ome is well supported by pertinent references. The references in general are well chosen and, fortunately, are complete with subject titles and thus are valuable extensions of the text. Production schedules doubtless account for the fact that the year 1974 is represented by a single article (in press).

The text itself is well and concisely written and in several segments reflects the authors' efforts at synthesizing concepts based on data from diverse sources. Such formulations may not represent the final word, but they nonetheless serve as useful hypotheses subject to change as new information accrues. A case in point is section 5 dealing with the penetration of the virion into the host cell. The authors handle very deftly a number of controversies related to this topic, which have now been largely dissipated by the exhibition of pertinent biochemical and biophysical data.

One possible shortcoming might be cited. Much of the work represented in the monograph was based on electron microscopic studies, yet only one micrograph appears in the volume. Altogether, however, this is a very useful compendium for the student of molecular virology.

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Psychophysics

Sensation and Measurement. Papers in Honor of S. S. Stevens. HOWARD R. MOSKOWITZ, BERTRAM SCHARF, and JOSEPH C. STEVENS, Eds. Reidel, Boston, 1974. xiv, 470 pp., illus. $39.50.

This book was planned as a festschrift for S. S. Stevens, who died before its completion, in his 66th year. In it 45 of Stevens's colleagues and students present 40 papers (34 published for the first time here) that show his influence and breadth. The contributions range over many disciplines: psychophysics, measurement theory, psychophysiology, sensory mechanisms (vision, warmth, gustation, audition), information processing, physiology, speech, linguistics, and integrative theorizing. The book serves as a fine eulogy.

Its unifying thread is invariance. Stevens consistently taught, by example, that "the scientist's contest with nature has prospered to the degree that simplicities and uniformities [invariances] have been detected amid the complexities that afflict observation and experiment" (Stevens, *Psych. Rev.* **78**, 446 [1971]). Kepler's "incredible and ravishing delight" (G. Holton, *Theories and Concepts in Physical Science*, Addison-Wesley, 1952, p. 148) in the simplicity available from mapping mathematical curves onto physical measurements infected Stevens, and he passed this excitement on to his students.

The book begins with Békésy's argument that the sensory system operates by a single set of principles (invariance) but that different sense organs are adapted to different physical invariances in nature. His theorizing on the relations between inhibition and localization guides Békésy to demonstrate, for example, how taste stimuli can be localized at nonstimulated sites on the tongue. In the absence of an integrative theory, such discoveries are unlikely at best. Békésy's data are not voluminous, but the argument is exciting and persuasive and should stimulate research.

A different pursuit of invariance is taken by Howes. He transforms Zipf 's law from a pervasive curiosity to an argument for a single semantic mechanism for both the production and the perception of speech. His data and analyses further suggest that not all of an individual's permanent vocabulary is available at any one time to produce discourse. Rather, smaller and temporary semantic fields are scanned, and how the individual gains access to these fields should now become the problem of interest. The analysis is compelling, mathematically rigorous, and important to psycholinguists and neurologists.

Galambos presents new findings (Picton's work) showing that P_{300} in the auditory evoked potential reveals perceptions that are independent of the physical stimulus. He also presents a fine-grain analysis of the evoked potential over the first few milliseconds after presentation of the stimulus.

Miller's paper is an intriguing analysis of the semantic relations between the words "listen" and "hear" and the words "look" and "see." Irwin and Mills provide a method of demonstrating the power law in the classroom without apparatus. Luce and Green powerfully suggest the existence of an attention band in loudness, which reminds one of the critical band in frequency and which is important to theories of judgment and attention. Stromeyer, following Stabell's lead, demonstrates the McCollough color aftereffect in scotopic conditions. The psychophysical data show, in agreement with physiological observations, that rod signals are involved in the opponent color system.

There is some overextension in otherwise excellent papers. Land argues correctly that his new data are predicted by his Retinex theory. But he neglects other theories that make the same predictions, such as that of simultaneous contrast and Arend's work (*Psych. Rev.* **80**, 374 [1973]). Marks's data on spatial summation in the warmth sense should become the standard in the field, but his argument that warmth sense-spatial interaction processes are the reverse of those of brightness with the eye may be too strong. His data allow an argument Stevens would prefer, that the functions are of the same form but with a scalar shift. Summation and spatial resolution on the skin look like the same processes in the retina, but the skin area is much larger than the comparable retinal area. Investigation of this psychophysical problem may now move toward concern with the relations between stimulus durations and inhibitory functions. Pollack's measurement of the perception of correlations is slightly marred by careless referencing.

Perhaps the best part of the book is Stevens's 24-page autobiography. It is a revealing and sometimes funny story of a life that failed to conform to what many educators expect of promising scientists. It is a must for students of psychology and for historians of science.

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Brain and Behavior

Limbic and Autonomic Nervous Systems Research. LEO V. DICARA, Ed. Plenum, New York, 1974. xvi, 428 pp., illus. $24.50.

The book under review is based on the implicit assumption of a unique relationship between the limbic and autonomic nervous systems. A similar assumption is encoded in the term "visceral brain" often used to describe the limbic formations. Therefore, in addition to asking whether its chapters are valuable contributions in themselves, one may ask a second question about this volume: Is there any evidence in the chapters of the special relationship between limbic and autonomic functions?

With regard to the individual chapters, they are superb. Each is a major contribution, usually a much-needed review of a particular line of research. Wenzel on the olfactory system, Satinoff on thermoregulation, Malsbury and Pfaff on male mating, Candland and Leshner on agonistic behavior, Pappas on emotionality, Schneiderman *et al.* and Obrist *et al.* on cardiovascular responsivity, and Sterman on sleep cover their fields competently and with considerable imagination, which makes for good reading. And there are in-

teresting chapters on development, stress responses, and other subjects.

But with regard to making explicit any unique relationship between the limbic and autonomic nervous systems, there is what almost appears to be a conspiracy of silence. Only in the contribution by Cohen is any evidence presented that limbic rather than other parts of the forebrain are involved in autonomic regulation. And Cohen's research is limited to pigeons. All the other chapters that deal with forebrain control of autonomic responses include references to influences initiated from the lateral cortical convexity (especially precentral and anterior frontal).

Does this mean that DiCara's conception of the volume is inappropriate? Perhaps, but there remains the nagging conviction that the editor has some intuition which, if it could only be made explicit, would illuminate a considerable range of brain-behavior relationships. *Limbic and Autonomic Nervous Systems Research* can be an invaluable source in the search for this illumination.

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Cosmology

Black Holes, Gravitational Waves and Cosmology. An Introduction to Current Research. MARTIN REES, REMO RUFFINI, and JOHN ARCHIBALD WHEELER. Gordon and Breach, New York, 1974. xvi, 332 pp., illus., + appendix. $29.50. Topics in Astrophysics and Space Physics, vol. 10.

In the rapidly developing field of relativistic astrophysics and cosmology the existing books have been comprehensive treatises, generally emphasizing one aspect of the subject or another and demanding of the reader a fairly high level of technical proficiency. This book makes the basic concepts of the whole field accessible to the advanced undergraduate or beginning graduate student. It could be used on its own at this level or serve as an introduction or supplement to one of the more advanced books.

The first ten chapters are based on "Relativistic Cosmology and Space Platforms," a European Space Research Organization report by Ruffini and Wheeler dealing with relativistic stars, pulsars, supernovae, black holes, quasars, gravitational waves, and tests of gravitation theories. The remaining nine chapters describe modern cosmology, both observational and theoretical, ending with Wheeler's speculative ideas on the reprocessing of the universe.

The book is very well written. The prose is both readable and concise. Generally, the authors introduce a new concept or result by way of something already familiar to the reader (a Newtonian analog or a dimensional argument, for example), give a simple derivation where possible, and give extensive references should one wish to go deeper into the topic.

Many books of this kind are marred by numerous errors in the text. This one is relatively error-free. (Two that I noticed: gravitational radiation emission *decreases*, not increases as is stated, the period of a binary system, and the equations of stellar structure quoted for the Brans-Dicke theory are incorrect.)

In any rapidly developing field a book may be largely out of date by the time it is completed. Here this problem has been minimized through emphasis on basic physical ideas rather than on particular model-dependent conclusions. However, the authors felt it necessary to add a selection of reprints on black holes and gravitational waves in an attempt to update that part of the book. This decision is my only grounds for major criticism of the book: the book succeeds because it distills each topic and presents it in a manner that makes it easy to understand. The journal articles by their very nature are out of place in a book of this kind, and their omission would have reduced the length of the book, (and perhaps the price too) by over 20 percent.

Not only is this book suitable as a textbook for students, many working astrophysicists will find it a useful book to own.

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Books Received

Abnormalities in Parents of Schizophrenics. A Review of the Literature and an Investigation of Communication Defects and Deviances. Steven R. Hirsch and Julian P. Leff. Oxford University Press, New York, 1975. viii, 200 pp. $20.95. Institute of Psychiatry Maudsley Monographs, No. 22.

Academic and Entrepreneurial Research. The Consequences of Diversity in Federal Evaluation Studies. Ilene Nagel Bernstein and Howard E. Freeman. Russell Sage Foundation, New York, 1975. xiv, 188 pp., illus. $8.95.

Active-filter Cookbook. Don Lancaster. Sams and Bobbs-Merrill, Indianapolis, 1975. 240 pp., illus. Paper, $14.95.

Advanced Engineering Mathematics. C. Ray Wylie. McGraw-Hill, New York, ed. 4, 1975. xii, 938 pp., illus. $16.50.

Advances in Radiation Research. Biology and Medicine. J. F. Duplan and A. Chapiro, Eds. Gordon and Breach, New York, 1973. Three volumes, illus. Vol. 1. xxvi + pp. 1–466. $36. Vol. 2, xii + pp. 467–996. $42. Vol. 3. x + pp. 997–1522. $42. The set, $108.

All in Our Time. The Reminiscences of Twelve Nuclear Pioneers. Jane Wilson, Ed. Educational Foundation for Nuclear Science, Chicago, 1975. iv, 236 pp., illus. Paper, $3.45. Reprinted from *The Bulletin of the Atomic Scientists*.

Antiviral Mechanisms. The Gustav Stern Symposium. Morris Pollard, Ed. Academic Press, New York, 1975. xxxii, 344 pp., illus. $26. Perspectives in Virology, 9.

Archaeology beneath the Sea. George F. Bass. Walker, New York, 1975. xii, 238 pp., illus. + plates. $12.95.

Atlas and Laboratory Guide for Vertebrate Embryology. Saul Wischnitzer. McGraw-Hill, New York, 1975. xiv, 160 pp. Paper, $7.95.

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Biology. The World of Life. Robert A. Wallace. Goodyear Publishing Co., Pacific Palisades, Calif., 1975. xviii, 512 pp., illus. $12.95.

Biota of the West Flower Garden Bank. Thomas J. Bright and Linda Haithcock Pequegnat, Eds. Gulf Publishing Co., Houston, 1974. x, 436 pp., illus. $18.95. A Publication of the Flower Garden Ocean Research Center.

British Mesozoic Fossils. British Museum (Natural History), London, ed. 5, 1975. vi, 208 pp., illus. Paper, 75 p.

Carbenes. Vol. 2. Robert A. Moss and Maitland Jones, Jr., Eds. Wiley-Interscience, New York, 1975. xvi, 374 pp., illus. $24.95. Reactive Intermediates in Organic Chemistry.

Category Theory Applied to Computation and Control. Proceedings of a symposium, San Francisco, Feb. 1974. E. G. Manes. Springer-Verlag, New York, 1975. x, 246 pp. Paper, $10.80. Lecture Notes in Computer Science, vol. 25.

The Changing Global Environment. S. Fred Singer, Ed. Reidel, Boston, 1975. viii, 424 pp., illus. $18.50.

Chemistry for Biologists. J. Jayaraman and Kunthala Jayaraman. Thomson Press, Dehli, India, 1974. viii, 262 pp., illus. Paper, Rs 14.

Chromosomal Variation in Man. A Catalog of Chromosomal Variants and Anomalies. Digamber S. Borgaonkar. Johns Hopkins University Press, Baltimore, 1975. xxii, 230 pp., illus. $15.

Classification Theory of Algebraic Varieties and Compact Complex Spaces. Kenji Ueno in collaboration with P. Cherenack. Springer-Verlag, New York, 1975. xx, 278 pp. Paper, $12.10. Lecture Notes in Mathematics, vol. 439.

Communities and Ecosystems. Robert H. Whittaker. Macmillan, New York, ed. 2, 1975. xx, 388 pp., illus. Paper, $6.95.

Corporations and Society. The Social Anthropology of Collective Action. M. G. Smith. Aldine, Chicago, 1975. 384 pp. $17.50.

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