Book Reviews

Neurobiology

Neuroimmunology. JEREMY BROCKES, Ed. Plenum, New York, 1982. xvi, 256 pp., illus. $29.50. Current Topics in Neurobiology.

The application of immunological techniques to produce specific probes for a wide variety of proteins and complex lipids in the nervous system is currently an area of intense activity in neurobiology. Conventional antisera to purified or highly antigenic components have become useful reagents for identifying and localizing elements in the cytoskeleton, in myelin, and on the cell surface. With the arrival of the monoclonal antibody revolution in serology, a dazzling vision has taken over, of high-affinity antibody reagents, truly monospecific, well and permanently characterized, and available in virtually unlimited quantities. As Barnstable puts it in a review in this volume: "The cause for excitement is that the membrane resistances, capacitances and pumps beloved of biophysicists; the intramembranous particles of anatomists; and the 'lock and key' molecules of developmental biologists can all be named, isolated and studied as real molecules." Though such molecules are what we seek, the birds in hand are considerably more modest. In this volume there are eight reviews of the accomplishments of several of the laboratories concentrating on the use of immunological techniques in neurobiology.

In one of the outstanding reviews, Kelly and Hall describe the current immunological probes for presynaptic, cleft, and postsynaptic components of the neuromuscular junction. The difficulties that have developed with conventional antibodies, such as those to choline acetyltransferase, are briefly explained. Progress in this field is rapid, and, though the new monoclonal antibodies to this enzyme are not included, the review should serve as an adequate background for an informed evaluation of the newest developments. The authors describe the use of antibodies to the acetylcholine receptor to provide information that cannot be gotten with α-bungarotoxin binding. The contribution of monoclonal antibodies to the basic knowledge of the receptor, which is clearly summarized, is exceedingly interesting and should be instructive for all those interested in using antibody probes of other channel or receptor functions.

Progress in finding monoclonal antibodies to other muscle membrane proteins and extracellular matrix components is reported by Fambrough *et al.*, and Matthew *et al.* review in considerable detail one monoclonal antibody to a synaptic vesicle protein. This work illustrates well the range of techniques now available for characterization of the new reagents.

Barnstable reviews his rather beautiful localization of several monoclonal antibodies binding to photoreceptor or Müller cells in the retina. The paper includes a very thoughtful comparison of what we want with what we are getting, which should be required reading for all grant applicants hoping to work with monoclonal antibodies. Two of the major laboratories in the field are represented by contributions by Mirsky and Schachner. The former reviews the progress in defining neuronal and glial cells in cultures from the central and peripheral nervous system and the use of such markers in studies of development and differentiation and describes their monoclonal reagents. Schachner writes about the mouse cerebellum, her use of antibodies to filament antigens, oligodendroglial surface antigens, and toxins that bind to neurons. Stressing the changes that occur in development, she has combined studies of mouse mutants, cells in culture, and localization in tissue sections.

Most of these reviews have been carefully written and avoid including too much detail. However, few of them attempt to have full citations of work from other laboratories, and it is strange that the whole subject of neuropeptide transmitters is excluded. The neurologist seeking information about autoimmune or viral diseases affecting the nervous system, or animal models of them, will have to look elsewhere. In this volume there is only a short review of immunopathologic disease of the central nervous system, and it focuses on the role of immune complexes. On the other hand, though myasthenia gravis is not itself reviewed at length, basic aspects of the pathophysiology of antireceptor antibodies are well integrated into the review of the neuromuscular junction. Graduate students contemplating a search for monoclonal treasure in any field would do well to try to extract ideas about strategy and selective assays from these examples. As an alternative to reading the collected papers from the individual laboratories, and as a guide to the contents of those papers, these reviews are adequate up to 1980 or '81. Most of them include some results that were then unpublished.

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Social Behavior of Cells

Cell Behaviour. A Tribute to Michael Abercrombie. RUTH BELLAIRS, ADAM CURTIS, and GRAHAM DUNN, Eds. Cambridge University Press, New York, 1982. viii, 616 pp., illus. $89.50.

Michael Abercrombie pioneered the rigorous investigation of cell social behavior, which has since flourished as an exciting field of research. To commemorate what would have been his 70th birthday, many of his students and colleagues were asked to write reviews of their own research, all of which reflects to some degree the interests and intellectual influence of Abercrombie. Most of these papers were later presented at the Abercrombie Memorial Conference on Cell Behaviour in London in April 1982.

Since the authors were chosen primarily because of their professional relationship with Abercrombie, most aspects of cell motility and contact behavior are covered completely. Unfortunately, the selection process has also resulted in a good deal of repetition. For example, there are three reviews of epithelial sheet movement (Heath; Middleton; Edwards and Parkinson), three papers on neuron motility (Wessells; Ebendal; Bray), and three on the relationship of substratum adhesions to the cytoskeleton (Heaysman and Pegrum; Heath; Vasiliev). Each paper on a topic provides a slightly different point of view, but the overlap is substantial.

Though little is left unsaid on the subjects covered, some other subjects of very active research pertaining to cell motility are not covered. Work on the structure and biochemistry of contractile

proteins and other cytoskeletal elements is left out except for cursory treatment in a few papers. Since this is a subject basic to an understanding of cell locomotion, the book would have benefited by its discussion. Another lapse is that only one paper is devoted to in vivo studies of invasion and metastasis (Tickle), which is somewhat ironic since one of Abercrombie's many exciting contributions to cell biology was the idea that contact behavior might play a role in invasive cell movements. Coverage of invasive mechanisms could have been more thorough, for there are certainly many investigators working in this exciting field (Mareel, Poste, Nicolson, and Folkman, to name only a few).

Despite these shortcomings, the book compiles for the first time since the 1973 publication of the proceedings of a Ciba symposium, *Locomotion of Tissue Cells*, recent research and speculation on cell motility and cell behavior. The topics are loosely arranged in three categories: mechanisms of cell motility in vitro, contact behavior and cell guidance mechanisms in vitro, and control of cell behavior in vivo, including morphogenetic movements and invasive behavior. A few notable papers will be discussed from each category, although the selection is, in some respects, a matter of personal preference, since most of the essays are very good.

The mechanisms of cell motility, though still obscure, have been greatly elucidated recently, and the advent of the interference reflection microscope has been especially useful, since it allows one to follow the formation and disappearance of cell adhesions. Heath's discussion of cell contacts and their relationship to the cytoskeleton is particularly enlightening, as is his analysis of the strengths and shortcomings of the interference reflection microscope. As a result of the tractional forces exerted by the cytoskeleton against these substratum adhesions, the cell is propelled forward, and Harris's paper elegantly demonstrates the presence of this force. The potential consequences of tractional force are at least two. First, cells can deform their substrata as they locomote, which may in turn be responsible for tissue modeling during development and wound closure. Second, the amount of tractional force exerted by a cell may determine whether it is able to translocate in an organism. The latter has tremendous implications for understanding why some cells are motile or invasive in vivo.

A crawling cell can be directed by contact with other cells or by extracellular elements in its environment (as in the case of contact guidance and chemotaxis). Zigmond describes leukocyte response to a chemotactic gradient and presents, in a lucid and unbiased fashion, models for the various mechanisms these cells may use to detect a chemotactic gradient; she provides experimental evidence to support each of these mechanisms. Dunn reviews the historical evidence for contact guidance and presents an original and thoughtful approach to the possible control of contact guidance. He clearly outlines the unanswered questions and the means to investigate these.

Several papers discuss cell movement and cell behavior in vivo. A paper by Steinberg and Poole is particularly intriguing, not so much for the material on liquid behavior of cells, all of which has been published before, as for the report of studies of amphibian pronephric duct movement, which, for the first time, provide compelling evidence that adhesive gradients guide morphogenetic movements. Weston and Trinkaus both contribute informative, well-written papers that are distinguished by a clear presentation of problems that need to be solved and useful hypotheses that can be experimentally tested. Unfortunately, a number of papers under this subheading are rather far afield from the subject at hand, and a few authors, particularly Wolpert, present biased analyses of their research with no reference to published contradictory studies.

Although the book has its weaknesses—some repetitiveness, omissions, and a few substandard papers—its strengths are considerable. It covers in detail many aspects of cell motility and contact behavior. The reviews are, for the most part, thorough and unbiased and are accompanied by extensive bibliographies. The authors were asked to speculate more than is usual in order to foster new kinds of research. Most do to some extent, and some (for example, Harris) present original points of view that are quite exciting. Not surprisingly, a transcript of Abercrombie's Croonian Lecture, delivered in 1978, is particularly noteworthy for its insight and speculation about the many unsolved problems of cell locomotion, even though it is somewhat dated now. In any event, the book will be useful and informative to cell and developmental biologists alike, and it is a fitting tribute to the man who launched this field of investigation.

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Orogenic Andesites

Andesites. Orogenic Andesites and Related Rocks. R. S. THORPE, Ed. Wiley-Interscience, New York, 1982. xiv, 724 pp., illus. $83.95.

Skillful editing of this handsome volume, offered as a "reference text for undergraduate, postgraduate, and research workers" and containing 34 essays by 52 authors, conveys a sense of design and unity more substantial than is in fact the case. The opening 98 pages are devoted to an introduction by the editor, a short paper on the evolution and classification of orogenic volcanic rocks, and a terrifying review (25 pages of text overwhelmed by 27 pages of tables and 107 variation diagrams) of the mineralogy and petrology of Cenozoic orogenic volcanic rocks. The editor's introduction looks at rock genesis through plate tectonic glasses and makes the point, perhaps inadvertently, that, as in pre-plate days, it's a pretty messy ad hoc business. The classification note is concerned more with the evolution of nomenclature than with the evolution of rocks and, despite its title, says almost nothing about formal classification.

The writer of the mineralogy review then mutes the classification issue by arbitrarily attaching names to boxes in a potassium-silicon grid, as do several of the other authors. This, it seems to me, puts an end to serious discussion of relations between bulk-composition and rock type; after all, if andesite is defined as a rock containing 56 to 63 percent silica, it is not very surprising that the average silica content of andesite is usually between 59 and 60 percent, as is shown in a number of places on pp. 88–94. The review compensates somewhat for this implicit circularity of its chemical summaries by a valiant and welcome attempt to characterize the phenocryst assemblages of the orogenic lavas, and one of its results is especially surprising. Despite their high normative q content, nearly a third of the andesites examined by the author contain modal olivine. (Many of the other authors also mention olivine, but only as an "occasional" or "not uncommon" phenocryst, and usually in the less siliceous basaltic andesites rather than the andesites proper.) About the relative incidence of orthorhombic versus monoclinic subcalcic pyroxene, of such central importance in Japanese petrology and discussed elsewhere in the volume, the review says nothing.

The core of the book, sections 3, 4, and 5, is a series of essays on the distri-