and inadequate references, though the large bibliography (over 800 titles) is one of the major strengths of this work.

The book is a timely contribution in view of the growing general interest in environmental studies and in the geological basis for environmental planning and possible long-term climatic forecasting for the benefit of society. It is a valuable addition to the current debate on "When will the present interglacial end?"

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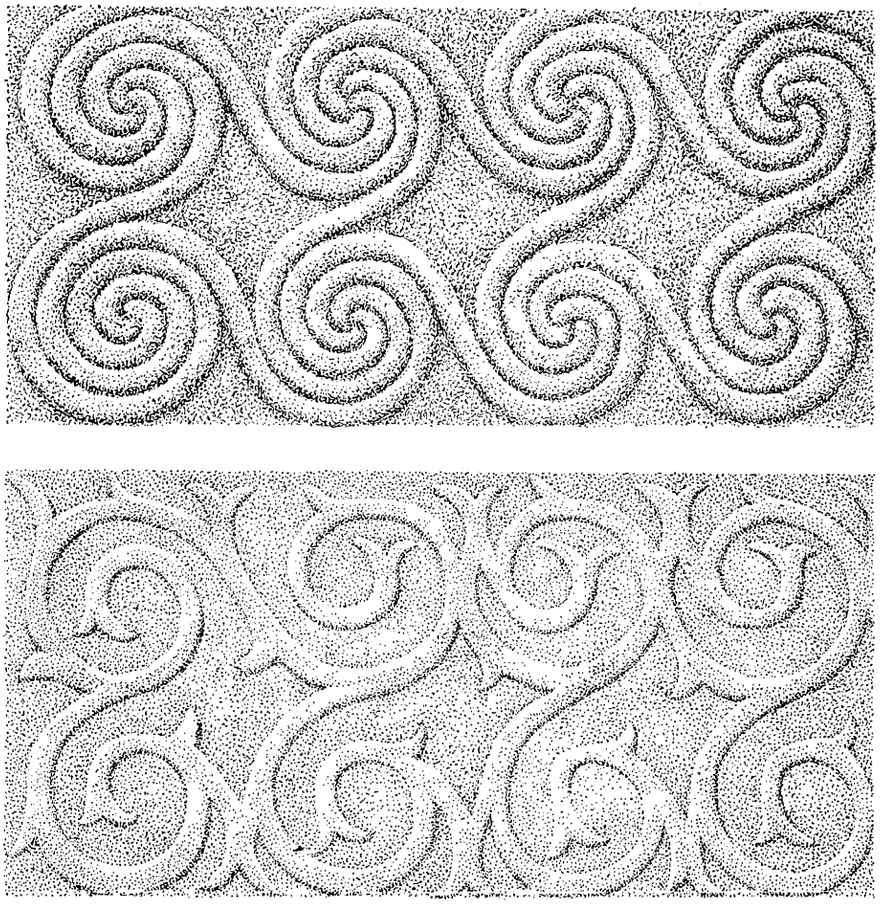
A Rethinking in Archeology

Before Civilization. COLIN RENFREW. Knopf, New York, 1973. 292, viii pp., illus. + plates. $8.95.

In this volume for the general reader Colin Renfrew surveys the controversies brought about by the discovery of the radiocarbon method of dating, interprets its implications, and suggests the future direction of research and fieldwork in European archeology. Almost half the book is concerned with past problems. There is little new for the specialist in his short summary of the traditional methods of dating and the assumptions of the diffusionist school which we know so well from the writings of V. G. Childe.

Most archeologists will find that the chapters on the first radiocarbon revolution and the impact of tree-ring calibration of radiocarbon dates constitute a useful review of the problems that beset the study of the Neolithic and Early Bronze Ages of southwestern Asia, the Mediterranean, and Europe during the 1950's and '60's. Renfrew rightly points out that the upward shift in absolute dates has brought a revolution in our conception of the temporal relationships of European cultures with one another and particularly with the cultures of the Aegean and southwestern Asia. The new high chronology based upon radiocarbon dating forces us to abandon the concept of a linkage between the Neolithic of Iberia and Atlantic Europe and the Aegean Bronze Age, a concept based upon presumptions concerning the diffusion of the Megalithic complex. The traditional tie of the European Neolithic through Vinča with the Early Bronze Age of the Aegean, which long provided the basis for the chronology of the Neolithic cultures of southeastern, central, and northern Europe, must now be given up and an entirely new search be undertaken for the character of the development of the Neolithic in lands beyond the Mediterranean basis. Renfrew's emphasis upon the linkage of the Early Bronze Age cultures of central Europe with the Mycenaean world is significant for archeologists in Anglo-American circles, but less important for many continental European archeologists, who have never accepted this traditional equation which must now be seriously modified in light of radiocarbon dating.

For Renfrew the new radiocarbon dating as now corrected by tree-ring calibrations means the abandonment of traditional diffusionist interpretations of European development. He argues that the cultures of Europe, which were created by peoples now to be viewed in a purely European context, must be explained in terms of the "New Archeology," with its methodological emphasis upon studies of population, economic organization, social organization, and technology and subsistence. Emphasizing that new explanations have yet to be fully formulated, he seeks a broad definition of the parameters of new approaches in dealing with such



"Relief spirals at the Maltese temple of Tarxien (*lower*) compared with spirals on a stele from one of the Shaft Graves at Mycenae, *c.* 1650 B.C. The Maltese temples were traditionally dated by means of this comparison." Some controversy on the matter remains, "Yet applying the tree-ring calibration to the Maltese dates, it now seems likely that the Tarxien phase must have come to an end before 2200 B.C. This would seem to rule out the derivation of any of the decorative motifs in the temples from the middle or late bronze age Aegean. And naturally the new chronology at the same time makes untenable the view, asserted by some, that the temples themselves have a similar origin. . . . The temples are so large, and involved so much labour, that they cannot have been the work of small local groups of only fifty or so people. . . . Some new thinking is needed here, about the society of the temple builders." [From *Before Civilization*]

major problems as the development of the Megalithic complex, copper metallurgy, Aegean civilization, and the early Bronze Age. Here one often agrees with his broad strategy but frequently disagrees with his tactics and at times wonders if another day will bring the emergence of a neodiffusionist view of prehistoric development in Europe.

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Government Support

Science and the Evolution of Public Policy. JAMES A. SHANNON, Ed. Rockefeller University Press, New York, 1973. xviii, 260 pp., illus. $11.

The Chaining of Prometheus. Evolution of a Power Structure for Canadian Science. F. RONALD HAYES. University of Toronto Press, Toronto, Canada, 1973. xx, 218 pp., illus. $15.

Well may foreigners envy Americans, who even when they are convened to lament the sad state of their country's science policy do so with the aid of grants from the National Science Foundation and a private philanthropy. And when the time comes for the editor to assemble the contributions for the press, he sits down to his onerous chores at the Rockefeller Foundation's Study and Conference Center in Bellagio, Italy. Almost all of the 11 distinguished Americans and one eminent Briton whose lecture-seminar presentations are collected in the Rockefeller volume manage, however, to ignore their affluent auspices. The keynote, sounded in the editor's introduction (drawn from the 1970 grant application) and reiterated in most of the essays that follow, is the "erosion of federal support." Joseph S. Murtagh calls 1967 "the end of the Augustan age for science." Harvey Brooks wonders whether "the endless frontier" envisioned by Vannevar Bush "has come to an end, like the geographical frontier of a century ago from which it draws its name."

Unfortunately for the dramatic effect of this collective *cri de coeur,* by the time the papers were being prepared for publication, in September 1972, even the editor felt compelled to add a postscript pointing out that "the downward move of appropriations in support of science programs has been reversed, at least for some programs of some agencies." As one examines the recently announced projections showing federal expenditures for research in colleges and universities reaching toward an estimate of $2.26 billion in fiscal 1975, up from slightly over $1.4 billion in 1970, the plaintive tone adopted in this volume seems somewhat excessive, or at least premature.

In fairness, it should be noted that if the prospects for the support of science seem to have brightened lately, one reason is that scientists, administrators, and publicists, including the contributors to this book, have scored some persuasive points against prevailing policies. One such point is made by Brooks when he observes that the preoccupation with military R&D and space exploration has left the United States at a serious disadvantage in terms of international economic competition. This country, he notes, makes a smaller investment in civil industrial technology, in proportion to gross national product, than most other advanced countries. Government cutbacks have imposed strains on engineering, mathematics, and physics, professions that are vital to progress in such fields as energy, information processing, optics, and superconductivity. Against the background of the sudden rediscovery of the need for energy R&D, Brooks's argument carries the ring of true prophecy. With respect to biomedical research, both Shannon and Murtagh, reflecting on their intimate experience of programs of the National Institutes of Health, suggest that past policies put the programs at risk by concentrating on research while neglecting the training of physicians and the actual delivery of health services, which were left to the states and the private sector. As this implies, the failure to provide for the actual improvement of health care may have contributed to a backlash against the support of biomedical research and training.

These and other, equally apt criticisms are put forth effectively. Nevertheless, the book as a whole suffers from two defects not uncommon in collections of this sort. Some of the essays deal with tangential issues, thus diffusing the focus of the book; and most of the others simply state separate positions, taking no account of disagreements. Henry Riecken devotes his paper to the exposition of a proposal for "controlled and focussed" social science experiments; Walter A. Rosenblith concentrates on the need to design new organizations uniting government, industry, and the universities in addressing social problems; Patrick Haggerty spends half of his essay posing as the businessman's Ivan Illich, proposing to deschool society by introducing televised courses in the workplace, and the other half on a rather more edifying discussion of the criteria for federal support of civil technology. Each of these issues would benefit from extended and critical commentary, but none is treated by any of the other contributors.

Only one contributor, Gerard Piel, makes his disagreements with some of his colleagues explicit. This is a pity because, as is clear from Piel's polemic, there are some sharp and interesting cleavages among the participants. Piel takes a position similar to that advanced by Michael Polanyi in his defense of the autonomy of the "republic of science," and recently echoed in Jacob Bronowski's call for the "disestablishment" of science. He lights into some of the other essayists for not challenging the American predilection for supporting academic science on grounds of pragmatic social utility. Piel would prefer to see pure science subsidized "as an end in itself, as the supreme expression of our humanity and our success in the attempt at civilization." He argues that the crisis of the universities arose because support for academic science came "by overflow" from expenditures for research on weapons, space, and health instead of from a direct commitment to the advancement of learning.

To perpetuate this system, Piel contends, with its overemphasis on project grants and on tying support for basic research to the development of useful technologies, is to invite recurrent crises and to undermine both the moral authority and the intellectual autonomy of the scientific community. Instead, he urges that the federal government provide stable institutional support for the universities, matching funds from other