

ters for "group-oriented chiefdoms"; Burl appears to disagree on p. 71, but to agree on p. 139.

On the other hand, Burl mentions in a number of places recent or current folklore and folk customs associated with sites, and place-name evidence (for example, p. 241) suggestive of their original purpose. On pp. 79–80 he approvingly cites evidence suggesting continuity from the later Neolithic to the Iron Age culture of the Celts. These scattered suggestions indicate that there was a coherent body of scientific and technological knowledge, albeit partly obscured by "religious" symbolism, continuing from the third millennium B.C. to the advent of Christianity and even, less coherently, beyond. It was not the purpose of his book to do so, but it is a pity that Burl did not pursue this in the framework of his suggestion (p. 86) that "primitive" or "simple" material culture is not necessarily incompatible with intellectual interests or abstract thought, for in many ways these inferences and observations are more important than the anthropologically inspired problem of attempting to identify sociopolitical forms. For the authority of respected astronomers (such as Hawkins and Hoyle) and engineers (such as Thom) has persuaded many archaeologists that supposedly supine and uncouth "barbarians" practiced quite sophisticated astronomy, surveying, planning, and construction. From this it is reasonable to infer, further, that these societies must have had some effective medium for transmitting precise information over considerable periods of time and, presumably, some well-developed, well-understood, and coherent system of symbols.

These implications derive in no way from "anthropological theory," but from essentially empirical observation of actual sites and inductive reasoning from the data. Nor do they have any necessary relationship to this or that "type" of sociopolitical organization. Indeed, it is becoming increasingly clear that several major innovations were made by "barbarian" rather than "civilized" societies, and archaeologists must come to understand that their traditional obsessions with the so-called "early civilizations" will not provide all the keys to the major human achievements of the past five millennia or so. This book takes us a little further in the right direction toward a reevaluation of traditional "cultural evolution."

BERNARD WAILES

Department of Anthropology, University of Pennsylvania, Philadelphia 19104

22 JULY 1977

Plasma Physics

Theory of Turbulent Plasma. V. N. TSYTOVICH. Translated from the Russian edition (Moscow, 1971) by David L. Burdick. Consultants Bureau (Plenum), New York, 1977. xviii, 536 pp. \$45. Studies in Soviet Science.

Plasmas support a wide variety of collective oscillations, and the term plasma turbulence has come to mean strong, broad-band excitation of one or more of these modes of oscillation. The present volume is a comprehensive review of the subject by an author who has made a number of contributions to the development of the theory of turbulent plasma. With the exception of the final chapter, which covers developments in the theory of strong Langmuir turbulence (cavitons and solitons) during the period 1972–1975, the book covers what was known about the topic of nonlinear wave-particle and wave-wave interactions prior to 1972. The general outline of the theory was well developed by that time, and, although the material is now five years old, it is not seriously out of date.

Although the bulk of the material discussed in the book is already available in the research literature, the explanations are more detailed than those found in a typical research paper, and the book could well serve as a reference text for an advanced seminar. It begins with a brief review of the linear dispersion relations of the more important plasma modes of oscillation and proceeds to a development of correlations, quasilinear theory, and resonance broadening. The treatment of these topics follows what are by now well-developed lines. This section is followed by a short, but very clear, treatment of the excitation and dissipation of turbulent fluctuations. The discussion is limited to the major types of destabilizing effects, beams, constant electric fields, and anisotropies of the distribution functions. The information contained in the introductory chapters is then applied to the problem of determining the spectrum of stationary plasma turbulence.

The remaining half of the book is devoted to several processes that result from plasma turbulence, stochastic acceleration, enhanced radiation output, and the scattering of electromagnetic radiation. Not only are these subjects of importance in laboratory plasma physics, they may well be intimately connected to the energy output of some of the more exotic astrophysical objects.

This monograph is an excellent suc-

cessor to the partially dated and much slimmer volume on the same subject by Kadomtsev. At some points one might wish for a bit earlier recourse to numerical evaluations and less emphasis on the more restricting analytical approximations, but this is a minor point. The book should be of interest to those concerned with either laboratory or astrophysical plasma turbulence.

JOHN E. WALSH

*Department of Physics,
Dartmouth College,
Hanover, New Hampshire 03755*

Dendroclimatology

Tree Rings and Climate. H. C. FRITTS. Academic Press, New York, 1976. xiv, 568 pp., illus. \$35.

Since the pioneering work of A. E. Douglass, the founder of the Laboratory of Tree-Ring Research in Tucson, dendroclimatology has become a major source of information about climatic change on the time scale of decades to centuries. Replicated tree-ring chronologies from over 50 locations in the western United States are yielding maps of the past climatic patterns from the eastern Pacific Ocean and North America.

The production of these maps is largely the result of a 15-year research program directed by H. C. Fritts and his colleagues V. C. LaMarche, C. W. Stockton, and T. J. Blasing. Their research has involved three phases of analysis in working from the development of a data base to the final calibration of the data in climatic terms.

First, Fritts assembled tree-ring chronologies from a geographic array of trees located at climatically sensitive sites.

The second phase focused on biological studies of the relation of tree-ring widths to both the aging of trees and the changes in external climatic variables. Fritts developed computer programs for standardizing his data in order to account for the allometric decrease in ring widths as a tree ages. He then constructed response models that show what combination of temperature and precipitation variations causes changes in the standardized widths.

In the final phase, Fritts adapted multivariate statistical techniques in order to estimate past climatic values from dendrochronological data. Maps of these estimates show the synoptic patterns of climates for selected years, pentads, and decades during the past 300 years.

Fritts's detailed ecological and numerical analyses of tree rings provide an excellent model to be followed by other researchers attempting to calibrate biological and geological data in climatic terms.

This sequence of research is the main topic of *Tree Rings and Climate*; in which Fritts draws his many studies together into a coherent description of the biological, meteorological, technical, and statistical knowledge that has underlain his work. The first chapter provides a thorough summary of the major concepts and the types of studies to be described later in the book. Fritts then shows his roots as a biologist and forester by presenting three chapters describing the morphology and physiological ecology of tree-ring growth from the cellular level up. A vast amount of literature is reviewed in these chapters, including the results of his own physiological studies of tree growth. The fifth chapter synthesizes the details of the earlier chapters by introducing three qualitative models relating temperature and precipitation changes to variations in ring width. Chapters 6 through 9 go on to describe Fritts's major work in statistically analyzing and climatically calibrating dendrochronological data. A non-quantitatively oriented reader will want to consult standard texts for descriptions of the statistical techniques used here, but applied mathematicians will find many good examples of the use of such techniques as analysis of variance, multiple regression analysis, principal components analysis, and canonical correlation analysis.

The book is well organized, and a series of well-designed drawings, graphs, maps, and photographs illustrates it. Its biological chapters will appeal to foresters and botanists, but its main aim is not to be the definitive review of the subject but rather to provide a comprehensive progress report on a rapidly developing field. The research presented is current, but in some cases its newness precludes a high order of synthesis in its presentation. In chapter 9, for instance, Fritts not only discusses the methods for mapping past climates but also describes an initial feasibility study, the lessons learned from it, and a climatological study needed for interpreting the maps derived from the tree rings. Were this work less current, the climatic reconstructions might have been discussed more directly.

Tree Rings and Climate illustrates an important application of biological data to climatic studies and presents a challenge to palynologists and micro-paleontologists to produce as fine a de-

scription of their own research in applied paleoclimatology. From Fritts's work, biologists and ecologists can learn how holistic thinking about biological processes can focus attention on the broad-scale variations in tree growth, which are readily interpretable in climatic terms. This approach yields not only valuable results but also a whole new field for research.

THOMPSON WEBB III

Department of Geological Sciences,
Brown University,
Providence, Rhode Island 02912

Books Received and Book Order Service

Books Received and the Book Order Service will be combined in issues in which there is a Reader's Service Card. To order any of the Book Order Service books, circle the corresponding number on the Reader's Service Card (pages 326A and 398A); the participating publisher(s) will ship the title(s) ordered and send you a bill.

Advances in Heat Transfer. Vol. 13. James P. Hartnett and Thomas F. Irvine, Jr., Eds. Academic Press, New York, 1977. xiv, 280 pp., illus. \$30. *To order this book circle No. 425 on Readers' Service Card.*

Associative Memory. A System-Theoretical Approach. Teuvo Kohonen. Springer-Verlag, New York, 1977. x, 178 pp., illus. \$21.20. Communications and Cybernetics, vol. 17. *To order this book circle No. 426 on Readers' Service Card.*

Astronomy. Frank N. Bash. Harper and Row, New York, 1977. xii, 468 pp., illus. + plates. Paper, \$11.95.

Automatic Control Systems. Richard M. Phelan. Cornell University Press, Ithaca, N.Y., 1977. 284 pp., illus. \$15.

Basic Chemistry. William S. Seese and Guido H. Daub. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1977. xvi, 576 pp., illus. \$14.50.

Botulism. The Organism, Its Toxins, the Disease. Louis D.S. Smith. Thomas, Springfield, Ill., 1977. xiv, 236 pp. \$18.75.

Catalog of Federal Regulations Affecting the Iron and Steel Industry. Council on Wage and Price Stability, Washington, D.C., 1976. xx, 236 pp., illus. Paper, \$4.70.

Chemistry and Biology of the Kallikrein-Kinin System in Health and Disease. Papers from a conference, Bethesda, Md., Oct. 1974. John J. Pisano and K. Frank Austen, Eds. National Institutes of Health, Bethesda, Md., 1976 (available from the Superintendent of Documents, Washington, D.C.). xxxviii, 612 pp., illus. \$12.

Coastal Resources Management. Beyond Bureaucracy and the Market. Robert B. Dutton, John L. Seymour, and Gerald C. Swanson. Lexington (Heath), Lexington, Mass., 1977. xviii, 198 pp. \$16.50. Studies in Marine Affairs.

Cohesion Hypothesis of the Ultimate and Commonsense Meaning of Existence. Frank Pilbath. Vantage, New York, 1977. xviii, 168 pp. \$7.50.

College Physics. Franklin Miller, Jr. Har-

court Brace Jovanovich, New York, ed. 4, 1977. xx, 836 pp., illus. \$14.95.

Computer Analysis of Neuronal Structures. Robert D. Lindsay, Ed. Plenum, New York, 1977. xviii, 210 pp., illus. \$22.50.

Contemporary Astronomy. Jay M. Pasachoff. Saunders, Philadelphia, 1977. xvi, 588 pp., illus., + plates + appendices. \$15.95. Saunders Golden Sunburst Series.

The Crisis in Social Security. Problems and Prospects. Michael J. Boskin, Ed. Institute for Contemporary Studies, San Francisco, 1977. xiv, 214 pp., illus. Paper, \$5.95.

Current Trends in the Management of Breast Cancer. R. Robinson Baker, Ed. Johns Hopkins University Press, Baltimore, 1977. xvi, 160 pp., illus. \$14.

Currents in Alcoholism. Papers from a conference, Washington, D.C., May 1976. Frank A. Seixas, Ed. Grune and Stratton, New York, 1977. Two volumes. Vol. 1. xvi, 496 pp., illus. \$19.50. Vol. 2. xx, 548 pp., illus. \$19.50.

Death, Grief and Bereavement. A Bibliography, 1845-1975. Compiled by Robert Fulton. Arno Press (New York Times), New York, 1977. viii, 256 pp. \$20.

Decision Making. A Psychological Analysis of Conflict, Choice, and Commitment. Irving L. Janis and Leon Mann. Free Press (Macmillan), New York, and Collier Macmillan, London, 1977. xx, 490 pp., illus. \$15.95.

Deserts of the World. M. P. Petrov. Translated from the Russian edition (Leningrad, 1973). Halsted (Wiley), New York, and Israel Program for Scientific Translations, Jerusalem, 1977. viii, 448 pp., illus. + loose maps. \$57.50. *To order this book circle No. 397 on Readers' Service Card.*

The Design and Operation of Small Sewage Works. D. Barnes and F. Wilson. Spon, London, and Halsted (Wiley), New York, 1976. xvi, 180 pp., illus. \$15. *To order this book circle No. 398 on Readers' Service Card.*

The Development of Cognitive Processes. Vernon Hamilton and Magdalen D. Vernon, Eds. Academic Press, New York, 1976. x, 772 pp., illus. \$46. *To order this book circle No. 399 on Readers' Service Card.*

Digital Electronics. An Introduction to Theory and Practice. William H. Gothmann. Prentice-Hall, Englewood Cliffs, N.J., 1977. xiv, 386 pp., illus. \$14.95.

Digital Systems. Principles and Applications. Ronald J. Tocci. Prentice-Hall, Englewood Cliffs, N.J., 1977. xvi, 480 pp., illus. \$15.95.

Domestic Animals of Nepal. H. Epstein. Holmes and Meier, New York, 1977. xii, 132 pp. + plates. \$27.50.

Geology and Palaeontology of Southeast Asia. University of Tokyo Press, Tokyo, 1976 (U.S. distributor, International Scholarly Book Services, Forest Grove, Ore.). Vol. 17. Teiichi Kobayashi and Wataru Hashimoto, Eds. viii, 208 pp., illus. + plates. \$39.50. Vol. 18. Teiichi Kobayashi, Ryuzo Toriyama, and Wataru Hashimoto, Eds. viii, 172 pp., illus. + plates \$39.50. *To order this book circle No. 427 on Readers' Service Card.*

Inhibition and Inactivation of Vegetative Microbes. Papers from a symposium, Nottingham, England, July 1975. F. A. Skinner and W. B. Hugo, Eds. Academic Press, New York, 1976. xiv, 378 pp., illus. \$26.25. Society for Applied Bacteriology Symposium Series No. 5. *To order this book circle No. 428 on Readers' Service Card.*

Magnetic Ions in Metals. A Review of Their
(Continued on page 407)