an organized coverage. Perhaps it is too early to expect such, but at least there could have been more synthesizing commentary for these 1184 pages than a 1½-page introduction: ideally, about four pages for each group of ten papers or so, to place them in context for the nonspecialist.

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Protozoology as Cell Biology

Protozoology. KARL G. GRELL. Third (first English) edition. Springer-Verlag, New York, 1973. viii, 554 pp., illus. $43.90.

For well over 100 years, German authorities dominated the field of protozoology, from such early monographers as Ehrenberg through such leaders as Bütschli, Haeckel, R. Hertwig, and Stein to Doflein, Hartmann, Jollos, and Schaudinn at the turn of the century (followed later by Kahl, Reichenow, and others). This dominance was reflected in the outstanding textbook, *Lehrbuch der Protozoenkunde* by Doflein and Reichenow, which held sway —seldom contested—from the time of its first appearance in 1901 until its sixth and last edition in 1949–53. This sturdy, many-paged work stood off such occasional rivals as the generally slimmer volumes of Calkins, Minchin, Wenyon, Hegner, and Kudo and was much copied and imitated. With the advent of World War II, however, and the tremendous postwar surge of interest in protozoological research—especially among American and other English-speaking protozoologists, parasitologists, and cell biologists—the German grip on the field weakened rapidly.

Once again, leadership in the field was reflected in textbook production. Witness the appearance, in the period from 1948 to 1973, of some 20 general treatments, six by American authors, six by Englishmen, the others by Russian, French, Czech, Polish, or Mexican workers. In the same 25 years, over two dozen substantial monographs or books appeared on special protozoan groups or even individual genera (*Amoeba, Blepharisma, Eimeria, Euglena, Paramecium, Plasmodium, Stentor, Tetrahymena,* and *Trypanosoma*); numerous invertebrate zoology texts were published (not to mention parasitological treatises heavily stressing protozoan species and a scattering of taxonomic and ecological booklets on ciliates and flagellates); several review volumes in cell biology and protozoology appeared; and four International Congresses of Protozoology were convened. German leaders in these enterprises have practically been countable on the fingers of one thumb.

Although high-class research in various important aspects of protozoology was being carried on in scattered laboratories in Germany during the postwar period and was published in the best of journals, it remained for Karl Grell to lead the revival of protozoology in his country in the most visible way—by publication of his outstanding, thoroughly modern textbook, first in two German editions (1956, 1968) and now in English.

Grell initially saw his volume as having limited, essentially European, usage, and early demands for an English translation surprised him. By the time he managed to get away from the research bench and the administrator's desk long enough to supervise a translation, he realized that the English version would have to be more than that: it would have to be updated and revised. The result is a pronounced success, in the opinion of this reviewer (and user) of the new edition.

An internationalist well aware of advances in biological research in the major laboratories of the world, Grell was one of the first to sense that protozoology is becoming increasingly wedded to cell biology, especially at the molecular and genetic levels. His innovative book treats the subject in large measure from a cellular approach, emphasizing areas in which he himself has a special interest and firsthand research experience. The outstanding features are easily identifiable: numerous clear and precise drawings and beautiful light and electron micrographs; scholarly and detailed exposition of a variety of cytological and genetic problems closely related to modern cell biology; neat presentation of "developmental cycles" of selected species (mainly parasitic forms); a thorough bibliography, a unique list of protozoological films, and well-prepared subject and generic (including treated species) indexes.

Of a total of 554 pages, Grell devotes 120 to cytology (including nuclear studies), ultrastructure, and selected biochemical-biophysical subjects and 155 to genetics, sexuality in general, cell cycles, and morphogenesis. References and indexes occupy some 87 pages. On the other hand, only 103 pages are allotted to matters pertaining to taxonomy and classification, including comparative morphology, evolution, phylogeny, and treatment of the dozens of representative groups comprising the major classes; only 73 pages are given to physiology and biochemistry and only 15 to parasitism per se; and there is no exclusive consideration of modern ecological problems. Furthermore, some of the information given on the slighted subjects, such as systematics, is quite dated (though there are scattered excellent exceptions to this) or overweighted in favor of a few select groups, such as the foraminiferans or radiolarians.

But much of the wealth, the usefulness, and the uniqueness of this authoritative textbook of protozoology also derives from the conscious selectivity and fine discrimination of the author. He realizes the goal he set for himself, as both the critic and the user should keep in mind when perusing this handsomely produced volume which restores a leadership role to the country that dominated the field in decades past.

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Protein Anomalies

Alpha-Fetoprotein and Hepatoma. Papers from a symposium, Tokyo, Dec. 1971. HIDEMATSU HIRAI and TORU MIYAJI, Eds. University Park Press, Baltimore, 1973. viii, 320 pp., illus. $29.50. GANN Monographs on Cancer Research, No. 4.

In a word, this volume is a "must" for anyone interested in developmental biology, genic control of protein synthesis, protein purification and immunochemical assays, or clinical pathology and clinical medicine. An exaggeration? Not really, since such is the nature of the subject: serum α-fetoprotein. Normal synthesis of α-fetoprotein occurs primarily in the embryo or fetus. In the human conceptus, the sites of synthesis are the liver, yolk sac, and gastrointestinal tract, and the rate of synthesis reaches a peak at 10 to 14 weeks of fetal development. At or near birth, synthesis of α-fetoprotein is sharply repressed, and the serum concentration of the protein falls rapidly. Repression is not complete, however, as several papers in this monograph reveal:

α-fetoprotein concentrations of 20 nanograms per 100 cubic centimeters of blood or less can be found in normal adults by means of radioimmunoassay. In 1963, Abelev reported elevated serum concentrations of α-fetoprotein in adult mice with hepatoma, and a year later Tartarinov reported a similar observation in patients with hepatoma. The anomalous presence of α-fetoprotein in adults was thought to be diagnostic of hepatoma for some time thereafter, until reports confirming the early observations of Masopust and his colleagues began to appear: elevated serum α-fetoprotein concentrations were sometimes present in patients with certain gonadal tumors and even in patients with hepatitis. Patients with gastric carcinoma, especially when metastasis to the liver has occurred, may also have elevated α-fetoprotein concentrations. What then *is* the value of serum α-fetoprotein detection in the diagnosis of any of these conditions, particularly hepatoma, and does quantitation add to specificity in diagnosis? In a patient with gastric carcinoma that has metastasized to the liver, is the increased α-fetoprotein synthesis due to the original tumor, to the hepatic metastases, or to the distorted hepatic parenchyma surrounding the metastases? Can serum α-fetoprotein assays be used to follow the efficacy of tumor therapy? Can they be used to evaluate prognosis? This review is not a whodunit, but limited space compels referral of the reader to the book for the answers to these questions, although it is recognized that some of the papers will raise still more questions. For example, in one study reported, rats given chemical hepatocarcinogens by mouth often have increased α-fetoprotein synthesis during the first few weeks of treatment, but synthesis later decreases even if the carcinogenic agent is continued; in those rats that subsequently develop hepatomas, increased α-fetoprotein synthesis recurs. What is the relation then between hepatopathy and hepatoma in the production of α-fetoprotein? There does seem to be an increased association between hepatitis, cirrhosis, and hepatoma in some countries, for example, Japan, and increased α-fetoprotein levels are seen in some patients with cirrhosis as well as in those with hepatoma. Do some types of hepatitis or cirrhosis predispose to hepatoma? Although the collection of 26 papers contained in this book were presented in December 1971, the data are timely. In fact, some of the information presented can as yet be found nowhere else. In all, this combined international effort represents not only a fine summation of our knowledge of α-fetoprotein, but also a significant advance.

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Books Received

Acupuncture. A Selected Bibliography. Vol. 1, 1800–1972. David E. Bresler and Patricia L. Wisne. National Acupuncture Association, Los Angeles, 1973. 130 pp. Paper $10.

Advances in Magnetic Resonance. Vol. 6. John S. Waugh, Ed. Academic Press, New York, 1973. xiv, 310 pp., illus. $27.50.

Advances in Nuclear Physics. Vol. 6. Michel Baranger and Erich Vogt. Plenum, New York, 1973. xii, 462 pp., illus. $25.

Analytic Function Theory. Einar Hille. Chelsea Publishing Co., New York, ed. 2, 1973. Two volumes, illus. Vol. 1, xii, 308 pp. Vol. 2, xiv, 496 pp. Each volume, $9.95. Reprint of the 1959 edition.

Biology of the Turbellaria. Papers from a symposium, Chicago, Dec. 1970. Nathan W. Riser and M. Patricia Morse, Eds. McGraw-Hill, New York, 1973. xxviii, 530 pp., illus. $25. McGraw-Hill Series in the Invertebrates.

Calculus of Several Variables and Differentiable Manifolds. Carl B. Allendoerfer. Macmillan, New York, and Collier Macmillan, London, 1974. xii. 228 pp. $12.95.

Cattle of North America. John E. Rouse. University of Oklahoma Press, Norman, 1973. xiv, 650 pp., illus. $20. World Cattle, vol. 3.

Characteristic Raman Frequencies of Organic Compounds. Francis R. Dollish, William G. Fateley, and Freeman F. Bentley. Wiley-Interscience, New York, 1974. xx, 444 pp., illus. $22.50.

Current Topics in Cellular Regulation. Vol. 7. Bernard L. Horecker and Earl R. Stadtman, Eds. Academic Press, New York, 1973. xx, 222 pp., illus. $17.50.

Developments in the Theory of Turbulence. D. C. Leslie, Clarendon (Oxford University Press), New York, 1973. xx, 368 pp., illus. $38.50.

Diatomic Interaction Potential Theory. Vol. 2, Applications. Jerry Goodisman. Academic Press, New York, 1973. xvi, 412 pp. $34. Physical Chemistry Series, vol. 31–2.

Discovering the Basis of Life. An Introduction to Molecular Biology. Ann Roller. McGraw-Hill, New York, 1973. viii, 280 pp., illus. Paper, $5.95.

Environmental Pollution and Mental Health. John S. Williams, Jr., Edward Leyman, Stephen A. Karp, and Paul T. Wilson. Information Resources Press, Washington, D.C., 1973. xii, 136 pp. $9.50.

Eye-movements and Visual Perception. R. W. Ditchburn. Clarendon (Oxford University Press), New York, 1973. xvi, 422 pp., illus. $30.50.

Fibre Optics. Theory and Practice. W. B. Allan. Plenum, New York, 1973. viii, 248 pp., illus. $22.50. Optical Physics and Engineering.

Final Report of the Commission of Inquiry into the Non-medical Use of Drugs. Information, Canada, 1973. xxvi, 1148 pp. Paper, $7.95.

A Guide to Sources of Consumer Information. Sarah M. Thomas and Bernadine Weddington. Information Resources Press, Washington, D.C., 1973. xii, 178 pp., illus. $10.50.

Habits of Some Asian Woodpeckers (Aves, Picidae). Lester L. Short. American Museum of Natural History, New York, 1973. ii, pp. 255–364, illus. Paper, $4.20. Bulletin of the American Museum of Natural History, vol. 152, article 5.

Hemodynamic Stress and Relief of the Heart. Proceedings of a congress, Ljubljana, Yugoslavia, Apr. 1971. Gojmir Južnič, Ed. Karger, Basel, 1973 (U.S. distributor, Phiebig, White Plains, N.Y.). xiv, 184 pp., illus. Paper, $30.55. Bibliotheca Cardiologica, No. 30. Part 1.

Heroes of Conservation. C. B. Squire. Fleet Press, New York, 1974. 108 pp., illus. $5.95.

Inorganic Chemistry of the Transition Elements. Vol. 2. A Review of the Literature Published between October 1971 and September 1972. B. F. G. Johnson, senior reporter. Chemical Society, London, 1973. xvi, 502 pp., illus. £9.50. Specialist Periodical Reports.

The International Law of Pollution. James Barros and Douglas M. Johnston. Free Press (Macmillan), New York, and Collier Macmillan, London, 1974. xviii, 476 pp. $14.95.

The Interpretation of Quantum Mechanics. Michael Audi. University of Chicago Press, Chicago, 1974. xiv, 200 pp. $11.50.

Introduction to Health Planning. David F. Bergwall, Philip N. Reeves, and Nina B. Woodside. Information Resources Press, Washington, D.C., 1974. x, 222 pp., illus. $15.

Linear Statistical Inference and Its Applications. C. Radhakrishna Rao. Wiley, New York, ed. 2, 1973. xxii, 626 pp. $22.50. Wiley Series in Probability and Mathematical Statistics.

Methods and Theories of Anthropological Genetics. Papers from a symposium, Santa Fe, N.M., Feb. 1971. M. H. Crawford and P. L. Workman, Eds. University of New Mexico Press, Albuquerque, 1973. xviii, 510 pp., illus. $20. School of American Research Books.

Methods in Cell Biology. Vol. 7. David M. Prescott, Academic Press, New York, 1973. xxii, 492 pp., illus. $31.

Microbial Genetics. Morad A. Abou-Sabé, Ed. Dowden, Hutchinson, and Ross, Stroudsburg, Pa., 1973. xvi, 452 pp., illus. $22. Benchmark Papers in Microbiology.

Mining Geophysics. D. S. Parasnis. Elsevier, New York, ed. 2, 1973. xx, 396 pp., illus. $28. Methods in Geochemistry and Geophysics, vol. 3.

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