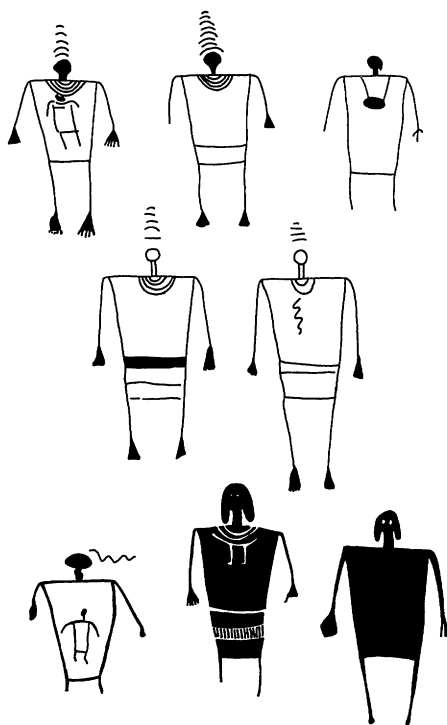


particular site is discussed in a sidebar instead of in the regular text. The sidebars, some of which extend for two or three pages, also lack headings to permit quick assessment of their subjects.

In chapter 4 Matson presents his evolutionary model of maize use, which in my judgment is the least successful aspect of the book. This model is derived from the integration of data in the evolutionary history of maize; morphology and ecology of "Chapalote, the earliest corn race found in the Southwest"; and changes in cultivation practices over time and space. Matson proposes that the earliest agriculture in the Southwest was floodwater farming of arid-adapted Chapalote maize in the lowland Basin and Range Province at about 1000 B.C. It was succeeded, by approximately 500 B.C., on the Colorado Plateau by floodwater farming involving cultivars more tolerant of colder, shorter growing seasons and deep planting to utilize stored soil moisture. This coincided with the initial appearance of Basketmaker II culture. The third stage, highland dry farming, necessitated maize with greater tolerance of colder and still briefer growing seasons, and perhaps greater drought resistance as well; it appeared by approximately A.D. 200 to 400.

The maize model treats several issues common to earlier discussions of the origins of southwestern agriculture, and it could actually be viewed as a reformulation of Emil Haury's seminal model on the subject. Somewhat inexplicably, Matson never compares his maize model to Haury's model, of which it is almost the antithesis. Matson posits that the earliest maize was grown in the lowland Basin and Range Province instead of the highlands above 6000 feet; that agriculture spread from the lowlands to the highlands instead of vice versa; that the earliest cultivation was by floodwater farming instead of dry farming; and that early maize was adapted to arid rather than mesic environments. Both models require that maize undergo genetic change before it spreads outward from its initial, optimal areas of cultivation.

In my view the maize model suffers from two principal flaws: an explanatory focus on cultivation practices, and reliance on the ecology of the modern Chapalote maize race to reconstruct that of pre-ceramic southwestern maize. With regard to the first point, Matson assumes that floodwater farming and dry farming are distinct forms of cultivation and that the former is the more ancient. Interestingly, he conceives of early agriculturalists in southeastern Arizona's river basins as practicing floodwater farming, despite the fact that the known early agricultural sites are located along perennial or semipermanent streams where water-table farming or even simple forms of "pot" (perhaps better described as "gourd" for the pre-ceramic



"Basket maker II rock art human figures." Adapted from P. Schaafsma's *The Rock Art of Utah*, Peabody Museum Papers, vol. 65, 1971.

period) or canal irrigation would be possible. Regardless, the problem is that we remain ignorant of what cultivation techniques were in use prior to the Christian era, and we will be hard pressed to identify them archeologically. There is no particular reason to suppose that floodwater farming was the earliest or the only cultivation method known at that time, nor is there any obvious explanatory value in focusing so closely on cultivation techniques. Second, the use of modern Chapalote as a morphological and ecological analog for pre-ceramic maize may be questioned. This practice has a long history in the Southwest, ultimately being rooted in the work of Mangelsdorf and his now nearly discredited theory of maize evolution. Chapalote was seen as "primitive" on the basis of its grain color and cupule structure, but recent morphological and isozyme studies have challenged this view. It seems inadvisable to uncritically accept modern Chapalote, the product of at least 3000 years of additional human and natural selection, as wholly representative of early Southwestern maize for modeling purposes.

Finally, the evidence to contradict the maize model may already be on hand. As Matson notes in chapter 5, which discusses the age of maize in the Southwest, maize directly dated to approximately 2800 to 3100 years ago has been found from sites in the Basin and Range of southeastern Arizona and southwestern New Mexico up into the Mogollon Highlands at Bat Cave and on the Colorado Plateau near Chaco Canyon, per-

haps even at Three Fir Shelter on Black Mesa. One might reasonably conclude from this distribution that early maize could be successfully cultivated across this full range of environments and that no evolutionary sequence of changes in cultivation practices or maize itself was necessary for its apparently rapid spread across the Southwest. That improved cultivars and new cultivation practices did appear later is not an issue; the archeological and ethnographic records demonstrate both. Maize has been shown to be remarkably plastic in its ability to grow in a wide range of habitats, and there is no reason to suspect that early maize was any less able to adapt to a broad range of growing conditions through repeated exposure to both human and natural selective pressures.

In chapters 6 through 8, Matson evaluates the fit between the available data on early agriculture and the expectations of all three models. Although he finds neither of the two older models to be decisively supported or discredited by the available archeological data, he does conclude that the maize model appears to be supported as a developmental sequence independent of either the *in situ* development or migration models. However, in my view the maize model rests largely on an inferred sequence of changes that treats cultivation techniques and maize ecology as the sole explanatory factors in the complex issue of how maize agriculture was able to spread across the Southwest. As a model, it is therefore difficult to assess from empirical data and may be extremely hard to either verify or falsify.

Despite my reservations about his maize model, Matson's book is one that any student of the transition from hunting and gathering to agriculture in the southwestern United States will find informative and thought-provoking. It represents the only up-to-date synthesis of the Archaic and early agricultural periods that considers the entire Southwest, and it should provide researchers with a much fuller picture of this complex issue than has been available before.

**Bruce B. Huckell**

Arizona State Museum,  
University of Arizona, Tucson, AZ 85721



## Other Books of Interest

**Geology of Japan.** MITSUO HASHIMOTO, Ed. Terra Scientific, Tokyo, and Kluwer, Boston, 1991. x, 249 pp., illus. \$125. *Developments in Earth and Planetary Sciences*, 8. Translated, with revisions, from the Japanese edition (1980).

Japan played such an important role in the development of plate tectonic theory that it

surprises many geologists to find that so little has been written about the basic geology of the islands in the international literature. This translation of a collection of ten papers by Japanese geologists is intended to correct this situation. In general, the translation is well done and the book is quite readable, though there is little to tie the papers together beyond a brief introductory chapter and a general chapter on geotectonic history. Most of the chapters focus on the distribution of specific rock assemblages or age provinces. Other chapters review submarine topography and the distribution of ore deposits. These chapters are decidedly descriptive and taxonomic; they are useful principally as an introduction to the basic lithologic framework of Japan. The book contains minimal descriptive structural geology, and little attention is paid to absolute age constraints on various rock packages. The editor states that the book was considerably revised during translation, but I found no citations of papers later than the mid-1980s. Though the book is a useful reference, it leaves the reader longing for a more up-to-date review.

—**Kip Hodges**, *Massachusetts Institute of Technology*

**Sakharov Memorial Lectures in Physics.** L. V. KELDYSH and V. YA. FAINBERG, Eds. Nova, Commack, NY, 1992. In two volumes. xiv, 1211 pp., illus. \$195. From a conference, Moscow, May 1991.

In May of last year the first of what is evidently intended to be a series of International Sakharov Conferences on Physics was convened in Moscow. Some 400 scientists, including about 100 from other nations, reportedly participated in the event, which was organized by the P. N. Lebedev Physical Institute with sponsorship by a number of other organizations inside and outside the Soviet Union. This two-volume proceedings from the conference presents some 100 papers in which 83 authors report on topics "closely related to the fundamental scientific concepts and the problems investigated by A. D. Sakharov." Volume 1 contains papers on field theory, quantum mechanics and mathematical method in physics, and superstrings, and volume 2 deals with the general topics of experiment, elementary particles, and quantum gravity and cosmology. Most of the papers, which are printed directly from typescript in (not always idiomatic) English, are highly technical in nature, partial exceptions including a philosophical essay on space-time by John Archibald Wheeler and comments on the cold fusion episode by Douglas R. O. Morrison and V. A. Tsarev. More in the nature of memoirs are the preface to the work, in

which Boris L. Altschuler of the Lebedev Institute comments on both Sakharov's scientific work and his political activities, and an appendix that reprints some dozen presentations made at a special Sakharov memorial session. Also included as an appendix is a report by Richard Wilson on the human rights situation in Armenia with an attendant resolution on the matter that was passed by the conference. A list of papers not printed in the proceedings and an index by general subject of those that are included end the work.—**Katherine Livingston**

## Books Received

**Atom-Photon Interactions.** Basic Processes and Applications. Claude Cohen-Tannoudji *et al.* Wiley, New York, 1992. xxiv, 656 pp., illus. \$69.95. Translated from the French edition (Paris, 1988).

**Attitudes to Genetic Engineering.** Japanese and International Comparisons. Darryl R. J. Macer. Eubios Ethics Institute, Christchurch, New Zealand, 1992. viii, 328 pp., illus. \$35. Text in English and Japanese.

**Audition.** Pierre Buser and Michel Imbert. MIT Press, Cambridge, MA, 1992. xii, 394 pp., illus. \$34.95. A Bradford Book. Translated from the French edition (Paris, 1987) by R. H. Kay.

**Coherence Phenomena in Atoms and Molecules in Laser Fields.** Andr D. Bandrauk and Stephen C. Wallace, Eds. Plenum, New York, 1992. x, 406 pp., illus. \$115. NATO Advanced Science Institutes Series B, vol. 287. From a workshop, Hamilton, Canada, May 1991.

**Combinatorics and Partially Ordered Sets.** Dimension Theory. William T. Trotter. Johns Hopkins University Press, Baltimore, MD, 1992. xvi, 307 pp., illus. \$45. Johns Hopkins Series in Mathematical Sciences.

**Compendium of Thermophysical Property Measurement Methods.** Vol. 2, Recommended Measurement Techniques and Practices. K. D. Maglic *et al.*, Eds. Plenum, New York, 1992. xviii, 643 pp., illus. \$139.50.

**The Computational Brain.** Patricia S. Churchland and Terrence J. Sejnowski. MIT Press, Cambridge, MA, 1992. xiv, 544 pp., illus. \$39.95. A Bradford Book. Computational Neuroscience.

**Computer Vision and Image Processing.** Linda J. Shapiro and Azriel Rosenfeld, Eds. Academic Press, San Diego, CA, 1992. xiv, 623 pp., illus. \$120.

**Conrad Ferdinand Meyer and Freud.** The Beginnings of Applied Psychoanalysis. Alexander Grinstein. International Universities Press, Madison, CT, 1992. xvi, 399 pp., illus. \$49.50.

**Contraception and Abortion from the Ancient World to the Renaissance.** John M. Riddle. Harvard University Press, Cambridge, MA, 1992. x, 245 pp., illus. \$39.95.

**Cooperation.** Beyond the Age of Competition. Allan Combs, Ed. Gordon and Breach, Philadelphia, 1992. xv, 248 pp., illus. \$20. World Futures General Evolution Studies, vol. 4.

**Coping with Science.** Gernot Böhme. Westview, Boulder, CO, 1992. viii, 122 pp. \$34.95.

**The Correspondence of John Bartram, 1734-1777.** Edmund Berkeley and Dorothy Smith Berkeley, Eds. University Press of Florida, Gainesville, 1992. xvi, 809 pp., illus. \$125.

**The Corrupted Sciences.** Challenging the Myths of Modern Science. Arnold Arnold. Paladin (HarcourtCollins), London, 1992. 398 pp., illus. 20.

**Criminal Behavior.** A Process Psychology Analysis. Nathaniel J. Pallone and James J. Hennessy. Transaction Publishers, New Brunswick, NJ, 1992. xviii, 466 pp., illus. \$34.95.

**Extinction and Phylogeny.** Michael J. Novacek and Quentin D. Wheeler, Eds. Columbia University Press, New York, 1992. viii, 253 pp., illus. \$50.

**From Stone to Star.** A View of Modern Geology. Claude Allègre. Harvard University Press, Cambridge, MA, 1992. xii, 287 pp., illus. \$39.95. Translated from

the French edition by Deborah Kurmes Van Dam.

**Fundamental Properties of the Neutron.** Yu. A. Alexandrov. Clarendon (Oxford University Press), New York, 1992. x, 210 pp., illus. \$70. Oxford Series on Neutron Scattering in Condensed Matter, vol. 6. Translated from the Russian by T. F. Drozdova.

**History and Evolution.** Matthew H. Nitecki and Doris V. Nitecki, Eds. State University of New York Press, Albany, NY, 1992. viii, 269 pp. Paper, \$16.95. SUNY Series in Philosophy and Biology. From a symposium, Chicago, IL, May 1989.

**How Psychiatrists Look at Aging.** George H. Pollock. International Universities Press, Madison, CT, 1992. xiv, 244 pp. \$32.50. Mental Health Library Series, Monograph 1.

**How the World Was One.** Beyond the Global Village. Arthur C. Clarke. Bantam, New York, 1992. xvii, 296 pp. \$22.

**Human Development and Homeostasis.** The Science of Psychiatry. William E. Powles. International Universities Press, Madison, CT, 1992. xviii, 622 pp. \$65.

**Hyperalgesia and Allodynia.** William D. Willis, Ed. Raven, New York, 1992. xvi, 400 pp., illus. \$98. Bristol-Myers Squibb Symposium on Pain Research. From a symposium, Galveston, TX, May 1991.

**Masters of Time.** Cosmology at the End of Innocence. John Boslough. Addison-Wesley, Reading, MA, 1992. xii, 266 pp., illus. \$22.95. A William Patrick book.

**Memory.** Organization and Locus of Change. Larry R. Squire *et al.*, Eds. Oxford University Press, New York, 1992. xiv, 423 pp., illus. \$65. From a conference, Irvine, CA, Oct. 1990.

**Metal Recovery from Industrial Waste.** Clyde S. Brooks with contributions by Philip L. Brooks, George Hansen, and Laurel A. McCarthy. Lewis, Chelsea, MI, 1992. xviii, 267 pp. \$59.95.

**Methods to Assess Adverse Effects of Pesticides on Non-target Organisms.** Robert G. Tardiff, Ed. Wiley, New York, 1992. xxviii, 270 pp., illus. \$65. Scope, 49.

**Microbial Control of Pollution.** J. C. Fry *et al.*, Eds. Cambridge University Press, New York, 1992. xii, 343 pp., illus. \$110. From a symposium, Cardiff, Wales, 1992.

**Microclimate, Vegetation and Fauna.** Ph. Stoutjesdijk and J. J. Barkman. Opulus, Knivsta, Sweden, 1992. iv, 216 pp., illus. Paper, \$38. Translated from the Dutch edition (Wageningen, the Netherlands, 1987) by Marijke and Eddy van der Maarel.

**Modern Acarology.** František Dušbábek and Vladimir Bukva, Eds. SPB Academic, The Hague, 1992. 2 vols. Vol. 1, viii, 651 pp., illus., + plates. Vol. 2, x, 779 pp., illus., + plates. The two, \$176. From a conference, České Budějovice, Czechoslovakia, Aug. 1990.

**Molecular Biology of Free Radical Scavenging Systems.** John G. Scandalios, Ed. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1992. x, 284 pp., illus. Paper, \$45. Current Communications in Cell and Molecular Biology, 5.

**Monitoring the Environment.** The Linacre Lectures, 1990-91. Bryan Cartledge, Ed. Oxford University Press, New York, 1992. viii, 216 pp., illus. \$45.

**Museums and Communities.** The Politics of Public Culture. Ivan Karp, Christine Mullen Kreamer, and Steven D. Lavine, Eds. Smithsonian Institution Press, Washington, DC, 1992. x, 614 pp., illus. \$45; paper, \$16.95. From a conference, Washington, DC, March 1990.

**Polymer Latexes.** Preparation, Characterization, and Applications. Eric S. Daniels, E. David Sudol, and Mohamed S. El-Aasser, Eds. American Chemical Society, Washington, DC, 1992. x, 462 pp., illus. \$99.95. ACS Symposium Series. From a symposium, Atlanta, GA, April 1991.

**Pre-Equilibrium Nuclear Reactions.** E. Gadioli and P. E. Hodgson. Clarendon (Oxford University Press), New York, 1992. xii, 518 pp., illus. \$125. Oxford Studies in Nuclear Physics, 15.

**Principles of Water Law and Administration.** National and International. Dante A. Caponera. Balkema, Brookfield, VT, 1992. xx, 260 pp. \$185.

**Sulphur Cycling on the Continents.** Wetlands, Terrestrial Ecosystems and Associated Water Bodies. R. W. Howarth *et al.*, Eds. Wiley, New York, 1992. xxii, 350 pp., illus. \$75. Scope, 48. From a workshop.