

The Invertebrates. vol. 5, *Smaller Coelomate Groups*. Chaetognatha, Hemichordata, Pogonophora, Phoronida, Ectoprocta, Brachiopoda, Sipunculida, the coelomate Bilateria. Libbie Henrietta Hyman. McGraw-Hill, New York, 1959. viii + 783 pp. Illus. \$13.50.

In this volume the structure of Libbie Hyman's imposing virtuoso feat takes on a slightly new aspect. Terminations are reached; the definitive scope of the work is delineated; advances and revisions are reviewed. Perhaps a new note of personal communication is introduced in this volume. Those invertebrate zoologists who feel so deeply in debt to the author cannot fail to feel keen disappointment on learning of her expectation that the Arthropoda will not be covered in her considerations. The testimony of substantial recognition, together with all possible assistance in the furthering of the work, should be unstintingly offered by her colleagues to encourage her in the realization of her project. It is a distinct pleasure, on the other hand, to see Libbie Hyman assume a very slight degree of the authority which is so rightfully hers, when she takes a few hearty pokes at zoological misconceptions which refuse to die. As always, her illustrations and her completely lucid exposition combine to evoke, in a way unexcelled in the literature, a sense of the reality of the creatures under discussion as vital organisms in an authentic environment. Such a presentation for any one phylum would have markedly enriched zoology. The compilation she has given us is unparalleled.

In chapter 18, "Phylum Pogonophora," the first presentation of a group of outstanding interest to students of the invertebrates becomes available. The classification and the arguments for the status of the group provided by Ivanov are accepted, but his proposal of a new name, Brachiata, is rejected. This chapter is further important for its closing section, "concluding remarks on the Deuterostomia." There it is stated that the consideration of the enterocoelous coelomates is concluded. The term *Schizocoela* is replaced with the category protostomatous coelomates; these are introduced, in the succeeding chapters, with the lophophorate phyla Phoronida, Ectoprocta, and Brachiopoda and with the phylum Sipunculida. Chapter 21, "Brachiopoda," concludes with a review of the status of the lophophorates that shows a still unelucidated connection between protostomes and deuterostomes.

Chapter 23, "Retrospect," recounts advances pertaining to groups covered in previous volumes, comments on viewpoints, and includes a bibliography of recent references. Obviously thoughtful considerations and reconsiderations are embodied in this compact presentation.

The usual meticulous documentation of the treatise continues, over 40 pages of concise but completely informative bibliography being included in the volume.

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New Books

Advances in Enzymology and Related Subjects of Biochemistry. vol. 21. F. F. Nord, Ed. Interscience, New York, 1959. 521 pp. \$12.50. Contents: "Mitochondrial metabolism," W. C. Schneider; "Electron transport and oxidative phosphorylation," D. E. Green; "Durch metall-ionen katalysierte vorgänge, vornehmlich im bereich der seltenen erdmetalle," V. E. Bamann and H. Trapmann; "Enzymic reactions in the synthesis of the purines," J. M. Buchanan and S. C. Hartman; "The enzymic synthesis of pyrimidines," P. Reichard; "The biosynthesis and function of carotenoid pigments," T. W. Goodwin; "Folic acid coenzymes and one-carbon metabolism," F. M. Huennekens and M. J. Oxborn.

Buffon. Storia naturale. Primo discorso, *Sulla maniera di studiare la storia naturale*. Secondo discorso, *Storia e teoria della terra*. A cura di Marcella Renzoni. Boringhieri, Turin, Italy, 1958. 581 pp. L. 6000.

Breeding Field Crops. John Milton Poehlmán. Holt, New York, 1959. 447 pp. \$8.50.

A Brief Text in Astronomy. William T. Skilling and Robert S. Richardson. Holt, New York, rev. ed., 1959. 363 pp. \$2.95.

Brimstone. The story of the Frasch sulphur industry. Williams Haynes. Van Nostrand, Princeton, N.J., 1959. 327 pp. \$5.95. This volume tells the story of the American sulphur industry from the pioneering days in the swamps of Louisiana through the years when the industry was developing and up to today's new sulphur recovery developments in France and Canada. This book is based on *The Stone That Burns*, published in 1942.

Chemistry of Carbon Compounds. A modern comprehensive treatise. vol. VI, pt. B, *Heterocyclic Compounds*. E. H. Rodd, Ed. Elsevier, Amsterdam, Netherlands, 1959 (order from Van Nostrand, Princeton, N.J.). 583 pp. \$24.

Children in Practice. John Peterson. Cambridge Univ. Press, New York, 1959. 234 pp. \$4.75.

Cholera. WHO Monogr. No. 43. R. Pollitzer. World Health Organization, Geneva, 1959 (order from Columbia Univ. Press, New York). 1019 pp. \$20. The 11 chapters that constitute the main part of this book were originally published in the

Bulletin of the World Health Organization. Two chapters were written in collaboration with William Burrows and Satya Swaroop. Chapter 1 (50 pages) is devoted to a history of the disease.

Creativity and Its Cultivation. Harold H. Anderson, Ed. Harper, New York, 1959. 306 pp. \$5.

Current Problems in Allergy and Immunology. Papers dedicated to Bela Schick on the occasion of his 80th birthday. William Kaufman, Ed. Karger, Basel, Switzerland, 1959. 1016 pp. \$14.40. The volume contains articles by 100 medical scientists and physicians on topics in allergy and immunology. A total of 66 papers were contributed. A bibliography of Schick's scientific papers is included.

Discussione sulla fisica moderna. Werner Heisenberg, Max Born, Erwin Schrödinger, Pierre Auger. Edizioni Scientifiche Einaudi, Turin, 1959. 131 pp. L. 1200.

Dosimetrie und Strahlenschutz. Physikalische und technische daten. R. G. Jaeger. Thieme, Stuttgart, Germany, 1959 (order from Intercontinental Medical Book, New York). 294 pp. \$11.80.

Flying Saucers. A modern myth of things seen in the skies. C. G. Jung. Translated from the German by R. F. C. Hull. Harcourt, Brace, New York, 1959. 186 pp. \$3.95.

Free Associations. Memories of a psychoanalyst. Ernest Jones. Basic Books, New York, 1959. 264 pp. \$5.

Galileo Galilei. Discorsi e dimostrazioni matematiche intorno a due nuove scienze. A cura di Adriano Carugo e Ludovico Geymonat. Boringhieri, Turin, Italy, 1958. 887 pp. L. 7000.

A Guided Tour through Space and Time. Eva Fenyo. Prentice-Hall, Englewood Cliffs, N.J., 1959. 191 pp. \$3.50.

Industrial Microbiology. Samuel Cate Prescott and Cecil Gordon Dunn. Ed. 3 revised by Cecil Gordon Dunn. McGraw-Hill, New York, 1959. 953 pp. \$17.50.

Information and Error. An introduction to statistical analysis. Solomon Diamond. Basic Books, New York, 1959. 319 pp. \$5.

Infrared Absorption Spectra Index for 1945-1957. 126 pp. \$7. This volume contains approximately 16,000 references to published infrared absorption spectra in 33 American and European journals and in one book. These references indicate the journal, volume, and page where an actual spectrum of the compound is reproduced. For many compounds a number of references will be found; for others, there may be only one. The literature from 1945 to 1957 inclusive is indexed and it is expected that subsequent literature will be covered in a supplementary index.

Introduction to the Laplace Transform. Dio L. Holl, Clair G. Maple, Bernard Vinograd. Appleton-Century-Crofts, New York, 1959. 181 pp. \$4.25.

An Introduction to Statistical Mechanics. J. S. R. Chisholm and A. H. de Borde. Pergamon, New York, 1959. 169 pp. \$6.

Ion Exchange. A laboratory manual. J. E. Salmon and D. K. Hale. Academic Press, New York; Butterworths, London, 1959. 143 pp. \$5.

Labor-Management Relations. Charles

Wiedemann. Reinhold, New York; Chapman & Hall, London, 1959. 156 pp. \$3.75.

Leonhard Euler. Lettere a una principessa tedesca. A cura di Gianfranco Cantelli. Boringhieri, Turin, Italy, 1958. 960 pp. L. 8000.

Native Peoples of South America. Julian H. Steward and Louis C. Faron. McGraw-Hill, New York, 1959. 492 pp. \$11.50.

Natural Child Rearing. Eve Jones. Free Press, Glencoe, Ill., 1959. 288 pp. \$4.95.

Navaho Art and Culture. George Mills. Taylor Museum of the Colorado Springs Fine Arts Center, Colorado Springs, 1959. 273 pp. \$4.50.

Organic Sequestering Agents. Stanley Chaberek and Arthur E. Martell. Wiley, New York; Chapman & Hall, London, 1959. 631 pp. \$25.

Paris Symposium on Radio Astronomy. IAU Symp. No. 9, URSI Symp. No. 1. Ronald N. Bracewell, Ed. Stanford Univ. Press, Stanford, Calif., 1959. 624 pp. \$15. This volume contains the research papers presented at the Paris symposium, 1958. It also contains a number of detailed summaries of the background and current state of major fields of radio astronomy and a report of discussions at the symposium. The main topics covered are moon reflection, radio emission from Jupiter and other planets and from the quiet and active sun, radio studies of the discrete radio sources (radio stars), radio evidence on the large-scale structure of

our own galaxies, cosmology, and mechanisms by which solar and cosmic radio waves are generated.

The Principles of Humane Experimental Technique. W. M. S. Russell and R. L. Burch. Methuen, London, 1959. 252 pp. 30s.

Principles of Organic Chemistry. T. A. Geissman. Freeman, San Francisco, Calif., 1959. 643 pp. \$7.

The Process of Aging in the Nervous System. James E. Birren and William F. Windle, Eds. Thomas, Springfield, Ill., 1959. 236 pp. \$7.

Production of Isotopes. A portion of the proceedings of the all-union scientific and technical conference on the Application of Radioactive Isotopes, Moscow, 1957. English translation. Consultants Bureau, New York, 1959. 139 pp. \$50.

Psychology and Human Performance. An introduction to psychology. Robert M. Gagne and Edwin A. Fleishman. Holt, New York, 1959. 501 pp. \$7.25.

Recent Research in Molecular Beams. A collection of papers dedicated to Otto Stern. Immanuel Estermann. Academic Press, New York, 1959. 198 pp. \$6.50.

River Pollution. vol. 1, *Chemical Analysis.* Louis Klein. Academic Press; New York; Butterworth, London, 1959. 216 pp. \$6.

The Rocket Handbook for Amateurs. An illustrated guide to the safe construction, testing, and launching of model rockets. Charles M. Parkin, Jr. Day, New York, 1959. 306 pp. \$5.95.

The Science of Biology. Paul B. Weisz. McGraw-Hill, New York, 1959. 810 pp. \$7.95.

Scientific Russian. George E. Condoynannis. Wiley, New York; Chapman & Hall, London, 1959. 237 pp. \$3.50.

Six Allies and a Neutral. A study of the international outlooks of political leaders in the United States, Britain, France, West Germany, Italy, Japan, and India. Lloyd A. Free. Free Press, Glencoe, Ill., 1959. 223 pp. \$5.

Source Book of Industrial Solvents. vol. III, *Monohydric Alcohols.* Ibert Mellan. Reinhold, New York; Chapman & Hall, London, 1959. 282 pp. \$10.

The Soviet Citizen. Daily life in a totalitarian society. Alex Inkeles and Raymond A. Bauer. Harvard University Press, Cambridge, Mass., 1959. 553 pp. \$10.

Substitution at Elements Other than Carbon. Fifth Weizmann Memorial Lecture Series, May 1958. C. K. Ingold. Weizmann Science Press, Jerusalem, Israel, 1959. 52 pp.

Techniques of Polymer Characterization. P. W. Allen, Ed. Academic Press, New York; Butterworths, London, 1959. 270 pp. \$9.50.

Words of Science and the History behind Them. Isaac Asimov. Houghton Mifflin, Boston, Mass., 1959. 266 pp. \$5.

The World's Metropolitan Areas. International Urban Research Institute of International Studies, Univ. of California Press, Berkeley, 1959. 125 pp. \$3.

rotations per second for $T = (J.D., 2,436,000)$ days. For the theoretical discussion below, it is convenient to use the equivalent form, with t ($= 86400 T$) in seconds:

$$\omega = 2.72e^{-5.51 \times 10^{-8}(t - t_0)} \quad (1a)$$

rotations per second.

Now the general equation of rotational motion of any body about an axis having moment of inertia I , under a damping couple C , is:

$$\omega = \omega_0 e^{-C(t-t_0)/I\omega} \quad (2)$$

Since, for Vanguard I, the moment of inertia I about the spin axis was measured before launching as $67,885 \text{ g-cm}^2$, Eqs. 2 and 1a show its observed total damping coefficient to be:

$$C/\omega = 67885 \times 5.51 \times 10^{-8} \text{ g-cm}^2/\text{sec} \\ = 0.00374046 \text{ g-cm}^2/\text{sec} \quad (3)$$

We assume practically all this quantity to be due to magnetic damping couple on the satellite, since, at its range of height, other possible factors, such as aerodynamic drag on the antennas, would be relatively negligible. For Vanguard I, its almost continuous and complete spherical shell, 8.13 cm in radius, of aluminum alloyed with 2.5 percent magnesium and 0.25 percent chromium

Magnetic Damping of Rotation of Satellite 1958 β 2

Abstract. From over 200 observations of the decreasing spin rate of Vanguard I made during the year since its launching, eddy-current induction theory yields 0.115 ± 0.001 gauss as the mean magnetic field normal to the spin axis of the satellite. This measured value agrees with that deduced from Bauer's model of the earth's dipole field.

The theory of the exponential decay of rotation of all celestial bodies due to magnetic induction of electric currents in them may now be demonstrated (I) experimentally with artificial satellites. Vanguard I (1958 β 2) has been tracked for a year by the Minitrack Branch of Project Vanguard, by radio signals from

dipole antennas on the satellite. The signals are at maximum intensity for the antenna axis perpendicular to the line of sight. The time rate of this intensity variation, as a means for measuring the spin rate of the satellite, has been regularly deduced from station passage traces and tabulated for over 200 dates during the year since launching. Ten-day means of these spin rates, plotted in Fig. 1 on a logarithmic scale against the date, closely follow a straight line for which the relaxation time (that is, a reduction factor of $1/2.718$) is 210 ± 3 days, from four determinations. Since the rotation rate ω was 2.72 rotations per second on Julian Date 2,436,280 (T_0), the empirical equation generally representing it is:

$$\omega = 2.72e^{-(T-280)/210} \quad (1)$$

Reports