Book Reviews

Peptidergic Neurotransmitters

Brain Peptides. DOROTHY T. KRIEGER, MICHAEL J. BROWNSTEIN, and JOSEPH B. MARTIN, Eds. Wiley-Interscience, New York, 1983. xiv, 1032 pp., illus. $97.50.

The first peptide neurotransmitter, substance P, was discovered by von Euler and Gaddum in 1931. Thus the concept of a peptidergic neurotransmitter is not a new one. However, the discovery of the enkephalins in 1975 provided an enormous impetus to the field. The application of such techniques as radioimmunoassay, immunohistochemistry, high-performance liquid chromatography, transcription assay, and hybridization in situ has produced an explosive increase in our knowledge. Many bioactive peptides have been discovered in the nervous system and proposed as neurotransmitters. Peptides whose existence is already well established in the endocrine system, such as cholecystokinin and insulin, have also been found in the brain. Indeed many peptides are now thought to have multiple roles, as neuronal, paracrine, or endocrine biological messages, depending on their cells of origin and release. This situation is not unique to peptides, of course. For example, the catecholamines can act primarily as endocrine messages if released from the adrenal medulla or as neurotransmitters if released from neurons.

Brain Peptides is an attempt to present the reader with the whole panorama of the subject, with an emphasis on peptidergic neurotransmitters in the central nervous system. The book contains 39 chapters divided into four sections. In the first, basic aspects of peptide structure, metabolism, and phylogeny are presented. In the second, the involvement of peptides in the central control of various physiological functions (such as nociception and thermoregulation) is discussed. The third section is a guide to practical techniques for studying peptides; their measurement, localization, and actions are all considered. In the final section, each peptide or group of peptides is discussed in its own right.

Clearly an attempt has been made to produce a survey that is of the highest quality and that is as up to date as possible. The chapters range from being at least satisfactory to being highly authoritative. It is impressive to find chapters devoted to such relatively recent discoveries as corticotropin-releasing factor (CRF) and growth hormone–releasing factor (somatocrinin). However, there are also some anomalies, such as the absence of any real discussion of the pancreatic polypeptide-related peptides such as NPY and PYY.

For the reader who wishes a relatively comprehensive introduction to all aspects of the field, this is probably the best book available. It is certainly superior to the many symposium volumes that have appeared over the last few years. However, the field has become so enormous that it is impossible to cover it completely even in a volume of this size. The field is moving at such a rapid rate that any attempt at an overall synthesis is bound to be rather out of date by the time it is published. Thus, for example, recent discoveries such as calcitonin gene-related peptide, substance K, or PHI/PHM-27 are not discussed here and some of the theoretical and technological implications of such discoveries are not considered.

This is an excellent volume for the reader who wishes to become acquainted with this field. For the more sophisticated reader, the volume will not be a substitute for review articles that appear in journals relatively rapidly.

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Quaternary Sediments

Glacial-Marine Sedimentation. BRUCE F. MOLNIA, Ed. Plenum, New York, 1983. x, 344 pp., illus. $65.

The stated purpose of this collection of 18 papers is to portray differences among glacial-marine sedimentary environments in a variety of geographic settings through studies of Quaternary-age deposits. In addition, descriptions of important pre-Quaternary rock sequences, ranging in age from the Late Precambrian to the Neogene, are presented to illustrate how criteria established from an understanding of Quaternary glacial-marine sedimentary sequences can be used to interpret more accurately the ancient record.

The first objective is admirably fulfilled by descriptions of sedimentary sequences and processes from the Gulf of Alaska, the Arctic and North Atlantic oceans, Baffin Island, the Puget Lowlands, and Antarctica. Depositional environments include fjord, deep and shallow continental shelf, perennially ice-covered (ice shelf and sea ice) seas, continental shelves bounding mountainous coasts, shelves with ice sheets grounded on the shallow sea floor, and deep sea. Processes include direct release from glaciers, sediment rain-out from meltwater and floating ice, deposition by turbidity and ocean currents, earthquake-triggered submarine landslides, and other mass movements. Separate models are presented for polar, subpolar, fjord-tidewater glacier, and glaciated coast sedimentation. The breadth of coverage and the wealth of detailed observations make this part of the book a mother lode for sedimentologists and stratigraphers.

A paper on the paleoecology of Late Pleistocene glacial-marine sediments by M. A. Balazarini is a reminder that fossil assemblages, when present in a stratigraphic sequence, can be important data proxies for such environmental conditions as water temperature, depth, and salinity. It also rubs salt into the wounds of those dedicated to the study of fossil-barren sequences.

The last three papers, by J. M. Armentrout, J. N. J. Visser, and N. Christie-Blick, present substantial descriptions of important examples of older glacial-marine sedimentation and interpretations based on knowledge of modern environments of deposition. They are all unusually well illustrated, including some extraordinary oblique aerial photographs of the Neogene Yakataga Formation in the Robinson Mountains, Alaska.

An unexpected bonus is a paper by J. B. Anderson on the spatial and temporal distribution of ancient glacial-marine sediments. It serves as a fine introduction to the complexities and controversies relating to the subject. He includes an informative summary of criteria for recognizing origins of diamicts and a useful bibliography.

This benchmark compendium on glacial-marine sedimentation owes much of its success to Molnia's perceptive selection of authors and to his own substantial contributions to the contents. It is a comprehensive, up-to-date summary of

important observations and interpretations of a sedimentary depositional environment that is receiving a surge of well-deserved attention. The book has already become an indispensable and oft-lent volume in my own library.

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British Geologists

The Great Chain of History. William Buckland and the English School of Geology (1814–1849). NICOLAAS A. RUPKE. Clarendon (Oxford University Press), New York, 1983. xii, 322 pp., illus. $45.

According to the author, a great revolution took place in geology in the late 18th and early 19th centuries involving the discovery of a "great chain of history": a succession of worlds that increasingly resembled our present world. This "new perspective of earth history . . . reduced the relative significance of the human world in time" just as the Copernican Revolution "had diminished it in space." This revolution, based upon Abraham Werner's classification of rock formations and Georges Cuvier's work in vertebrate paleontology, was accomplished largely by English geologists beginning with the founding of an "Oxford school of historical geology" in 1814 by William Buckland and William Conybeare. By the early 1820's, Buckland's correlation between continental and English stratigraphy and his hyena den theory, which substantiated his contention that the biblical deluge had formed the major valleys and transported the "diluvial" gravels and erratics, had made him "England's leading geologist." Buckland's cave paleontology "represented the first major ecological study of fossils as members of communities interpreted with the aid of present-day analogies."

Despite criticism from Scottish evangelicals and Huttonians that forced them to give up their claim that the "diluvial" phenomena had been caused by a single deluge resembling that in Genesis, Buckland's group had by 1830 expanded into the "English school of geology," committed to a "progressivist" synthesis of earth history opposed to the "anti-historical" Huttonian uniformitarianism of Charles Lyell, to which modern historical geology "owes little." The principal members of the school were Buckland, Conybeare, Adam Sedgwick, William Whewell, John Phillips, Henry de la Beche, Roderick Murchison, and (I would add) George Poulett Scrope. It allegedly disintegrated in the 1840's, but the changes that occurred in this period are only barely mentioned in the book (pp. 3–27).

This work is thus primarily a study of the geological theories of Buckland and their origin and influence from 1814 to about 1841. After an introduction that summarizes the principal points, it is organized around three major topics: diluvialism, the progressivist synthesis, and the relationship of geology with natural theology. These are divided into many subtopics, each covered chronologically, a formula that results in some subjects' being discussed more than once. The treatment of the interaction between Buckland's geology and literature, the arts, religion, natural theology, and the Oxford academic environment is valuable; and it is shown that the theoretical views of Buckland and the English school deserve respect, a point that has previously been made by Martin Rudwick (in D. H. D. Roller, Ed., *Perspectives in the History of Science and Technology*, 1971, pp. 209–227). The observational basis of the views of the English school is insufficiently treated, as is the important contribution to the progressivist synthesis made by Murchison and others in extending the use of fossils in the identification of Paleozoic strata.

Rupke's portrayal of the English school as the true founders of "the modern perspective of earth history" is largely unconvincing for the following reasons:

1) Rupke ignores significant differences between members of the English school, such as the greater interest that its clerical members had in reconciling geology with the Bible and the debate between Murchison and De la Beche over the importance of fossils in correlating the Devonian strata in the late 1830's.

2) Rupke exaggerates the differences between the English and Scottish schools. For example, it is difficult to reconcile the statement that John Fleming believed that "geology and the Bible ought to be kept apart" (p. 83) with the fact that Fleming proposed a scheme of reconciliation of geological history with Genesis that was similar to Buckland's.

3) Rupke rejects the label "catastrophist" for the English school, arguing that they emphasized "the continuity of progress and the undisturbed length of geological periods rather than catastrophic interruptions" (pp. 193, 200). Yet he defines the "progressivist synthesis" as "the perspective according to which earth history was driven by central heat channelled through progressive succession, and punctuated by global upheavals" (p. 184); and there is much contemporary evidence that members of the English school saw their catastrophism as implying progression and vice versa, with catastrophism as the more fundamental (see for example, Whewell, *Quart. Rev.* **47**, 126 [1832]). According to John Phillips, the English school had "always maintained" that geological "causes . . . have remained . . . unchanged in kind and are still operating with the same tendencies . . . but often on smaller areas and with less effect" (*Manual of Geology*, 1855, pp. 466–467). Whereas some saw these causes as "acting more violently" in earlier periods but now "tending to . . . quiescence" (Conybeare in an 1841 letter to Lyell; *Proc. Am. Philos. Soc.* **111**, 280, 287 [Oct. 1967]), others believed in "long periods of ordinary action . . . interrupted by epochs of extraordinary disturbance" (Phillips). That is, the latter saw catastrophes as still possible.

4) After arguing that the English school was progressivist, not catastrophist, Rupke then implies that progressivism was largely identical with the "modern perspective of earth history" and that, because Lyell and the Huttonians rejected the progressivist synthesis, they contributed little to this perspective (pp. 5, 186–191). This overlooks the influence that uniformitarianism had on progressivism during the 1830's and later as well as its influence on the broader geological synthesis of the late 19th century, which incorporated Darwinian evolution and much else. It also ignores the later Continental geologists (see Mott T. Greene, *Geology in the Nineteenth Century*, 1982).

5) Rupke depreciates the contributions of William Smith to English geology by asserting that they were not widely acknowledged before 1831, when some members of the English school created the "myth" that Smith was the "Father of English Geology" (pp. 191–193). This ignores much recognition of Smith long before that date, such as the laudatory but balanced appraisal by Conybeare in 1822 (*Outlines of the Geology of England and Wales*, pp. xlv–xlvii).

This book makes a substantial contribution to an understanding of Buckland and, to a lesser extent, the English school, since it is the most thorough treatment to date of Buckland's geological writings as a whole, especially his manuscripts. It is therefore a useful source book for the work and ideas of Buckland and of others that relate to him. However, it is superficial in its