No other gases were present in detectable quantities until just prior to the present Mauna Loa activity.

In the collection of March 14, 1940, however, hydrogen sulfide appeared for the first time. It was easily detected qualitatively by odor, by the darkening of lead acetate paper and by the formation of yellow cadmium sulfide when the gas was passed into cadmium sulfate solution. There was not sufficient hydrogen sulfide to make its quantitative determination possible.

On April 7, 1940, volcanic activity broke out at the summit of Mauna Loa. Samples of solfataric gas collected at Kilauea on April 11 again showed the presence of hydrogen sulfide, and samples collected on April 21 likewise contained hydrogen sulfide. The collections of May 10 and June 18 showed no hydrogen sulfide, even though Mauna Loa was still erupting, although with greatly lessened activity.

The appearance of hydrogen sulfide in the Kilauea solfataric gases just prior to Mauna Loa activity may have been a premonitory sign. If so, this appears to afford an exceedingly valuable method of forecasting volcanic outbreaks. Furthermore, this incidence of hydrogen sulfide suggests a close relationship between solfataric activity and primary volcanism.

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SCIENTIFIC BOOKS

A GEOLOGICAL EXPEDITION TO THE SUNDA ISLANDS

Geological Expedition of the University of Amsterdam to the Lesser Sunda Islands in the Southeastern Part of the Netherlands East Indies, under the Leadership of H. A. Brouwer. Vol. 1, 348 pages, with numerous plates, maps and sections, 1940. Amsterdam (American sales agent, Nordeman Publishing Company, New York). Price, $8.40. Work to be completed in four volumes, by 1941; price for the set, $33.50.

THE able geologists and geophysicists of Holland have already shown that the vast East Indian Archipelago is supremely important for the genetic problems of continental stability, the origin of sea basins and the origin of mountain chains. Because it is a key region for investigations of terrestrial dynamics, the new data recorded in this four-volume symposium, due to the energy of Professor Brouwer, are particularly welcome. The present volume, on the geology and paleontology of the Netherlands half of the island of Timor, is written by D. Tappenbeck, A. L. Simons (both dealing with the general geology); by F. A. H. W. de Marez Oyens, another member of the 1937 expedition; and by Professor J. Wanner, of Bonn University. Oyens describes the Permian crinoids of Timor, and Wanner the Permian blastoids. Throughout, the emphasis is on the details of observation, in field and laboratory. The projected fourth volume "will coordinate the different contributions [including also those by seven other members of the expedition] and give the general conclusions which might arise."

The oldest system of Timor rocks, crystalline schists, were carefully studied; their age is pre-Triassic, but could not be more closely determined. Sedimentary series belonging to the Permian, Triassic, Jurassic, Cretaceous and Tertiary were found; unfortunately, their respective thicknesses are not given. An outstanding conclusion of Tappenbeck is that the Tertiary epoch of intense folding and thrusting should be placed in Oligocene time, rather than in the mid-Miocene, as so long believed by other investigators. Since Timor lies in the great "negative strip" of gravity anomalies, discovered by Vening Meinesz, this change of date for the major, orogenic disturbance of Tertiary time has significance for the general theory of mountain-making. The Simons chapter describes large masses of serpentine, especially voluminous along the north shore of the island; here is another proof that eruption of ultra-basic, igneous rock is an accompaniment of the intense deformation along the principal mountain arcs.

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THE INVERTEBRATES

The Invertebrates: Protozoa through Ctenophora. By LIBBIE H. HYMAN. First edition. 726 pp. McGraw-Hill Publications in the Zoological Sciences. A. Franklin Shull, consulting editor. 1940.

DR. HYMAN is to be congratulated on the appearance of the first volume of her courageous project to furnish a reasonably complete and modern account of the morphology, physiology, embryology and biology of the invertebrates. The real need of an accurate and critical survey of this sort in English has long been recognized alike by teachers, professional zoologists specializing in other fields and by advanced students. The author has achieved a satisfying measure of success in this important, confused and difficult field. "It is obviously impossible," Dr. Hyman says in her preface, "for any one person to have a comprehensive first-hand knowledge of the entire range of invertebrates, and consequently a work of this kind is essentially a compilation from the literature." It is obvious to the reader that the present work is not a mere rehashing of the literature but a fresh study of a

wealth of fascinating material. Dr. Hyman has had the interest and energy to engage herself in the Herculean task of dealing at first hand with many of the animals she is discussing. The majority of the profuse illustrations were made by the author directly from living and prepared specimens. For this purpose several summers were spent at various marine stations.

The original conception of the work was a three-volume treatise: one volume devoted to the non-coelomate invertebrates, a second volume for the coelomate forms, except arthropods, and a third volume for the arthropods. However, after six years of intensive work, it developed that the first volume would have to be split into two parts: (1) the lowest invertebrates through the radiate forms and (2) the acoelomate and pseudocoelomate bilateral animals. The present volume of 726 pages is part one. The book opens with two short introductory chapters, the first on protoplasm, the cell and the organism, and the second on classification. During the discussions of the fundamental nature of the developmental process and the nature of life there are challenging and provocative analyses of the chromosome-gene theory and the mechanistic theory. The chapter on classification summarizes previous taxonomic practices and briefly gives the author's reasons for her present scheme: 22 phyla based primarily on anatomical and embryological facts and on a number of important characters (not any one arbitrarily chosen feature) including general grade of construction, type of symmetry, presence and kinds of body space, absence or presence of an anus, presence of segmentation, possession of appendages, presence and nature of excretory, respiratory and endoskeletal systems. Dr. Hyman's procedure seems sound, conservative and workable. It should form a useful basis of discussion and further investigation. The Mesozoa and the Parazoa are separated from the Eumatozoa, which are divided into radiate and bilateral (in preference to diploblastic and triploblastic) grades. Among the Bilateria, three types of structure are recognized (following Schimkevitch), namely, the acoelomate, pseudocoelomate and eucoelomate types. "Such a division stands firmly on a realistic anatomical basis and eschews all theoretical vaporizings such as the alleged degradation of flatworms from annelids, the coelomic nature of the gonad cavities, and similar ideas." The Eucoelomata are subdivided into the Schizocoela and Enterocoela (Huxley). A suggestive phylogenetic tree (which readers are cautioned not to take too literally) derives the Bilateria from a primitive flatworm by way of a stereogastrula type of ancestor. Above the ancestral flatworms, the phyla are arranged in two main lines of ascent, the groups with determinate cleavage and mesoderm originating from definite cells or bands (Protostomia) and the groups with indeterminate cleavage and mesoderm and coelom arising as endodermal sacs (Deuterostomia).

The bulk of the book is devoted to detailed consideration of the Protozoa, the Mesozoa, the Porifera, the Cnidaria and the Ctenophora. The treatment of each group is introduced by a brief historical résumé. Then follow explanations of characters of the Phylum, classification, general morphology and physiology, discussion of the major divisions, phylogenetic and general considerations—including embryology, behavior, regeneration and ecological relations. Paleontology is given brief consideration. Each chapter is followed by an extensive and well-chosen bibliography, brought up to date. The author's approach, throughout, has been basically morphological. Not only gross structure but histological and cytological features are elucidated. The method of presentation is such that the text is to a large extent a discussion and elaboration of the illustrations. Specificity, clarity and economy are effectively achieved by this type of organization. The volume contains 221 figures, most of which occupy a full page and include a half dozen or more drawings, largely original. The rest are selected from the literature; many are redrawn. All are skilfully executed and well labeled. The "type" method has been avoided, since one of the major purposes of this treatise is to give an extensive account of the range of morphological variation to be found within each group. Frequently, original observations fill gaps in the literature and correct wide-spread misconceptions even about some of our common laboratory animals.

For the average zoologist, perhaps the greatest value of this book will be the opportunity of convenient access to the perplexing vocabulary of invertebrate morphology. Terms are explained clearly, often in relation to their homologues. In addition, the author has made an earnest effort to bring order out of confused terminology. As one example, such words as ectoderm, entoderm and stomodaeum have been limited to embryological stages. In their stead, the terms epidermis, gastrodermis and pharynx have been used for adult animals. One might be tempted to quibble with minor points such as the preferred definition of the cell or the concept of the acellularity of the Protozoa. Taxonomy can not fail to be controversial.

The technical execution of the book is admirable. There are surprisingly few typographical errors. The book is well indexed. It is earnestly hoped that the author will be able to complete the other volumes of the treatise, as visualized. Biology and the standard of biological teaching are certain to benefit by this capable revaluation of the invertebrates, in the light of recent progress, by an investigator of mature experience.

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