problem is moving rapidly, and for the latest findings the *Proceedings of the First National Symposium on Sickle Cell Disease* should be consulted.

The *Proceedings* is a compilation of 500- to 800-word summaries of some 140 papers prepared for or presented at the symposium. The summaries were submitted at the time of the conference and generally contain ample references. The summaries were not refereed, but most of the authors show a considerable degree of self-restraint in interpreting the therapeutic implications of their findings. The summaries include interesting new findings on the relationship between sickle cell disease and zinc deficiency and the problems of nerve conduction abnormalities in patients given the otherwise effective cyanate treatment. The book also contains a list of references on sickle cell anemia for the period January 1970 to June 1974, obtained by a computer-based literature search. The summaries are organized according to the nature of the session in which they were originally presented: plenary sessions and sessions devoted to molecular, cellular, or clinical aspects of the disease. This arrangement aids the reader in finding items of interest to him and also conveys the breadth of the conference, which covered the full spectrum of approaches to the sickle cell problem. The book represents an excellent compromise between rapid publication of short abstracts, which generally contain only limited information, and the publication of a tailored monograph, which is a more lengthy process and risks producing a work that is somewhat outdated by the time it appears.

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Pituitary Histophysiology

The Anterior Pituitary. A. TIXIER-VIDAL and MARILYN G. FARQUHAR, Eds. Academic Press, New York, 1975. xvi, 248 pp., illus. $37.50. Ultrastructure in Biological Systems, vol. 7.

Pituitary morphology, both general and comparative, has been the subject of a number of recent publications that have concentrated on the fetal development, histochemistry, and ultrastructure of the gland, but the approach and subject matter of this collection of papers are refreshingly uncommon. This compact volume is a compilation of current work, much of it still in progress, that combines techniques of cell biology with elegant ultrastructural studies.

The three chapters dealing with in vitro culture methods for pars distalis cells are an exceptional contribution. The cellular heterogeneity of the pituitary and the complex hormonal milieu affecting the intact gland have limited morphologic analysis of secretory processes and prompted numerous attempts at culture. Tixier-Vidal reviews and analyzes the more conventional methods of explant and monolayer culture. Changes in subcellular organelles are correlated with specific supplementation of the medium with such hormones as synthetic thyrotropin- and luteinizing-hormone–releasing factors. Technical problems inherent in the culture methods, such as the preferential outgrowth of prolactin cells in tissue monolayers and the ubiquitous problem of fibroblastic overgrowth, are discussed. Perhaps the most exciting portion of the book concerns the studies of Farquhar *et al.* on successfully maintained, individually separated (dispersed) pituitary cells in vitro. Use of this method permits for the first time clear analysis of secretory function of specific endocrine cells without the problems inherent in whole organism, explant, or conventional tissue culture. The apparent physiological heterogeneity of rat somatotropes revealed by leucine pulse-labeling implies that there may be functionally different subpopulations of all specific endocrine cells.

Follicular cells, which historically have been misinterpreted as chromophobes in light microscopic studies, are studied in vitro. A discussion of their phagocytic capabilities by Farquhar, who first described these cells in 1957, makes enlightening reading for the investigator not directly involved with pituitary morphology who might have been unaware of their existence, let alone their potential significance in the biology of the gland.

Hymer comprehensively reviews the technology of separation of both intact cells and subcellular organelles, particularly secretion granules. Of great interest and potential usefulness is the possibility of density gradient separation of intact pituitary cells into groups of a single class. Although only partial success has been achieved, the method promises to make possible in vitro studies of large populations of a single cell type.

Olivier *et al.* report on a wealth of personal experience with the ultrastructure of human pituitary neoplasms (72 cases). The problem of the functional chromophobe adenoma, reviewed by Herlant in an excellent introductory chapter, is well illustrated. Presentation of the material in tables would have facilitated comparison of secretion granule morphology of tumor cells with that of the corresponding normal cell and might have more clearly expressed the variation in granule profiles in tumors of the same functional type. Follicular cells as components of the commonest pituitary neoplasm, the nonfunctional chromophobe adenoma, are mentioned, but the single electron micrograph does not illustrate the point convincingly. Profiles of small secretion granules in some apparently nonfunctional chromophobe adenomas may, as the authors speculate, represent fragmentary peptide synthesis such as is known to occur in some adrenocorticotropic-hormone–producing adenomas. It will be interesting to test this hypothesis using the elegant methods of immunoelectronmicroscopy reviewed by Nakane elsewhere in the volume.

This volume will be useful to mammalian or comparative morphologists, cell biologists, and clinical investigators. The brief and cogent reviews that introduce each chapter, particularly that of Herlant, put into perspective morphologic problems of the pituitary and their significance to the newer applications of cell biology and make this an ideal review for the student. Clear presentations of the technical methods employed and their limitations are exceptional features of the experimental reports.

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Molecular Virology

Early Interaction between Animal Viruses and Cells. KARL LONBERG-HOLM and LENNART PHILIPSON. Karger, Basel, 1974. x, 150 pp., illus. Paper, $35.75. Monographs in Virology, vol. 9.

This is a tightly packed and informative monograph by two investigators of long-standing and productive association with the field. The approach to the subject is patterned somewhat after an earlier review by Philipson (*Prog. Med. Virol.* **5**, 44 [1963]). The expanded scope of the present monograph reflects the enormous amount of new information that has become available in the intervening dozen years, particularly on the penetration of viruses into cells, the uncoating of the viral genome, and the early phases of virus-dependent or other host-cell macromolecular syntheses.

The discussion of individual virus groups in the section on uncoating of the viral gen-

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-