have had to wade through the verbal thickets of the "new archeology" is the fact it is on the whole well written, even though at points it recalls in its somewhat mechanical presentation the dissertation that was its ancestor.

A work that draws from so many potential models and attempts to explain relatively briefly complex cultural processes is bound to be subject to objections. I find the model for Hallstatt change on the whole convincing. However, in stressing the Hallstatt–Massilia axis the author may simplify a process of contact that involved more deeply other Celtic groups. Also, he does not define clearly enough the nature of the goods exported to the Mediterranean from the Celtic centers. I believe that these were probably portable luxury goods such as slaves or furs and that more concentration on anthropological analogies for both the fur and slave trade in other cultures would have made the sections on trade processes more convincing. The different nature of La Tène contacts is clear both from the archeological and the historical record. However, the use of a model that has La Tène youth seek their fortune in the expanding centers of north Italy gives an anachronistic, *Gastarbeiter* image to a very different cultural scene.

Such disagreements normally arise when an author reaches out intellectually, especially in dealing with material as difficult as that presented by European prehistory. They should not detract from the fundamental quality of this study. Wells belongs to a growing school of Continental, British, and American scholars who are moving European prehistory into the modern archeological mainstream. This volume is an excellent contribution to that development.

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Molecular Clouds

Interstellar Molecules. Papers from a symposium, Tremblant, Quebec, Canada, Aug. 1979. B. H. ANDREW, Ed. Reidel, Boston, 1980 (distributor, Kluwer Boston, Hingham, Mass.). xl, 704 pp., illus. Cloth, $76.50; paper, $34. International Astronomical Union Symposium No. 87.

About ten years ago, only a few diatomic molecules were known to exist in the interstellar medium, and they were of only occasional interest. Since then, the development of more sensitive observational techniques, especially in radio astronomy, has led to the discovery of roughly 50 molecules, and their central importance in the interstellar medium has been established. These proceedings are the record of 139 papers given at a 1979 symposium, and even for the nonspecialist they give a good sense of the range of current studies and the vitality of the field. It is remarkable that not much more than a decade ago the results described here were, for the most part, not even imagined.

Within the interstellar medium molecules can be destroyed by ultraviolet light, so they are mainly concentrated into clouds, where they are shielded by dust grains. The clouds are usually cold ($T \lesssim 100$ K), so that radio and infrared wavelengths are the natural spectral region for the study of these species. However, there are some important observations that can be made only in the visible or ultraviolet.

Many of the observational programs presented in this volume survey and identify molecules in different directions; the species range from the quite simple CN to the more complex HC_9N. The main building blocks are carbon, nitrogen, oxygen, and hydrogen. However, even very rare isotopes such as ^{17}O are measured, and, as discussed in papers by Penzias and others, the relative abundances of different isotopes provide valuable information about the history of nucleosynthesis in different regions of the Galaxy. One of the most interesting recent developments is the detection of thermally excited molecular emission from mass-losing regions of individual stars, discussed by Zuckerman and a large group mainly from Caltech.

Once a molecule is detected, many observational questions follow, and they are discussed extensively in this book. How much of the species is present? How is the molecule excited? What other molecules are present? By what chemical pathways are the molecules formed and destroyed? A wide range of phenomena from shock waves (discussed by Hollenbach and by Beckwith) to cosmic ray ionization are important, and they result in a striking variety of effects from masers to high velocity flows. The large numbers of studies described in this volume indicate that considerable progress toward a quantitative understanding of the gas-phase chemistry and physics of individual clouds has been made.

Finally, one tries to use the studies of individual regions to develop an integrated picture of the interplay between the interstellar gas and the evolution of the Galaxy as a whole. Clouds are massive, yet cold, so they can and sometimes do collapse to form stars. Since we understand very little about the details of star formation, much of the ultimate rationale for the study of molecular clouds is that we may learn more about the origin of stars and planets, including our own solar system.

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Marine Mineral Deposits

Underwater Minerals. D. S. CRONAN. Academic Press, New York, 1980. xvi, 362 pp., illus. $57.50. Ocean Science, Resources and Technology.

David Cronan has written the first comprehensive volume on the marine minerals of the global ocean, with emphasis on those mineral deposits that hold promise for early exploitation. This book covers marine placers, aggregates, authigenic minerals, phosphorites, manganese nodules, metalliferous muds, and certain sub-sea-floor lode and sedimentary deposits. Cronan has also included brief chapters on exploration and exploitation methods. His extensive research experience with nodules and metalliferous muds has resulted in an obvious emphasis on these two major mineral types. Nonetheless, the book does provide a desirable balance between the shallow water placers and aggregates, deposits that are already being mined economically, and the deep-sea nodules and metalliferous muds, deposits that are still waiting to be mined. I applaud Cronan's effort to concentrate on the scientific and technical aspects of finding and recovering these much-needed deposits and avoid the pitfall of succumbing to discussion of the international political problems that, at present, constrain the development of these industrially important metal and mineral reources. Given the international disagreement over who owns the deep sea floor, the chapters on nodules and metalliferous muds may be of secondary importance to the global industrial community, while the information on marine placers and aggregates (both shallow-water deposits) will surely be the focus for readers of this book in the more immediate future. Obviously, the entrepreneur will seek economic reward where there is the least political conflict and disagreement; hence, the decade of the 1980's will be one of increasing mining of the sea floor on the continental shelves of the world.

The reader who expects to find suggestions for sites to explore, or to mine, will be somewhat disappointed. Cronan has, wisely or unwisely, avoided recommendations for exploration targets. On the other hand, for the scientist engaged in exploration, he has provided the finest synthesis of information on the principal marine minerals, and in some cases ores, that has been published since H.M.S. *Challenger* scientists first discovered manganese nodules on the deep sea bed over a century ago. The book is readable, the discussion is well documented, the figures are crisp and clear, and the references are pertinent and up to date. Whether our interest in marine mineral deposits is the discovery of new resources in a metal-hungry world or simply the science of mineral genesis of such deposits, Cronan's book is the best idea factory on the subject to date.

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Brain Peptides

The Role of Peptides in Neuronal Function. JEFFERY L. BARKER and T. G. SMITH, Jr., Eds. Dekker, New York, 1980. xvi, 768 pp., illus. $95.

During the past decade the number of different chemicals thought to act as messengers transmitting information between neurons within the brain has increased dramatically. This has been due to the discovery of a new class of possible neurotransmitter candidates, the neuropeptides. Almost 30 small peptides have been found to occur within neurons and nerve endings in the mammalian central nervous system, and the peptides now heavily outnumber the ten or so previously described amine and amino acid transmitter candidates. Most of the brain peptides are substances previously described as hormones in the periphery, now appearing in new guise within the nervous system. The present volume, the proceedings of a meeting held in 1980, is the latest progress report on this rapidly growing field.

In planning how to cover this large and diverse area of research, one has the alternatives of dealing with the subject in terms of individual peptides or by more general reviews of various aspects of research strategy. In this volume both approaches have been used. Thus, the first half of the book consists of a series of reviews of general strategies for neuropeptide research, including coverage of the immunohistochemical and chemical analytical techniques that have been fundamental to much of the progress made so far. There are also reviews of peptide biosynthesis and release and of the use of electrophysiological techniques for studying peptide actions on single cells, both in vivo and with neurons in tissue culture.

The neurohormones vasopressin and oxytocin are the first known examples of "neuropeptides" synthesized by neurons in the hypothalamus and released into the blood from the terminals of these cells in the neural lobe of the pituitary gland. These peptides are now also known to exist in nerve endings within the brain and spinal cord, where they may serve different functions. The neurosecretory neurons of the hypothalamic-neurohypophyseal system, however, continue to serve as excellent and thoroughly documented models for understanding the general properties of peptidergic neurons. It is not surprising, therefore, to find no fewer than four chapters devoted to this topic, with good reviews of the biosynthesis (J. T. Russell *et al.*), release (J. J. Dreifuss *et al.*), and behavioral actions (R. Walter *et al.*) of vasopressin and oxytocin and of the electrophysiological properties of the hypothalamic neurosecretory neurons (J. D. Vincent *et al.*). Nor is it inappropriate that the opioid peptides, enkephalin and endorphin, receive similarly extensive coverage, with chapters on opiate receptors and endogenous opioids by H. W. Kosterlitz, W. A. Klee and R. A. Streaty, and P. G. Nelson *et al.* and a discussion of the behavioral pharmacology of the opioid peptides by J. W. Lewis *et al.* Other chapters deal with vasoactive intestinal polypeptide, cholecystokinin and bradykinin, hypothalamic releasing hormones, neurotensin, substance P, and some of the numerous peptides found in invertebrate nervous systems.

More than a dozen similar symposia have been held during the past two years; there have also been excellent reviews of the subject (see, for example, S. H. Snyder, *Science* **209**, 976 [1980]), and two new journals exist to cater exclusively to papers on neuropeptides. The reader may reasonably wonder whether there is not already something of a glut in this particular market, and one suspects that the present volume will appeal mainly to those directly involved in neuropeptide research. It can be criticized for the somewhat xenophobic selection of authors (22 of the 29 chapters are from laboratories in the United States, eight from the National Institutes of Health), but geographical balance can be restored by consulting the complementary volume, *Neuroactive Peptides*, arising from a meeting held at the Royal Society, London, also in 1980 (*Proc. Roy. Soc.* B. **210**, 3). The present volume contains a great deal of useful and up-to-date information and could certainly serve as a useful source book for those interested in finding out more about any aspect of this new growth area of neuroscience.

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