to be exhaustive treatises. They are forward-looking personal viewpoints. One may often find that the lists of references do not include people whose work is often thought of as "the modern classics" in a particular topic; but this is in line with the basic intention to encourage a few chosen authors to put forward their own personal suggestions.

The final question is, how deep and far-reaching are the personal speculations offered about each of these challenging problems? Frankly, I should myself have liked to see people stick their necks out a bit further. This book is intended to be a bit more solid than that "collection of half-baked" ideas published a few years ago as *The Scientist Speculates*, edited by J. Good. At the same time its essential purpose, as I understand what the editors say in the preface, was to be stimulating. I suppose it is an inherent characteristic of biological systems that, when provided with a little pleasurable stimulation, they are not content to be grateful for what they have, but demand more. This book left me with rather that feeling.

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The New Archeology

Explanation in Archeology. An Explicitly Scientific Approach. PATTY JO WATSON, STEVEN A. LEBLANC, and CHARLES L. REDMAN. Columbia University Press, New York, 1971. xxii, 192 pp., illus. $6.

Watson, LeBlanc, and Redman undertake the formidable task of summarizing the many and divergent innovative trends of the last decade's "new archeology." Their book has three major foci: explanation, explanatory frameworks, and archeological applications of the two.

The authors' treatment of explanation follows the heavily deductive-nomological emphasis of many recent discussions of methodology in archeology. Having described this approach, they explore interfaces between it and more traditional archeological epistemologies. While the lack of rigor in the citation of examples of concepts such as *law* and *hypothesis* will bother some readers, this looseness must be seen in the context of the authors' use of the deductive-nomological approach as a basis for thinking about verification and for organizing natural experiments rather than as a final solution to the truth problem.

A number of papers criticizing use of deductive-nomological research strategies have appeared in the last several years, many of them after this book was written. Watson, Redman, and LeBlanc handle some of the objections that have been raised, tackling, for example, the question of how an archeologist might handle the three or four culture-bearing strata that lie between him and the one stratum relevant to his research. However, meaningful comparison of the deductive-nomological strategy and those suggested by other archeologists is limited by the largely hypothetical nature of archeologists' discussions of these approaches. Research results that would permit a more definitive comparison of their relative effectiveness are largely wanting.

The discussion of explanatory frameworks is a concise summary of the more important concepts that archeologists are borrowing from ecology and general systems theory. While both of these theoretical frameworks are identified as rich sources of testable propositions, Watson, LeBlanc, and Redman are hard pressed to provide concrete examples of their use in archeology. This failure should not, however, be placed on their shoulders. For while ecology and, especially, general systems theory have become a part of the rhetoric of new archeology, legitimate applications are still few and far between, given that archeologists' traditional interest in the natural environment and subsistence theory should not be equated with ecology and that the notion that human behavior is organized and patterned cannot be equated with general systems theory.

At a more general level, one must question whether the authors' discussion of general systems theory and ecology exhausts the range of theoretical experimentation that has characterized the new archeology. Its beginnings must be placed within a Whitean cultural materialist mold. But major efforts to deal with more individualistically, behaviorally, and cognitively oriented theoretical frameworks have appeared in the works of some new archeologists. Even among ecologically oriented archeologists there are evident differences between those interested in "ecosystem" ecology and those who derive their inspiration from microprocessual approaches.

Finally, one must mention those archeologists who see the overzealous borrowing of theories and models from other disciplines as a limitation on our ability to understand the past. In many passages throughout their book, the authors emphasize the unique opportunity for the study of long-term behavioral and cultural change that archeological data provide and the need to *construct* models appropriate to this effort. Had they chosen to consider ecology and general systems theory in the context of building these models of change, the authors would surely have produced a more coherent explanatory framework.

In the final section of their book, the authors describe some of the major analytical models that new archeologists have employed. The models in question range from rather concise statistical ones to what would perhaps better be considered theories, locational analysis for example. The consideration of each model is insufficient for providing a working ability with it, but more than adequate for introducing the reader to the model and its applications.

The book is an excellent summary of the major issues that new archeologists have attempted to bring to the attention of their discipline. It provides a concise dictionary of new archeology's conceptual jargon. And it explicitly and implicitly identifies lines of research that must be pursued if the loftier of new archeologist's claims concerning our ability to understand the past are to be satisfied.

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Origins of the Solar System

From Plasma to Planet. Proceedings of a symposium, Saltsjöbaden, Sweden, Sept. 1971. AINA ELVIUS, Ed. Wiley-Interscience, New York, and Almqvist and Wiksell, Stockholm, 1972. 390 pp., illus. $25. Nobel Symposium 21.

The 21st Nobel Symposium dealt with chemical and physical processes that may have been important in the very early stages of formation of the solar system. The proceedings, edited by Aina Elvius, have now been published as *From Plasma to Planet*, a title that neatly summarizes the contents of the volume.

Of the 20-odd long papers presented, most of them by distinguished scholars

in the field, four deal directly with the plasma physics of the early solar nebula, and with the interaction between plasma and solid particles. Indeed, an important theme (or more properly, a much-debated question) running through the symposium was the importance of plasma processes for condensation in the early solar nebula. Must one, as Alfvén and Arrhenius argue, treat the nebula as a plasma (albeit with low ionization)? Or may one treat it as an essentially neutral gas, as Anders argues? The issue is not settled. One thing that makes the book valuable is that both views are represented not only in fine, comprehensive papers but also in relatively lengthy discussions between the proponents. As those of us who have attended many symposia know, one often learns more in informal conversation than from the lectures themselves; in *From Plasma to Planet*, some of those helpful conversations are recorded. In these discussions one can detect a growing impatience on the part of a number of participants, as the conference progressed, with Alfvén's frequently expressed view that one should work back from the present state of the solar system rather than attempt to determine the consequences of various assumptions concerning early conditions. Many of the participants felt that both approaches are valuable and that our imperfect knowledge of the solid state and other necessary branches of physics and of the interiors of the planets makes working back from the present state less direct than it might seem.

A fine feature of the proceedings is the emphasis put on observational and even laboratory work. This ranges from discussions of fossil cosmic ray tracks in meteorites to descriptions of past and future space missions by the Soviet Union and the United States. The Soviet Union was represented by G. I. Petrov; the United States by Homer Newell. The former reported on the roving automatic laboratory (Lunokhod) missions, the latter on projected U.S. space shots including "Grand Tour" (major-planet) and cometary missions.

The volume contains a number of good articles which, even if they were without any specific reference to the overall concern of the conference, would be of interest in themselves. Among these, one may mention Massey's discussion of atomic and molecular reactions in space with particular reference to the abundance of various molecules in the interstellar medium and the earth's upper atmosphere; Sato's gasdynamical view of the motion, heating, and accretion of solid bodies in the solar system; Gehrels's interrelations of asteroids and comets; and Lindblad's account of meteor and asteroid streams.

The articles are well written and clear. Contrary to what is often the case in collections of symposium papers, the level of presentation is remarkably uniform and such as to be understandable and rewarding to the nonspecialist in the field.

The editor acted with commendable speed to have the book ready within a year after the symposium. A consequence, however, is that occasional typographical errors have slipped in. One, amusing rather than serious, is the frequent reference to Toro's "perihelium."

In summary, the book is distinguished by a number of fine papers and carefully preserved conversations on a wide variety of topics related to its central problem. Almost anyone with a general concern for the origin of the solar system will find many articles of lasting interest. It is certain to be a useful library source for workers in the field.

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Parasites

The Trypanosomes of Mammals. A Zoological Monograph. CECIL A. HOARE. Blackwell, Oxford, England, 1972 (U.S. distributor, Davis, Philadelphia). xviii, 750 pp. + plates. $34.50.

In 1904 Laveran and Mesnil published the first edition of their *Trypanosomes et Trypanomiases*, and in 1912 the second edition. Despite the medical and veterinary importance of the trypanosomes, and despite the fact that thousands of papers have been written on them, Hoare's book is the first on these Protozoa since 1912. It is oriented toward the parasite rather than the host, being devoted primarily to zoological aspects rather than to the diseases (if any) caused by the parasites. When Laveran and Mesnil wrote their book, they described 56 species of *Trypanosoma* from mammals, but only 34 of them have stood the test of time. Many additional species have been named, and Hoare takes up about 125.

Trypanosomes occur in all groups of vertebrates, but most of the known species are found in mammals; these are all that Hoare includes in his book. General discussions of history, structure, life cycle, diagnosis, classification, evolution, and host-parasite relations take 118 pages, after which there is a systematic discussion of each species for 488 pages. A 31-page host-parasite checklist gives the names of the trypanosomes which have been found among about 400 species of mammals belonging to 218 genera and 12 orders. This is followed by a 79-page list of references and a 27-page index.

Trypanosomes cause disease primarily in the tropics, but there they are extremely important, in both the Old and the New World. Sleeping sickness of man, caused by a trypanosome, was an important cause of death in Africa; Chagas' disease, caused by another trypanosome, is a serious public health problem in South and Central America, where about 10 million people are infected. Nagana and related diseases, also caused by trypanosomes, have interdicted much of sub-Saharan Africa for livestock raising, and surra is a problem wherever camels are or have been.

Because there are many trypanosomes, some pathogenic and some not, and because a great deal has been written about them, our comprehension of them is confused. Hoare's book is welcome because it assembles and organizes the confusing details in a critical fashion. It is an authoritative, thorough, and readable review of our knowledge of all the species found in mammals and will serve as a basis for all future studies on them.

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Books Received

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