

origin or geologic history and sticks closely to factual observations. Yet it is a pity that he has not often taken pains to point out which observations tend to support a given hypothesis, for his long experience in the region gives him a unique opportunity to do so.

The volume is certainly the best general summary available and will be widely read. At the same time, its local flavor clearly illustrates the continuing need for a concise presentation of the geological evolution of the African continent addressed to the scientific profession at large.

BRIAN J. SKINNER

*Department of Geology and
Geophysics, Yale University,
New Haven, Connecticut*

New World Archeology

Prehistory of North America. JESSE D. JENNINGS. McGraw-Hill, New York, 1969. xiv + 402 pp., illus. \$9.95.

Prehistory of North America is an introductory synthesis written as a textbook. It follows a logical progression, giving an outline of methods, descriptions of prehistoric cultures, and discussions of theoretical issues. It should fulfill its intended function well. Descriptions of sites and artifacts are accompanied by numerous drawings; there are no photographic illustrations. Archeological social reconstructions are discussed, but the author relies on ethnographic analogy where possible.

Continent-wide culture stages provide the organizational theme for Jennings's account of the establishment of big-game hunters and the subsequent development of a stable Archaic hunting-and-collecting way of life. In dealing with aspects of the succeeding Formative stage the book necessarily takes on a more specific regional organization.

Classic stage cultures of Central America are not considered, but the origins of plant domestication in Mexico are included because these events transformed the Archaic lifeway. The Arctic is treated as a unique region because its cultures do not fit the author's definition of the Archaic stage; they lack the necessary "total exploitation" of vegetal resources. This is the least convincing argument in the book.

It is Jennings's discussion of hypotheses and future problems that provides the most interesting and informative passages; from the catalog of what we

do not yet know an overview of the current status of American archeology emerges. The probability of an Asiatic-chopper-tool substratum and the likelihood of significant Old World stimulus in the Americas are examples of still-unresolved problems regarding which the author believes fieldwork may provide evidence in the future.

Jennings thinks that the terms "Woodland" and "Mississippian" have outlived their usefulness but does not attempt to devise replacements—wise from the textbook point of view but disappointing from that of synthesis. He does, however, put forward the concept of *archaic efficiency* as a modification and extension of the idea of primary forest efficiency. Archaic-stage technology, utilizing new raw materials by means of innovations in tools, provided a stable way of life, regardless of regional differences. Efficiency resulted in increase in population to the supportive capacity of the land. The author asserts that the Archaic stage would have lasted indefinitely had not outside stimulus resulted in regional changes after 2000 B.C.

Jennings clearly regards the idea of archaic efficiency as the most important contribution of his new synthesis of North American prehistory. There is no denying that he has provided much food for thought as well as an admirable text.

ROGER T. GRANGE, JR.

*Department of Anthropology,
University of South Florida, Tampa*

Microbial Biochemistry

Bacterial Physiology and Metabolism. J. R. SOKATCH. Academic Press, New York, 1969. xii + 444 pp., illus. \$14.50.

The major catabolic and biosynthetic pathways in many bacterial genera are now firmly established, and there is also detailed knowledge of the enzymic reactions. A teacher faced with providing a course for graduate students or senior undergraduates in bacterial biochemistry can quickly alienate the class by recitals of metabolic pathways and fermentation balances. It seems better to give the principles, with detailed treatment of selected examples, and Sokatch's book should be a most suitable adjunct to a course in which this is attempted. It provides broad, accurate, and up-to-date coverage of metabolic pathways in bacteria, supple-

mented with physiological background and with molecular biology.

The book is divided into three parts: on physiology, energy metabolism, and biosynthetic metabolism. The first section includes a general discussion of the diverse nutritional requirements of bacteria ranging from the chemolithotrophs to the exacting Lactobacillaceae. There is also a thorough description of the characteristics of bacterial growth in batch and continuous culture and under synchronous conditions. This section ends with a most useful chapter on the chemical composition of bacteria, which includes recent work on the lipids and on the surface layers.

Energy metabolism is treated in logical sequence, beginning with a discussion of the utilization of oligosaccharides, followed by a chapter on sugar transport, a process whose nature is now being clarified by the isolation of specific transport proteins. Anaerobic and aerobic breakdown of carbohydrate is considered in detail, with emphasis on the experimental approaches used to reveal the mechanisms. Utilization of nitrogenous compounds and of aromatic hydrocarbons is also covered well. In addition to descriptions of the enzymic steps, there are many useful figures and schemes showing the chemical structures of the various intermediates. The work with *Mycobacterium phlei* is given the most attention in the chapter on aerobic electron transport and coupled phosphorylation, but the diversity of the systems by which these processes occur in bacteria is clearly pointed out. The principles of photophosphorylation in photosynthetic bacteria are briefly discussed, and the oxidation of inorganic substrates by the chemoautotrophs receives quite extensive treatment. The methane-producing bacteria are not considered in this book, an omission which must surely be remedied in future editions, in view of present interest in these organisms.

Biosynthesis is given comprehensive treatment. This section considers not only the formation of monomers but also synthesis of cell wall materials, complex lipids, nucleic acids, and proteins. A good synopsis is provided of studies of protein synthesis and its regulation up till 1968; this should provide a framework for the student trying to keep up with the current literature. "Classical" biosynthesis is covered in detail, beginning with the utilization of carbon dioxide by photosynthetic and chemosynthetic bacteria and with brief