. The general character of Egyptian mathematics is considered in some detail on pages 10-24. A comparison of mathematics of the Egyptians and Babylonians is indicated on pages 27-31, and this is followed by a sketch of Greek influence on Egyptian mathematics. The English translation of the original hieratic text and commentary occupy pages 33-131. The plates at the end of the volume include a hieroglyphic translation of the hieratic made from the papyrus itself.

Professor Peet has brought to his work not only the mind of a trained Egyptologist, but also an interest in mathematics, and I, who have given some years of study to the papyrus, have nothing but praise for the way in which the work has been done. While I may not agree entirely with some of the details of Professor Peet's explanations of the various mathematical processes, the care with which the translation is made and the thoroughness and clearness of the notes is very great. The book should be placed in every mathematical library in the country, and should be studied by every one who wishes to understand the mathematical processes of the Egyptians approximately seventeen centuries before Christ.

It is interesting to note in this papyrus the beginning of several of our present mathematical processes. For example, division was really performed by mul-