Book Reviews

Protozoologie. Karl G. Grell. Springer, Berlin, 1956. 284 pp. Illus. DM. 59.

In many ways, this is a refreshing treatment of the field of protozoology. Karl Grell has drawn heavily on his own investigations and on modern discoveries of protozoologists, particularly in the United States where he recently spent several months. One result has been that much of the content is new in the sense that it has never appeared previously in book form. The drawings and photographs are particularly attractive; the author has relied heavily on good photographs, and the publisher has apparently spared no expense in insuring the best possible reproduction for the illustrations.

Grell's concept of the Protozoa and his taxonomic treatment of some of the major groups will probably not be acceptable to all protozoologists. I was pleased to note Grell's forthright acceptance of the Protozoa as *unicellular* animals, thereby avoiding the semantic pitfall of those who discuss *cellular* morphology or *cellular* physiology in Protozoa, organisms which they have described previously as being either *acellular* or *noncellular*. The author's exclusion of the entire group of the Cnidosporidia from the Protozoa on the basis of a differentiation among the somatic cells and nuclei, a character absent *by his definition* from other Protozoa, will strike many protozoologists as being somewhat arbitrary, especially in the absence of any elaboration of the statement that they are perhaps degenerate Metazoa.

The classification of the Opalinida as an order of the Flagellata, and of the Hypermastigidae as a family of the Polymastigina might be considered by some to be debatable on the basis of present evidence. The transfer of the Haemosporidia from a separate order to a family Haemosporidae of the Coccidia, on the other hand, is a change which has seemed inevitable following the discovery of the exo-erythrocytic phases of Plasmodium. The formation of a new suborder Eucoccidia to accommodate a single species of sporozoan without schizogony, and the creation of a second new suborder, the Schizococcidia, to accommodate the rest of the Coccidia seems rather drastic, inasmuch as the species in question has gregarine as well as coccidian characteristics.

Grell has the facility of writing simply and of explaining with great clarity. The sections on asexual reproduction, and on fertilization and sexuality are particularly well written. Not all protozoologists in this country are convinced, however, of the existence of sexual processes in a single representative of the Amoebina, *Sappinia diploidea.*

It is to be hoped that protozoologists will some day come to an agreement with respect to the meaning of the term *blepharoplast.* It is used here (pp. 16, 203) as synonymous with the *kinetoplast* as defined by Kirby. Other workers equate it with the basal granule.

A few minor points might be corrected in future editions. The experiments of Taylor would contradict the statement that there is no experimental proof that the longitudinal fibrils of ciliates conduct stimuli (p. 171). On the other hand, there is no published support for the view that the lens of a dinoflagellate "eye" actually concentrates light rays (p. 174). There is considerable recent evidence that the ciliates in ruminants may perform some essential functions for the host, so that they should not properly be described as commensals (p. 187). There is little reason to continue to call the rod-shaped structures of Lamblia (Giardia) parabasal bodies (p. 206), for they show practically no correspondence with parabasals in other flagellates. The name *Plasmodium praecox* (p. 253) is a synonym of *P. relictum.* The method of *Balantidium coli* in attacking the intestine of man is commonly due to the action of the parasite itself rather than to toxic or bacterial injury (p. 265).

The intimate knowledge of the author in certain fields of protozoology has produced a marked unevenness in the topics treated. For example, of the 187 pages set aside for the general treatment of the Protozoa, 140 pages are devoted to the nucleus, asexual and sexual reproduction, and genetics. The result is often a very detailed and highly technical discussion of such topics as chromosome structure and behavior, or of modifications of types of mitosis found in the Hypermastigidae of the gut of the wood roach, while the vacuolar system of the Protozoa, for example, is covered in four paragraphs. Modern studies of protozoan nutrition, furthermore, are practically never mentioned, the role of *Tetrahymena* in this field being referred to in a short paragraph in small type. The phenomena of encystment, of excystment, and of regeneration are hardly mentioned.

Similarly in the treatment of the different groups of the Protozoa, while there are some very beautiful photographs and a highly technical discussion of reproduction among the Foraminifera, covering 12 pages, the ciliate suborders Apostomea and Thigomotricha are dismissed in two and one-half lines.

In a future edition, the addition of a subtitle defining the limited scope of the book would be more accurate than the term *Protozoologie.* Within the bounds he has set for himself, Grell has done an excellent job in presenting in a clear and attractive manner certain aspects of modern protozoology. The listing of recent films dealing with the Protozoa is a welcome innovation.

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Physics, Psychology and Medicine. A methodological essay. J. H. Woodger. Cambridge University Press, London, 1956. 146 pp. $1.75.

J. H. Woodger believes that in the education of British physicians excessive emphasis has been placed on the approach to problems which regards physics as the fundamental discipline. In consequence, graduates of medical schools are not adequately equipped to handle the increasing number of cases of mental illness that they will encounter in their practice. The ostensible aim of this little book is to show the need for a medical training which will recognize the importance of psychology and even of relevant parts of the social sciences.

Most of the book, however, is an elementary account of scientific methodology; and, except for occasional asides, it deals largely with logical and epistemological distinctions that are the stock in trade of beginning courses in these subjects. Woodger explains at some length the differences between statements that are first-person reports of observations (not very convincingly described as statements concerning "feelings in a very wide sense of the word"), generalizations of such statements, and explanatory hypotheses. He notes that the connections of the latter to observation statements are rather loose, and that there is

no way of knowing whether explanatory hypotheses are true; and he maintains, in somewhat misleading language, that an element of "faith" is involved in reaching such hypotheses. The purpose of this long detour into methodology seems to be to make the reader more tolerant of the distinctive approach of medical psychology and to provide a foundation for the thesis that many sciences are "autonomous" in relation to physics. But to me, the detour appears to be quite irrelevant as an intellectual support for the educational plea Woodger is ostensibly making.

Woodger takes to task the proposal to employ a purely behavioristic language and method in the treatment of mental illness, on the ground that such an approach does not work with many patients. Woodger may be quite right in this. However, he also goes on to say that, since such an approach has "more remote political and theological implications," and since "medicine should be neutral in these matters and offer its helping hand to all and sundry, irrespective of creed or politics," medicine "must be shy of adopting any doctrine which will restrict its hypothesis-making and modes of treatment to one particular theoretical direction" (p. 143). But what Woodger is apparently recommending here is that in *constructing* explanatory hypotheses in medical psychology, one ought to keep a weather-eye open to the political and theological convictions of patients. In my opinion, this is the path to madness.

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Glaucoma. Transactions of the first conference, 5–7 Dec. 1955, Princeton, N.J. Frank W. Newell, Ed. Josiah Macy, Jr., Foundation, New York, 1956. 251 pp. Illus. $4.50.

This volume is a record of accepted facts, experiences, animal experiments, opinions, and theories on glaucoma and factors that influence intraocular pressure. It contains the papers that were presented at a conference by a panel of investigators predominantly from the ophthalmic field.

The first of three principal sections is concerned with a type of the disease termed "angle closure glaucoma." This type of glaucoma is the most satisfactorily treated but also is of lowest incidence. Unanimity of opinion is expressed concerning this type of the classified disease, both with regard to mechanism of the cause and the control. The theory of pupillary block, now more generally accepted by ophthalmologists, is unanimously agreed upon by the panel.

The second section is concerned with factors which influence the intraocular pressure that originates in the central nervous system. Experiments previously published by Von Sollman (National Institutes of Health) are reviewed and discussed. These experiments demonstrate changes in the intraocular pressure in response to an electric stimulation on an isolated area of the interbrain of the cat. No conclusions were offered that suggest a relationship of these experiments to glaucoma. The effect of such stimulation was dramatic but not sustained.

Opinions varied concerning the existence of afferent or efferent nerve end organs located in the trabecular meshwork of the anterior chamber. No conclusions were reached on whether nerve fibers in the area merely pass through this tissue or have terminations in this location. Certain chemical experiments were cited as evidence of the existence of an efferent function from one eye to the other. Interpretations of the results were sharply questioned by several members of the panel.

The third and largest section is concerned with the anatomical location of the resistance to the outflow of aqueous fluid from the anterior chamber. Barany (Sweden) reviews his experiments on enucleated eyes. The eyes were perfused with aqueous fluid, and a level of resistance to the standard condition of the experiment was more or less constant. Hyaluronidase was added to the perfusion fluid; this caused the resistance to outflow to drop by approximately one-half. It is Barany's assumption that the hyaluronidase dissolves some of the mucopolysaccharide of the anterior chamber trabecular structure, thus allowing for an increased flow of aqueous fluid. Operative destruction of the trabecular meshwork reduces the resistance to aqueous outflow to zero. From these experiments it would appear that the structure responsible for the increased or decreased resistance to aqueous outflow is located in the trabecular meshwork.

Grant (Boston) did the same operative destruction of the trabecular meshwork that Barany did and found in the majority of instances that there was no increase in the facility of aqueous outflow. Grant concluded that the obstruction to outflow was more peripheral than it is in the trabecular meshwork. Considerable discussion and questioning by the members of the panel failed to throw light on the discrepancy in results.

Barany further describes perfusion experiments in an attempt to locate the sensitive material located in the angle, which he assumed to be hyaluronic acid. Experiments designed to throw light on the regulation of resistance of the angle suggested that the angle was able to adapt to the absence of hyaluronic acid; other parts of the meshwork increased their resistance to outflow.

Becker (St. Louis) presents results of tonography after the use of Diamox to study further the pressure regulatory mechanism by altering the change in inflow without altering the resistance to outflow.

There is considerable discussion on cellular volume in the angle and the possibility of its influence on outflow.

Autobiographical sketches of the participants are appended. The index is excellent.

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Advances in Carbohydrate Chemistry. vol. 11. Melville L. Wolfrom and R. Stuart Tipson, Eds. Academic Press, New York, 1956. xviii + 465. $11.

I make no claim to being a qualified judge of detailed presentations by recognized experts in eight highly specialized carbohydrate fields. However, to one with at least a working knowledge of carbohydrate literature and a daily need for its effective application, these *Advances* have proved their value. The very high editorial and technical standards, established by the previous ten volumes, have been rigorously maintained.

Continued application of periodate oxidation in establishing carbohydrate structures justified a concentrated study (by J. M. Bobbitt). Since this technique can be misapplied all too easily by inexperienced hands, a particularly valuable section stresses significant precautions to be observed during its use.

The multiple functionalities of the osones and of kojic acid have attracted much attention with very little interest in applications having developed. Although osones are usually represented in the α-ketoaldehyde manner originally proposed by Emil Fischer, the consistent lack of ketonic properties makes this open-chain structure very questionable. A survey of osone research, supplied by S. Bayne and J. A. Fewster, should assist in stimulating further studies. Much more attention has been given to kojic acid, even to the extent of several past attempts and at least one current attempt at commercialization, and A. Beélik has written a very worth-while chapter. Despite its structural challenge, significant industrial applications are still in the future.

F. G. Gonzáles presents an interesting discussion of the products from reactions between reducing sugars and β-ketonic esters along with detailed procedures and tables of constants. The author is obviously intrigued by the possible unique biological significance of these com-