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-

pounds and the information assembled indicates that further research is justified.

Any student or research investigator with an assignment in the area of biosynthesis of simple sugars soon becomes aware that the existing literature is bewilderingly complex. As is shown by L. Hough and J. K. N. Jones, the biosynthetic reaction sequences may very well be quite diverse. Their excellent critical examination of the field is certainly welcome.

Branched chain sugars were very rare when volume 1 of these *Advances* appeared; even now nomenclature has not been organized. Fortunately, F. Shafizadeh has collected the existing information and has proposed a reasonable system for deriving names. Since numerous branched sugars of biosynthetic origin have been described in recent years, this step was well taken. The nucleic acids represent a radically different situation. More than sufficient information existed to permit a survey for volume 1, and the tremendous literature growth since is ample justification for a new study. G. R. Barker gives special emphasis to synthesis, isolation, and fine structure examinations in a chapter on these "acids."

Earlier volumes have presented several phases of polysaccharide chemistry, but relatively recent physical-chemical studies have greatly expanded the general understanding of starch; this has been compiled for volume 11 by C. T. Greenwood. Although there is still incomplete agreement on such characteristics as molecular weights, relative modes of attack by acids, alkalies, and enzymes on amylose and amylopectin and the binding of iodine in helices, the quantity and quality of current investigations are encouraging.

The editors are to be congratulated for having produced another excellent volume in this valuable series of *Advances.*

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Features of Evolution in the Flowering Plants. Ronald Good. Longmans, Green, London–New York, 1956. 405 pp. Illus. $6.

"Whatever opinion may be held about the idea of evolution itself, or about its possible modes of operation, it cannot be denied that change with time is an all-pervading principle of the natural world" (p. v). With these words Ronald Good, of the University of Hull, begins a curious but interesting book on the evolution of the flowering plants. He feels that "Many particular problems require to be thought out again from the beginning, but the special need is for a new, objective, and sober consideration of the facts, and, above all, of the facts in some of those aspects of biology which have so far received less attention, and which are therefore less obscured by the patina of controversy" (p. v). Again, letting Good speak for himself, we find that he believes that ". . . when these neglected facts are taken properly into account, some, at least, of the best-known speculations about organic evolution are seen to have a less general applicability than is usually claimed" (p. v). Finally, after examining these facts, he draws the conclusion: "Little or nothing in this picture of evolution in the Flowering Plants supports the view that they are the product of any highly competitive and eliminative plan of nature. On the contrary, it suggests that no matter what new characters or combinations of old characters change with time may present they are all able to find an existence somewhere in the scheme of things" (p. 388).

Now these are strong words from a botanist of the reputation that Good enjoys. And one is thus led to examine with particular care the evidence on which his conclusions are based (the more so since the book is directed to students and nonbotanists). Unfortunately, it would appear that it is the "picture" which he draws that misrepresents the reality he wishes to portray.

After disabusing the reader of his zoological prejudices by making a rather carefully thought out comparison between the higher plants and animals, Good plunges into a general description of the higher categories of flowering plants and their presumed interrelationships. This is based, of course, upon comparative morphology. The last four chapters of the book develop some of those interesting and little-known facts of parallelism and convergence with which the taxonomist, but usually not the geneticist, is familiar. For example, Good discusses the monocotyledons which look like dicotyledons, and vice versa, the diverse instances of floral aggregation often leading to the formation of a pseudanthium, and the Compositae which have heads of several flowers resembling the single pendent flowers of a fuchsia or the bilabiate flowers of a mint. From the existence of such examples, Good concludes that natural selection has not played a role, or at least not an important one, in the evolution of the flowering plants. My own bias leads me to exactly the opposite view.

Two chapters of the book are devoted to a highly specialized and very interesting family, the Asclepiadaceae or milkweeds. In all plants of this family there are intricate structures concerned with obligate insect pollination, coupled with mechanisms of great complexity. Since I have been concerned with this family for a number of years, I was surprised to find that the structures which I consider to be highly adaptive and necessary to the successful completion of pollination, are thought by Good to be "functionless." Furthermore, he apparently finds the Asclepiadaceae to illustrate particularly well his ideas about evolution.

These facts, together with inaccuracies or loose or confusing statements when cytological or genetic facts are mentioned, seriously limit the value of the book. It does not discuss adequately evolution as a process; but it does present an interesting picture of what has been produced in the course of the evolution of the flowering plants.

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New Books

Arizona's Meteorite Crater. Past, present, future. H. H. Nininger. American Meteorite Museum, Sedona, Ariz., 1956. 232 pp. $3.75.

Out of the Test Tube. The story of chemistry. Harry N. Holmes. Emerson Books, New York, ed. 5, 1957. 313 pp. $4.50.

Rare Earths in Biochemical and Medical Research. A conference sponsored by the Medical Division, Oak Ridge Institute of Nuclear Studies. ORINS-12. Granvil C. Kyker and Elizabeth B. Anderson, Eds. Medical Division, Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tenn., 1955 (order from Office of Technical Services, Department of Commerce, Washington 25). 468 pp. $2.20.

Diophantische Approximationen Eine Einfuhrung in die Zahlentheorie. Hermann Minkowski. Chelsea, New York, 1957. 235 pp.

Bibliography of Russian Mathematics Books. George E. Forsythe. Chelsea, New York, 1956. 106 pp.

Elements of Partial Differential Equations. Ian N. Sneddon. McGraw-Hill, New York, 1957. 327 pp. $7.50.

Theophrastus on Stones. Introduction, Greek text, English translation, and commentary. Earle R. Caley and John F. C. Richards. Ohio State University, Columbus, 1956. 238 pp. $6.

Applied Analysis. Cornelius Lanczos. Prentice-Hall, Englewood Cliffs, N.J., 1956. 539 pp. $9.

Rauwolfia: Botany, Pharmacognosy, Chemistry and Pharmacology. Robert E. Woodson, Jr., Heber W. Youngken, Emil Schlitter, Jurg A. Schneider. Little, Brown, Boston, 1957. 149 pp. $5.50.

Engineering Uses of Rubber. A. T. McPherson and Alexander Kemlin. Reinhold, New York; Chapman & Hall, London, 1956. 490 pp. $12.50.

Handbuch der Physik. vol. XV. *Low Temperature Physics* II. S. Flügge, Ed. Springer, Berlin, 1956. 477 pp.

Contributions à l'Etude des Parasites et Phorétiques de Coléopteres Terrestres. Supplement No. 4 to *Vie et Milieu.* Jean Théodorides. Hermann, Paris, 1955. 310 pp. F. 1500.