mals, with higher centers of gravity, the antigravity control is more dynamic, hence postural muscles are all of the fast type.

Among the papers from outside the U.S.S.R., several are of particular interest. Burěs, Burešová, and Křivánek, from Prague, describe the release of potassium from cortical cells as the basis for spreading depression. Grundfest discusses the evolution of sense cells as a transition from transducing mechanisms to electrogenic neurones. Pantin clearly separates the fast and slow systems of contractile response in sea anemones. A brief but scholarly historical essay on concepts concerning the evolution of the brain is given by Magoun.

This volume makes available to Western physiologists some important work previously published only in Russian. Many of the chapters are provocative and informative. The quality is extremely uneven, and the title of the volume is not appropriate.

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Transistor Devices

Principles of Electron Tubes: Including Grid-Controlled Tubes, Microwave Tubes, and Gas Tubes. J. W. Gewartowski and H. A. Watson. Van Nostrand, Princeton, N.J., 1965. xvi + 655 pp. Illus. $18.50.

The decade of the 1960's may go down in the history of science and technology as the one in which training in transistor devices *completely* displaced that on the use of electron tubes. The collection of tales is growing about the young engineers who design intricate control equipment, up to the point where an electron tube becomes necessary, and then bog down completely. Gewartowski and Watson's book may well turn this tide. Here is a book that presents, between its covers, the fundamental principles of electron tubes with the technological developments, covering the full range from diodes and triodes, through picture tubes, klystrons, magnetrons, traveling wave tubes, and gas discharge devices, to an ultimate chapter on gaseous lasers. Not infrequently in universities the inside of the electron tube is described in one course and circuits and the uses of the tubes in another course; the courses may even be taught in different departments. Occasionally, students have time for only one of the courses, a situation that leaves them in an oddly incomplete position professionally. Gewartowski and Watson acknowledge this to be the rule rather than the exception. The book is written for the use of engineers and physicists at approximately the first-year graduate level.

The problem of rigor and completeness within the bound of 600 pages is squarely faced and met. Electron sources and electron optics are first treated. The reader is left satisfied with his comprehension of the subject—that is, he knows that the treatment is usable and that greater complexities lurk very near. The subject of "radio tubes" is handled by treating the fundamentals and illustrating them with one example each of a triode, a tetrode, and a pentode. The ground is laid immediately for klystrons and other microwave tubes by raising the question at the outset of the electron transit time compared with the signal period. The famous teaser that has been stumbled over by generations of students—"what is the current induced in an external metallic circuit while an electron is traversing a diode space?"—is clearly formulated and solved, and its importance in practice is subsequently emphasized. The use of equivalent circuits is presented and extensively used. A smooth transition from lumped circuit constants to microwave procedures is made, and a quite thorough treatment of elements of microwave equipment and analysis is presented.

Approximately one-third of the book (the middle section) deals with klystrons, traveling wave tubes, and magnetrons. The treatment, as is customary in this book, covers the principles and designs of tubes *and* a discussion of uses of the tubes. The final chapters deal with gas discharges and devices.

In general, the problems presented are exercises in application of principles, with only a few purely numerical ones.

Regardless of whether authors, editors, or publishers deserve the credit, it should be noted that the style, format, and language are remarkably good.

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Boring's Selected Papers

History, Psychology, and Science. Selected papers of Edwin G. Boring. Robert I. Watson and Donald T. Campbell, Eds. Wiley, New York, 1963. xii + 372 pp. $8.95.

The pen of E. G. Boring has been one of the truly phenomenal instruments of our time. Skillfully directed toward all manner of public psychological questions and problems—the psychology of science, systematics, psychological history and historiography, critique of the communication process, psychophysics and psychophysiology, persistent vexations of epistemological roots (not to mention a solid set of laboratory investigations and even ventures into psychopathology)—it has been of enormous influence in shaping the psychological thought of this generation and will be in shaping that of the next. The *omnium gatherum* by 1961 was reckoned as 505 publications!

If the present book were being put together in the early days of the republic, it would have carried some such title as "The Science of Science; being a selection of some of the essays of Edwin Garrigues Boring on scientific topics not hitherto assembled in one place, though for the most part already published in scholarly journals, and eschewing all writings dealing with such matters already contained in Professor Boring's justly popular *History of Experimental Psychology, Sensation and Perception in the History of Experimental Psychology, The Physical Dimensions of Consciousness*, and, with one notable exception, his recently expanded autobiography, *Psychologist at Large*."

The one exception is "Human nature *versus* sensation: William James and the psychology of the present," a paper originally printed in 1942 in *American Journal of Psychology* at a time when preoccupation was less with "microscopic psychology," as James derisively called it, than with new aptitude tests and formulae for correction of restricted range. The James paper is a great paper, a masterful effort to point up the differences between the Jimmian psychology and the modern positivistic approach, and fully merits the reiteration provided by *Psychologist at Large* and the present volume.

The contribution selected for keynote position and one eminently deserving

that place is "Eponym as placebo," Boring's address before the Seventeenth International Congress of Psychology (Washington, D.C., August 1963), in his role of Honorary President. The locus and timing of the original provide sufficient rationalizatiion for a reprinting in this book; congress proceedings are not that widely distributed or consumed. Eponymous events in science are those named after great innovators, those apparently responsible for revolutionary trends or outstanding periods of intellectual development—Newtonian physics, Darwinian biology, and Freudian psychology. The idea of science progressing by eponyms is not simply a regression to the Great Man theory of history but a recognition that the need for communication is often served by using the names of men as labels, provided hero worship is at the same time shunned. Eponymy, indeed, distorts history. "It magnifies those persons who are found above the threshold and diminishes those below it. Eponymic distortion arises out of man's limited range or perception . . . out of his need for leaders . . . and out of his desire to perceive high goals upon which he may train his ambition." The eponym is a placebo.

The overall content of the book, 30 papers in all (plus a set of alphabetized references and careful indexes of names and subjects) is organized under five major rubrics: The Zeitgeist and the Psychology of Science (8 papers), The History of Psychology (5), The Scientific Method (7), The Mind-Body Problem (4), and The Psychology of Communicating Science (6). Taken together with *Psychologist at Large* (another dozen papers, some selected short essays, and a chronology of Boring's principal publications through 1960, as well as the autobiography) and, of course, the major works listed above, one has an excellent working library of Boring's formal output. The informal one will probably never be assembled—oceans of letters and memoranda on all manner of things, residing in countless files all over the world, and treasured by their possessors.

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Plant Biochemistry, An Introductory Survey

The Chemistry of Plant Processes. C. P. Whittingham. Methuen, London; Philosophical Library, New York, 1965. 209 pp. Illus. $7.50.

This pocket-sized but densely packed introductory survey of plant biochemistry goes on to cover also most of the organismal features of plant function, emphasizing their cellular and biochemical aspects. Up-to-date textbook material of this kind has been badly needed in the field. The book is tersely written, and by the student must be studied, not just read. Its value is enhanced by 167 literature references, plus a small selection of general references at the end of each chapter.

The book is divided into two parts, the first covering plant metabolism and including chapters on cellular structure and function; enzymes; fermentation and respiration; energetics of respiration and biological syntheses; photosynthesis; and nitrogen metabolism. The subjects of respiratory metabolism and photosynthesis are very effectively developed, with historical milestones and examples of experimental data that will give the student an unusually good feel for the why behind biochemical pathways and components, which students so often confront as straight and tedious memory work.

Part 2 proceeds to nonbiochemical and organismal aspects of plant physiology, and includes chapters on osmotic relations of the individual cell (including diffusional and active uptake of solutes), water relations of the whole plant, translocation, and growth. The book concludes with an appendix entitled "Chemistry of the constituents of living organisms," which presents a brief survey of bio-organic chemistry useful for the many students whose background could well be refreshed at the beginning of a course.

A few important topics have been missed, including oxygen affinity of respiratory chain oxidases; mechanism and problems of respiratory and photosynthetic gas exchange of tissues and organs; mineral nutrition; and dormancy. The term *glycolysis* is not used or explained; I consider this unfortunate in view of the term's wide use.

Part 2 is noticeably weaker, less accurate, and less modern in outlook than the more purely biochemical chapters in part 1. Coverage of osmotic relations is old-fashioned. The one-page treatment of water transport by the vascular system is hopelessly inadequate. We run into quite a few misleading or incorrect statements—for example, there is no evidence for movement of salts through a tissue against a concentration gradient (p. 136); the mechanism of root pressure is unknown (p. 137); Munch's theory is that mass flow occurs from a place of high suction pressure to a place of low suction pressure (p. 157); the action spectrum of *Avena* and *Phycomyces* phototropism indicates auxin destruction (p. 172); the active component of coconut milk has been shown to be 6-furfuryl adenine (p. 178); *Xanthium* requires a 14-hour dark period for flowering to occur (p. 178); only the far-red-absorbing form of phytochrome is capable of causing floral induction (p. 180).

I noticed quite a number of typographic errors in the spelling in the text, in the titles and authors' names in the references, and in the footnote numbers in the text that cite literature references. The latter errors could cause much trouble for those not familiar with the references cited.

These shortcomings could be rather easily rectified. And even as it stands, *The Chemistry of Plant Processes* is an admirable piece of work, and one that will, I am sure, find wide application as a textbook in modern courses in plant physiology.

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Active Organisms

The Biology of Hemichordata and Protochordata. E. J. W. Barrington. Freeman, San Francisco, Calif., 1965. vi + 176 pp. Illus. Paper, $2.50.

Naturalists and experimentalists alike will appreciate this well-written résumé of some of the more recent work on the groups concerned. The emphasis is on function, and the animals are portrayed as active organisms operating in an environment. Information on structure, physiology, behavior, and ecology is interrelated, and descriptive