Aspects of Vision

Human Color Perception. A Critical Study of the Experimental Foundation. JOSEPH J. SHEPPARD, JR. Elsevier, New York, 1968. xviii + 196 pp., illus. $10.

Sheppard's aim in *Human Color Perception* is to provide a work which is brief but yet comprehensive enough to be of value to active research workers. In his view, most books dealing with color are so encyclopedic but at the same time so lacking in experimental details that their usefulness is seriously limited. This book attempts to meet the problem by presenting discussions of selected experimental results and summaries of the conclusions that might be drawn from them. A wide variety of topics is covered. In my opinion the material dealing with color mixture and the standard observer is particularly lucid and well presented.

There are no chapters on color blindness or on color theory. This does not mean that the author is uninterested in theory. His book, which discusses and reinterprets experimental results from physics, physiology, and psychology, is permeated with color theory. Many generally accepted ideas are subjected to rather sharp attack. Thus it is only natural that the book will not please all of its readers. Some of the chapters are based upon a narrow sampling of experimental reports and these reports are given unusual interpretations. There is a tendency to concentrate upon the irregularities and inconsistencies which exist among various sets of data without giving adequate consideration to the many instances where agreement is found. For example, the treatment of spectral sensitivity becomes involved with the shoulders or humps which often appear on the luminosity curve. One is left with the impression that the humps seldom approach statistical significance and have not as yet provided information that is leading to an improved understanding of color processes. Furthermore, the book regards all attempts to resolve the luminosity curves into component processes as "failures" because they have not agreed with simple additive linear models. Admittedly, many accounts of the components of the luminosity curve have been overly optimistic. Nevertheless, I am not ready to agree that they have not been of considerable value.

Another example is given by the negative conclusions which the author reaches regarding trichromatic theory after his consideration of retinal physiology. These might not have been the same if he had made a more comprehensive search of the literature. No mention is made of Tomita's work with receptor potentials or of Riggs, Johnson, and Schick's investigations of the human electroretinogram. Only brief mention is made of retinal densitometry and the rather important results of Rushton and of Weale and their associates. Microspectrophotometry is played down because there is some possibility that its account of cone photopigments is strongly toned by receptor waveguide complications. It is not certain, however, that this problem will be as bad as Sheppard suggests. Let us hope that the reader does not become so discouraged that he tends to discount microspectrophotometry and other physiological approaches altogether.

The custom of naming temporal and flicker phenomena after their discoverers may be of questionable value with reference to the progress of visual science. One objection to this practice is that it gives the reader a sense of false security. For example, calling brightness enhancement the Brücke-Bartley effect may lead one to believe that it is better understood than actually is the case. Extensive use of names may lead to needless disagreement. I would prefer not to say that stabilized viewing produces a Ditchburn-Ratliff effect, as Sheppard does, because the pioneering work of Riggs and others is not acknowledged. Yet, if everyone's contribution is recognized, ponderous statements may result. An example is cited from the present work: ". . . the Prevost-Fechner-Benham effect and the Brücke-Bartley effect are but particular manifestations of the Broca-Sulzer effect."

Human Color Perception rightly calls attention to many of the difficulties which currently exist in our understanding of color processes as well as in the theories we use to account for them. But not all topics are covered with equal accuracy or in equal depth. A complete critical account of color would necessarily be more detailed. While this book is not recommended for a beginner in the field of color because of its unorthodox approach, it will be of interest to persons who are already active in this area, and, in particular, to those whose work is given critical examination.

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Storytellers

American Indian Mythology. ALICE MARRIOTT and CAROL K. RACHLIN. Crowell, New York, 1968. xiv + 211 pp., illus. $7.95.

Reading this compilation by two anthropologists of stories originally told by Indians of the United States would be a busman's holiday for any anthropologist interested in oral art, and would also please any adult who wishes an introduction to Indian sacred myths, popular tales, and traditions that could be shared with most of the family. The compilers have collected most of the narratives themselves—whether in the native languages or in English is not stated, so far as I can discover—and have added a few from published collections of other recorders. To their selections are added a 17-page introductory essay on Indian prehistory, history, and culture, including the oral art; for each of the 36 narratives a prefatory page or two dealing specifically with the tribe telling the story and giving other relevant information, together with a concluding statement to identify the narrator and the collector or the published source; and finally a bibliography. The two dozen or so photographs, attractive as they are, are, unfortunately I think, mostly of artifacts rather than of people doing things in their tribes. The impersonality is at variance with the dynamic, holistic approach that the compilers exhibit in their commentaries and in their retelling of the narratives and that makes what was meant to be heard and not read stay alive and not die or deflate on the printed page.

Marriott and Rachlin have that rare gift which Charles Perrault also had of presenting orally transmitted narratives in a written style that appeals to all readers despite cultural differences. They somehow capture for the page the atmosphere of oral narration. When it is a Cheyenne "little story," that entertains and instructs, the reader seems to join, as the commentary describes the scene, the adults lounging against the tipi wall, feasting on dried fruit or sausages, and listening to the storyteller, seated in the place of honor, with the children near him. We learn only so much of Hopi sacred mythology because we are "not even a tiny bit Indian—Cherokee even." We laugh at Bear hastily putting his moccasins on wrong after an all-night gambling game and waddling forever after. And at an informal gathering at the Native Ameri-

can Church we hear a new story about what happened to a man who said that talk about witches, curses, and peyote is old superstition, that what matters nowadays is how to fix a television set.

The compilers achieve their goal of aiding the general reader in understanding Indian religion and mythologies and the philosophies embodied in the narratives. The book is a tour de force, and one can understand why they have been appointed "artists in residence" at a college.

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The Study of Plants

Textbook of Theoretical Botany. Vol. 3. R. C. MCLEAN and W. R. IVIMEY-COOK. With a section on genetics by Kenneth Lewis. Wiley, New York, 1967. x + 1108 pp., illus. $19.25.

This is the third volume of an advanced text intended to cover "the study of the plant from every point of view" (volumes 1 and 2 were published in 1951 and 1956). Perhaps botany students in Britain will buy a 3000-page text, but whether their counterparts in America will do so is open to doubt, particularly in these days of paperbacks and Annual Reviews. Furthermore, although this third volume is certainly written in good style, it is neither up to date nor documented.

There are three sections: Paleobotany (400 pp.), Genetics (200 pp.), and Physiology (480 pp.). Let it be said at once that there is nothing particularly "theoretical" about the book. It is as full of description and experiments as any other biological textbook; evidently the term "theoretical" is being used in the opposite sense to "applied." The section on paleobotany is indeed fully descriptive, and very well illustrated with both photographs and diagrams. Some of these are original, and it is obvious that the authors have personal knowledge of their subject. However, although the text is very readable, no concession is made to beginners, a rather intimate knowledge of plant anatomy being assummed. The Cordaitales, for instance, are described as "plants the stems of which had a distinctively coniferous type of anatomy, with little or no centripetal xylem and a broad zone of close-grained, secondary centrifugal wood with multiseriate tracheidal pitting like that of the living *Araucaria*." How many readers of this journal, I wonder, will form an immediate visual picture from this description? How many, indeed, have ever looked at sections of *Araucaria*, living or dead? Perhaps, in any case, it is time that paleobotanists gave up their traditional preoccupation with anatomy and devoted more attention to what we can deduce as to the conditions of life of ancient plants. The authors discuss world climates occasionally, especially in Pliocene and Quarternary times, but one misses any attempt to correlate form with environment. Stomata, for instance, which would be interesting in this connection, are mentioned (and figured) but once, although leaves and fronds constitute the bulk of the remains described. The exclusion of fossil algae, though no doubt necessary for the great sweep of coverage in time, space, and forms of the land plants, does make it harder to obtain an overall view of the process of plant evolution.

The section Genetics, contributed by K. R. Lewis of Oxford, is a rather complete account of the genetics and chromosomes of higher plants. Emphasis is on the "classical." A bow is made to modern biochemical genetics with a ten-page section on gene action, treating nutritional mutants in *Neurospora* and hemoglobin mutants in man, and with a comparable section on nucleic acids, giving the structure and mode of replication of DNA. But to say that "Indeed, considerable progress has been made towards determining which triplets code which amino acids" is to give a rather lackadaisical picture of the breakneck rate of discovery in this field. Cytoplasmic inheritance is treated briefly, but, as might be expected, since much of the material appears to have been written a good many years ago, the presence and role of DNA in plastids and mitochondria are not mentioned.

Unfortunately, the authors did not follow the lead of the second section and invite a plant physiologist to write the physiology; they chose to do it themselves. The result can be imagined; the "renaissance man" has no easier a time in botany than in any other science. McLean says in the preface, "Some may consider it rash for one who is not a professed physiologist to attempt to write on plant physiology." He is right. For one thing, approximately ten years seem to have elapsed between the writing of most of the text and publication. This means, for example, the exclusion of ferredoxin and the second photochemical reaction from the treatment of photosynthesis, and the ascription of ATP production in photosynthesis to oxidative phosphorylation in one paragraph and to true photophosphorylation in another. It limits the treatment of cytokinins to a paragraph, excludes all the work with C^{14}-labeling of auxins, and of course excludes too the now actively investigated question of the role of RNA in hormone action. Among other things, we learn, oddly, that the red-far-red reversibility of phytochrome "is only shown in presence of auxin"; that alcoholic fermentation differs from simple hydrolysis "only in degree, not in kind"; that the yellow *and red* colors of autumn leaves are due to lutein and carotene; and that among growth stimulants "pentaoxyanthraquinone is seven times more active than auxin." In addition to such quirks, important fields like the physiology of leaf abscission, fruit ripening, and the rooting of cuttings are totally omitted, yet space is found for a detailed treatment of Moewus' sex-substances in *Chlamydomonas*, now discredited. Unfortunately for the student, the statements made cannot be queried or verified, for although the genetics section does at least mention a dozen books, the physiology section includes not a single reference to a book or journal.

Perhaps the volume is worth while for its treatment of paleobotany.

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Problems in Atomic Physics

The Physics of Electronic and Atomic Collisions. Invited papers from the Fifth International Conference, Leningrad, July 1967. LEWIS M. BRANSCOMB, Ed. Published for the Conference General Committee by the Joint Institute for Laboratory Astrophysics, Boulder, Colo., 1968. xvi + 200 pp., illus. Paper, $7.

The original development of quantum mechanics was stimulated by unsolved problems in the field of atomic physics. When the principles of quantum theory were found to be applicable to nuclear phenomena, research in physics tended to become concentrated at the forefront of knowledge, which at that time was nuclear physics. Left behind in atomic physics were a host of difficult and challenging problems which could be characterized as many-body problems of inhomogeneous systems with a Coulomb interaction among the compo-