microfossil occurrences by B. M. Funnell reminds us that this important source of information should not be overlooked in the euphoria over the later drilling results. Funnell realized early the implication of these occurrences for testing the sea floor spreading hypothesis, and his brief discussion on the subject is up to date for the time (1967).

A. Longinelli summarizes the major difficulties in interpreting $^{18}O/^{16}O$ fluctuations in Pleistocene faunal assemblages. We do not know how the isotopic composition of sea water changed through time, and we are largely ignorant of the ecology of shell formation. Some information has become available since 1967, however. One promising approach is to calculate the most probable temperature of formation for the total assemblage of surface water species in well-preserved sediments on the basis of the present-day temperature range of each species. This allows the isotope curve to be standardized against temperature, so that the effect of varying composition can be accounted for.

M. N. Bramlette (who pioneered the stratigraphic use of coccolithophorids) and W. R. Riedel (who did the same for radiolarians) introduce the section on biostratigraphy by listing concepts and rules in this field of research and illustrating the special conditions obtaining in deep sea deposition that may foil the unwary.

Other comprehensive presentations of wide interest in this volume include Bé and Tolderlund's foraminiferal temperature range and distribution charts (the zone chart has a drafting error, showing a transition zone fauna in the Baltic Sea, which actually contains no planktonic Foraminifera), Riedel's maps and documentation of the distribution of pre-Quaternary radiolarians, and the very useful papers on Quaternary and Tertiary stratigraphy by Hays and Berggren and by Berggren.

The discussion of the Miocene-Pleistocene boundary by Hays and Berggren shows that this part of stratigraphy is unnecessarily burdened by problems of a historical-nomenclatural type in addition to difficulties deriving from the real world of evolution and climatic change. With improved understanding, certain local (and quite possibly incomplete) type sections will take their proper, subordinate place. The need for ever sharper "definitions" of a Pliocene-Pleistocene "boundary" will then diminish. Sharp boundaries between epochs, after all, are figments of the mind, not facts. Berggren's Cenozoic time scale (at the end of the book) has undergone several revisions in response to new information. The latest edition will be found in a forthcoming issue of the *Journal of Foraminiferal Research.*

In addition to the more comprehensive papers mentioned, there are numerous shorter contributions with useful information on planktonic and benthonic microfossils. In addition, there are a (surprisingly small) number of papers that would normally be rejected by a journal, in their present form.

This fine volume will become an important reference for all students of deep sea sediments.

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Chromosomes and Other Topics

Advances in Cell and Molecular Biology. Vol. 1. E. J. DUPRAW, Ed. Academic Press, New York, 1971. xvi, 308 pp., illus. $15.

Probably any short modern compilation concerned with a subject as broad as cell and molecular biology must cover diverse topics and only a small portion of the total. If there is a feature common to most of the reports in this one, it is the use of ultrastructural observation. The volume is also characterized by scholarly reviews that will be of interest to most cellular biologists.

Elgin, Froehner, Smart, and Bonner, in their paper on chromosomal proteins, draw particular attention to the extraordinary evolutionary conservation of histone IV (comparable to that of the sugar-phosphate backbone of DNA) and to the existence of only a small number of unique histone molecules. Although histones must contribute to genetic repression, other components of chromatin (possibly other proteins in concert with RNA) must provide the requisite specificity. Conceivable roles of acetylation, methylation, and phosphorylation are unclear. Hormonal response may imply gene derepression by prevention of histone binding during replication. Nonhistone chromosomal proteins seem to serve not to repress template activity but to interact with histones so as to mitigate repression. From vast accumulated information the authors suggest promising approaches to the problem of gene repression and activation.

After keen analysis of a large body of old and new information on chromosome breakage and rejoining, Kihlman suggests, as a hypothesis to stimulate discussion, that dark repair, genetic recombination, and chromosome aberration all involve the same biochemical mechanisms. His response to the inevitable consideration of chromatid structure is to support the single folded fiber model. However correct his judgment may ultimately prove to be, it is unfortunate that he has neglected alternative explanations for supporting evidence. He accepts visual evidence for lack of doubleness of chromatid structure as conclusive although postreplicative chromosomes are known frequently to appear single, and he ignores visual evidence for doubleness of chromatid structure.

"The molecular architecture of synaptonemal complexes" by Wettstein and Sotelo should be read thoroughly. Some initial ambiguities of terminology are later clarified. If DNA is indeed present in the synaptonemal complex, available evidence suggests that it must be scarce. The authors, whose studies of the fine structure of the synaptonemal complex are among the best available, doubt that the structure bears a close resemblance to the lampbrush state. They suggest that synaptonemal-like complexes (not associated with orthodox pairing) may result from failure of synthetic repression. It is disappointing that these authors, like other students of the synaptonemal complex, have not considered the structural intricacies apparently necessitated by shortening of bivalents during pachytene.

McGee-Russell and Allen describe elegant ultrastructural studies on *Allogromia* which provide evidence for a highly labile class of microtubules to account for reticulopod extension. They significantly suggest that labile microtubules may be more generally distributed.

Lampert notes that chromosomes from malignant cells have a characteristically altered appearance at metaphase (spread poorly, stain lightly and unevenly). He found chromosome dry mass similar in malignant cells to that in normal cells but packing ratio altered. He suggests that the differences in packing ratio may be related to the state of gene regulation.

Bajer and J. Molè-Bajer describe

elegant and meticulous work on the mitotic spindle. Their warnings concerning extrapolation from one species to another and conclusions based solely on fixed material (where, in the time required to kill, chromosomes may move as much as 0.5 micrometer and membranes may be formed or destroyed) might well be heeded by workers in other areas. The relationship of microtubules to chromosome movement is imperfectly understood. It appears that kinetochore fibers pull kinetochores during most mitotic movements, but microtubules are not attached to the poles in either plants or animals. Educated guesses are that anaphase movement is triggered by the removal of some blocking material and that kinetochore microtubules grow poleward with elimination occurring at the poles at metaphase and through anaphase. The entire fiber could thus be transported poleward, pulling the chromosome, the motive force possibly supplied by interaction between kinetochore fibers and continuous fibers.

Bahr, in a paper on mitochondrial DNA content and x-irradiation, concludes that DNA content is correlated with dry mass. He suggests that a mitochondrion containing only one DNA molecule must have a minimum dry mass, the "unit mitochondrion."

Several of the authors seem to favor strongly the chromatid folded fiber unineme structure model previously proposed by the editor, without reference to other possibilities. Although this model may prove to be correct, it can be questioned whether the current state of knowledge warrants such reverence. Consider, for example, that the model could impose magnificent acrobatics during the terminalization process on chromatids involved in chiasmata.

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Analytical Chemistry

Spectrochemical Methods of Analysis. Quantitative Analysis of Atoms and Molecules. J. D. WINEFORDNER, Ed. Wiley-Interscience, New York, 1971. xiv, 530 pp., illus. $23. Advances in Analytical Chemistry and Instrumentation, vol. 9.

The two major divisions of this book cover, respectively, flame spectrometric methods of analysis and absorption and luminescence spectrometry in solutions. Each division has an opening chapter which is intended to introduce the theory by describing excitation and deexcitation processes. The chapter by Alkemade and Zeegers on these processes in flames is long (125 pp.), detailed, and inclusive. It should be of great value to serious workers in flame spectrometric research and could be read with benefit by most others who are using flame spectrometric methods. It is probably much too detailed for the beginner. The corresponding chapter by McGlynn, Srinivasan, and Maria on solution spectrometry is much shorter (35 pp.) and quite narrow in approach. It assumes considerable knowledge of the subject and treats only phosphorescence kinetics. These authors state, "We hope . . . we will provide a little information and impart a few attitudes which will be helpful to the reader." Without faulting these aims, one can wonder if they were the intentions of the editor.

Each of these introductory chapters is good in its own way. Many of the others are of much poorer quality. The appendix on signal-to-noise ratio theory in optical spectrometry, by the late W. J. McCarthy, must be mentioned as an outstanding feature of this book. It is concise and lucid and deserves to be read by the majority of us, students and workers, who are not already familiar with this topic. The mathematical analysis of signals and noise has proven its value in the design of instruments and experimental procedures, and this is the clearest introduction to the subject that I have seen.

The editor states in the preface that the book is intended for analytical chemists, for other scientists using spectrometric methods, and for students, and that it is intended to introduce the subjects and to serve as a review of recent work. I'm afraid that these several aims are too contradictory to coexist in a single volume. Each author not only has focused on a single topic, but also has focused on a single aim. Although the book offers something for almost any individual, it also has many parts which will be essentially useless for that same person.

This is not a textbook. This is not a reference book. This is not a set of reviews. This book cannot be classified. Many scientists and students will benefit by selective reading from it.

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Books Received

Advances in Agronomy. Vol. 23. N. C. Brady, Ed. Prepared under the auspices of the American Society of Agronomy. Academic Press, New York, 1971. xvi, 408 pp., illus. $21.

Advances in Electronics and Electron Physics. Vol. 30. L. Marton and Claire Marton, Eds. Academic Press, New York, 1971. xii, 334 pp., illus. $19.50.

Advances in Immunology. Vol. 13. F. J. Dixon and Henry G. Kunkel, Eds. Academic Press, New York, 1971. xvi, 336 pp., illus. $16.50.

Advances in Microwaves. Vol. 7. Leo Young, Ed. Academic Press, New York, 1971. xiv, 294 pp., illus. $18.50.

The American Ideology of National Science, 1919–1930. Ronald C. Tobey. University of Pittsburgh Press, Pittsburgh, 1971. xiv, 264 pp. $9.95.

Animals of the Arctic. The Ecology of the Far North. Bernard Stonehouse. Holt, Rinehart and Winston, New York, 1971. 172 pp., illus. $10.95.

Annual Review of Phytopathology. Vol. 9. James G. Horsfall, Kenneth F. Baker, and George A. Zentmyer, Eds. Annual Reviews, Palo Alto, Calif., 1971. xii, 494 pp., illus. $10.

Atlas of Fossil Man. C. Loring Brace, Harry Nelson, and Noel Korn. Holt, Rinehart and Winston, New York, 1971. x, 150 pp., illus. $3.25.

Biochemical Aspects of Reactions on Solid Supports. George R. Stark, Ed. Academic Press, New York, 1971. xii, 234 pp., illus. $13.50.

Computer Applications in Civil Engineering. Paul D. Spindel. Van Nostrand Reinhold, New York, 1971. viii, 216 pp., illus. $8.95.

Concentrations of Solution. A Programmed Learning Manual. Charles B. Leonard, Jr. Medical Examination Publishing Co., Flushing, N.Y., 1971. 120 pp. Spiral bound, $3.

Conceptual Foundations of Quantum Mechanics. Bernard D'Espagnat. Benjamin, Menlo Park, Calif., 1971. xviii, 494 pp., illus. Cloth, $21.50; paper, $6.95.

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Dams and Other Disasters. A Century of the Army Corps of Engineers in Civil Works. Arthur E. Morgan. Porter Sargent, Boston, 1971. xxvi, 422 pp. $7.50.

Differentiable Dynamics. An Introduction to the Orbit Structure of Diffeomorphisms. Zbigniew Nitecki. M.I.T. Press, Cambridge, Mass., 1971. xvi, 282 pp., illus. Paper, $6.50.

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(Continued on page 566)