

Ancient Technologies and Archaeological Materials

S.U. Wisseman and W.S. Williams
(Gordon and Breach, Amsterdam, 1994)
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The average person on the street tends to equate technical analysis of archaeological remains with age-determination via radiocarbon assay. *Ancient Technologies and Archaeological Materials* counteracts this limited view by providing a diverse set of examples of how scientific analyses can be mustered to address archaeological questions ranging from "where was this made?" to "what did they eat?" The volume originated through the University of Illinois Program on Ancient Technologies and Archaeological Materials, and it is explicitly intended as a secondary textbook in undergraduate courses on interdisciplinary anthropology, archaeology, or museum studies.

The book consists of 12 chapters arranged into four topical sections. The introductory chapter by Wisseman and Williams outlines the nature of interdisciplinary work in archaeology. "Archaeometry" is defined as research carried out by physicists and chemists that serves the needs of art conservators, museum curators, and archaeologists. "Archaeological science" also admits laboratory-based archaeologists. Optimistically, these authors predict that interdisciplinary training programs will improve the productivity of collaborations between archaeologists and physical scientists.

Section 2, "Ancient Technologies and Experimental Archaeology," includes two chapters on pottery, one on iron tool production, and one on ancient Greek engineering. Wisseman (chapter 2) illustrates the feedback between low- and high-tech ceramic analyses with examples drawn from the investigation of Attic figure pottery, Etruscan bucchero pottery, and Roman Terra Sigillata. Riley, Hopke, Martin, and Porter (chapter 3) use petrographic and chemical techniques to investigate the provenance (sources) of Mississippian pottery; unfortunately for the beginning student, discussion of what the authors call "advanced statistical methods" of compositional data analysis is needlessly inaccessible and the results are almost completely unsubstantiated. In Chapter 4, Charles Keller, an anthropologist who apprenticed as a blacksmith, gives an impressionistic account of how the technology of iron-working can be maintained and transmitted by individuals in non-industrial settings. Keyser (chapter 5) reevaluates Heron's "steam engine," using texts to reconstruct the technological context of the invention.

Section 3 concerns the analysis of organic materials. Klepinger (chapter 6) tells how elemental analysis of human bone can be used to infer aspects of ancient diet and toxic exposure. Van de Guchte and Edging (chapter 7) instruct readers on the recovery of plant macrofossils (e.g., maize cobs) and microfossils (pollen and phytoliths) and summarize some of the archaeological questions (including radiocarbon dating) that can be addressed through the analysis of plant remains. Raheel (chapter 8) catalogues fibers and dyes likely to be found in Old World archaeological contexts and provides some guidelines for identification.

Section 4 includes four chapters on museum science and conservation. The analytical approaches discussed by Williams (chapter 9) range from x-ray diffraction to aid identification of firing temperature in Ecuadorian pottery to thermoluminescence measurement of adhering clay mold fragments to help authenticate a 3,000-year-old Chinese bronze vessel; the emphasis is on minimally destructive tech-

niques that do not compromise the display values of objects. In Chapter 10, Oehlschlaeger-Garvey, Maguire, Williams, and Keen illustrate use of a nondestructive technique, x-radiography, to reveal design features of two corroded iron belt buckles from a seventh-century tomb in France. Freund describes processes contributing to the deterioration of buildings on the Athenian Acropolis together with some restoration and conservation efforts. In the final chapter, Wisseman describes noninvasive and minimally invasive techniques used to examine an Egyptian mummy.

Anyone looking for an easy, readable introduction to archaeometry and the uses of materials analysis in archaeology and museum science will find this volume informative.

Reviewer: Hector Neff is Senior Research Scientist in the Archaeometry Group, Research Reactor Center, University of Missouri. His research interests include provenance investigations, archaeological ceramic analysis, and Mesoamerican archaeology.

The following recently published books, relevant to materials science, have come to *MRS Bulletin's* attention. Some of the books listed here may be reviewed in future issues of *MRS Bulletin*.

Books

All You Wanted to Know About Mathematics but were Afraid to Ask: Mathematics for Science Students, vol. 1. L. Lyons. Cambridge University Press, New York, 1995. Cloth, 340 pp, \$59.95, ISBN 0-521-43465-3; paper, \$24.95, ISBN 0-521-43600-1.

Bioceramics, vol. 8. J. Wilson, L.L. Hench, D. Greenspan, eds. Elsevier Science, New York, 1995. Cloth, 540 pp, \$200.00, ISBN 0-08-042677-8.

The Chemistry of Non-Sag Tungsten. L. Bartha, E. Lassner, W.-D. Schubert, and B. Lux, eds. Elsevier Science, New York, 1995. Cloth, 184 pp, \$80.00, ISBN 0-08-042676-X.

Crystallography, 2d ed. W. Borchardt-Ott. Verlag-Springer, Berlin, 1995. Paper, 316 pp, \$29.95, ISBN 3-540-59478-7.

The Electrical Properties of Disordered Metals. J.S. Dugdale. Cambridge University Press, New York, 1995. Cloth, 254 pp, \$69.95, ISBN 0-521-26882-6.

Electronic Transport in Mesoscopic Systems. S. Datta. Cambridge University Press, New York, 1995. Cloth, 392 pp, \$69.95, ISBN 0-521-41604-3.

Engineering Design: A Systematic Approach, 2d ed. G. Pahl and W. Beitz; K. Wallace, L. Blessing, and F. Bauert, trans.; K. Wallace, ed. Springer-Verlag, New York, 1996. Paper, 574 pp, \$49.50, ISBN 3-540-19917-9.

Fractals and Disordered Systems, 2d rev. and enlarged ed. A. Bunde and S. Havlin, eds. Springer-Verlag, New York, 1996. Cloth, 430 pp, \$69.50, ISBN 3-540-56219-2.

Fundamentals of Adhesion and Interfaces. D.S. Rimai, L.P. DeMejo, and K.L. Mittal, eds. VSP, The Netherlands, 1995. Cloth, 304 pp, \$85.00, ISBN 90-6764-197-9.

Fundamentals of Semiconductors: Physics and Materials Properties. P.Y. Yu and M. Cardona. Springer-Verlag, New York, 1996. Cloth, 631 pp, \$49.00, ISBN 3-540-58307-6.

Handbook of Compound Semiconductors: Growth, Processing, Characterization, and Devices. P.H. Holloway and G.E. McGuire, eds. Noye Publications, Park Ridge, NJ, 1995. Cloth, 936 pp, \$98.00, ISBN 0-8155-1374-7.

Inelastic Deformation of Metals: Models, Mechanical Properties, and Metallurgy. D.C. Stouffer and L.T. Dame. Wiley & Sons, New York, 1996. Cloth, 518 pp, \$74.95, ISBN 0-471-02143-1.

Low Thermal Expansion Glass Ceramics. H. Bach, ed. Springer-Verlag, New York, 1995. Cloth, 239 pp, \$149.00, ISBN 3-540-58598-2.

Magnetism in Disorder. T.J. Hicks. Oxford University Press, New York, 1995. Cloth, 163 pp, \$85.00, ISBN 0-19-851016-0.

Materials Analysis Using a Nuclear Microscope, M.B.H. Breese, D.N. Jamieson, and P.J.C. King. Wiley & Sons, New York, 1996. Cloth, 452 pp, \$89.95, ISBN 0-471-10608-9.

Physical Metallurgy and Processing of Intermetallic Compounds, N.S. Stoloff and V.K. Sikka, eds. Chapman & Hall, New York, 1996. Cloth, 700 pp, \$94.95, ISBN 0-412-98971-9.

The Physics Quick Reference Guide, E.R. Cohen, ed. AIP Press, Woodbury, NY, 1996. Paper, 219 pp, \$30.00, ISBN 1-56396-143-1.

Progress in Electrorheology: Science and Technology of Electrorheological Materials, K.O. Havelka and F.E. Filisko, eds. Plenum Press, New York, 1995. Cloth, 382 pp, \$115.00, ISBN 0-306-45074-7.

Quantum Field Theory in Condensed Matter Physics, A.M. Tselik. Cambridge University Press, New York, 1995. Cloth, 348 pp, \$74.95, ISBN 0-521-45467-0.

Semiconductor Characterization: Present Status and Future Needs, W.M. Bullis, D.G. Seiler, and A.C. Diebold, eds. AIP Press, Woodbury, NY 1996. Cloth, 749 pp, \$78.00, ISBN 1-56396-503-8.

Sintering Theory and Practice, R.M. German. Wiley & Sons, New York, 1996. Cloth, 568 pp, \$74.95, ISBN 0-471-05786-X.

Solid State Phenomena: As Seen by Muons, Protons, and Excited Nuclei, E.B. Karlsson. Oxford University Press, New York, 1995. Cloth, 320 pp, \$105.00, ISBN 0-19-853778-6.

Solid State Physics: Advances in Research and Applications, Vol. 49. H. Ehrenreich and F. Spaepen. Academic Press, San Diego, 1995. Cloth, 512 pp, \$89.95, ISBN 0-12-607749-5.

Structural Electron Crystallography, D.L. Dorset. Plenum Press, New York, 1995. Cloth, 466 pp, \$69.50, ISBN 0-306-45049-6. □

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