

(Stoltman) focuses on petrography rather than chemical characterization of ceramics. After a review of methods, he addresses four types of issues that petrographic data can address: classification, function, production, and exchange. The production section summarizes the postulates used in different types of provenance (sorry, I have to use that form over the author's preference for provenience) problems: the provenience, local-products-match, and spatial patterning postulates. And he concludes by reminding us that the purpose of ceramic studies should be to address a problem such as ceramic exchange. The "micro" emphasis of "Microartifacts" (Sherwood) might have had this chapter better placed in the previous section. This chapter reminds us again of the significance of scale, and the importance of information content at different scales, here at the small end of the spectrum. The question of scale was clearly represented in Fig. 12.1; the section on data representation would have benefited from some graphical representations of data; Fig. 12.3 seems to show little at all. "Current Practices in Geophysics" (Kvamme) is an excellent overview of the field methods of magnetism, resistivity, conductivity, and ground-penetrating radar. Unfortunately the page headings for this chapter, Aracheogeophysics [sic], made me wonder if it had something to do with spiders. Units for resistivity were incorrectly given as ohm/meter instead of ohm-meters). Table 13.1, comparing and contrasting the various geophysical methods, provides a useful overview to consider when selecting a particular method to use. The glossary was helpful, but this was a feature used only in this chapter.

Geochemical Methods

"Beyond ^{14}C Dating" (Rink) starts off with five questions to be asked in developing a site chronology: what material can be dated; what are the usefulness of these materials for the time range expected; what is the dated event; what would be the events bridging the dated material to the target dates; what would be the precision of the chosen methods? Tables 14.1, 14.2, and 14.3 provide helpful information relevant to these questions. The dating methods dealt with, beyond ^{14}C , are argon-argon, uranium-series, fission-track, ESR, and luminescence dating.

"Stable Carbon and Oxygen Isotopes in Soils" (Nordt) returns to the topic of soils. Fig. 15.2 is a nice summary of how C_3 and C_4 plants generate various $\delta^{13}\text{C}$ values in soil organic matter, although the novice will have to wait another 11 pages for the definition of PDB. Several case studies support the book's goal of providing practical examples. "Sourcing Lithic Artifacts by Instrumental Analysis" (Herz) gives a quick overview of the alphabet soup of techniques – NAA, XRD, SEM, OES, AAS, ICP, CL, PIXE, ESR, NMR – and provides citations for one seeking more details in order to better savor the soup. And Herz warns us not to skip hand specimen and petrographic examination before heading straight for the high-tech stuff. Various materials spanning the rock cycle are then discussed: obsidian, basalt, granite, serpentine, marble, sandstone, chert, carbonates, and amber (ok, that one's not a rock). Table 16.2 is a useful summary of which methods are

most promising for which lithic types (and even contains my own favorite, magnetism). He reminds us that possible goals include learning about: the time of fabrication; trading patterns; changing aesthetic tastes; technology; forgery detection; and assembly of broken artifacts. I like Herz' representation of the various choices as entire "systems" of analysis, not just techniques or methods.

Prehistorical Perspective

The sole article in the final section of the book is "A Personal View of Earth Sciences' Contributions to Archaeology" (Bar-Yosef). He discusses three areas in which close cooperation between earth scientists and archaeologists has been important: the environments of sites; site formation processes; and chronology. In echoing those topics that were interwoven into the fabric of this book, in speaking to the need to critically evaluate new methodologies, and in giving us a final, stern, and appropriate reminder of the need to integrate analytical methods with archaeological problems, Bar-Yosef has indeed earned the mantle of the "old teacher."

Overall, the production of the book is of generally good quality, although some photographs and figures could have been crisper, and some photographs would have benefited from color. The preface gets off to a bad start with a misspelling in the second sentence, and a few of the articles (e.g., Ferring, Wells, Nordt) have more typographical errors than one would hope for in a volume of this quality.

My perspective on this book is as an archaeomagnetist and geophysicist, but also as an instructor for an undergraduate course on archaeometry. The peculiar nature of my course is that students need not have much background in either earth sciences or archaeology, so the level of this book would be challenging for most of my students. Were my course taught more as an upper level course in geology, this book would be a better fit as a text. And for those teaching graduate level course, the fit could be even better. Some geoarchaeological topics are not well represented in this book, but of course could be covered in supplementary readings. Nonetheless, it's a book that should be in all of our institutions' libraries, and on many of our bookshelves as well. And, a less expensive paperback edition would make it more attractive to a wider audience.

Soils in Archaeological Research. Vance T. Holliday, Oxford University Press: Oxford, UK, 2004. xv + 448 pp., 111 figures and tables, three appendices, index. Price: \$115 (cloth). ISBN: 0-195-14965-3.

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Soil is often considered to be the product of numerous intersecting natural processes, including erosion of geological

materials, topography, climate, living organisms, and time. But as Vance T. Holliday argues in *Soils in Archaeological Research*, human behavior must be added to this list, and soil must be understood and studied as a product of social and cultural forces as much as natural ones. This idea is not exactly new, however; soil surveyors and pedologists have long recognized that physical, biological, and chemical properties of soil may be altered significantly as a direct result of human activity (hence the concept of “anthrosol”). Yet, as Holliday points out, only recently has pedological research become integrated as a core component of geoarchaeology (compared to stratigraphy, sedimentology, and geomorphology). In his latest contribution to archaeological soils research—adding to a long list of key contributions he has made to this realm of study over the last quarter century—Holliday convincingly demonstrates that, as the physical embodiment of human/environment relationships, the soilscape is an important analytical domain because it reveals the consequences of the complex and multi-layered dialectic between human behavior and soil bodies over long periods.

While archaeology historically has been largely concerned with the study of human behavior manifest at the level of the site (a vaguely defined area of human settlement or activity), only very recently has the analytical unit shifted to the scale of landscapes and entire regions. Holliday takes advantage of this observation to highlight the ways in which geoarchaeologists draw theoretical and methodological insight from other social and natural sciences to study the use, management, and meaning of landscapes. For studying landscapes as social and natural phenomena, Holliday argues that geology, pedology, and other earth sciences must play a central role. These varied strands have combined to form new, transdisciplinary approaches to landscape research, which focus on the physical evidence for human/environment relations over very long time spans, on the order of hundreds or thousands of years.

The book is organized into 11 chapters and three appendixes. The first three chapters cover basic terms and concepts relevant to pedoarchaeology, including detailed discussions of soil genesis and soil geomorphology. Chapters 4-7 introduce the reader to basic data collection techniques (soil surveys and soil stratigraphy) and interpretive approaches (especially concerning pedogenesis and the concept of time) to understanding soil formation processes. The remainder of the book, Chapters 8-11, deals with special topics that often are of particular interest to archaeologists: paleoenvironmental reconstructions, landscape evolution, site formation processes, and human impacts on soilscares. The book concludes with three valuable appendixes that provide information on suggested modifications to USDA field nomenclature, approaches to total and extractable soil phosphorus, and (co-authored with Julie Stein and William Gartner) a comparison of various common laboratory methods for sediment and soil analysis.

Perhaps the greatest value of this book (in my opinion) is Chapter 11, “Human Impacts on Soils,” which should be required reading for all archaeology students. In this chapter,

Holliday sets out to provide a comprehensive review and critical discussion of the ways in which human behavior impacts soils and what we can learn about those processes, such as the shape and spread of settlement, stratigraphic relationships and site formation processes, and intrasite activity areas, as well as more traditional studies of agriculture and natural resource management. After an impressive synthesis of the literature, Holliday focuses on the analysis and interpretation of a range of physical and chemical attributes associated with soil phosphorus, anthrosols, and agriculture.

Soil phosphorus (P), for example, is a sensitive indicator of human activity, as its deposition is associated with a variety of human activities including food preparation and consumption, refuse disposal, and fertilizing. The basic idea is that the surfaces of certain soil particles, particularly clays, hold ions carrying a negative charge (anions) that act like magnets to attract positive ions (cations). Cations, including those from aluminum and calcium, bond with P to form relatively stable chemical compounds, which become attached to soil particles in a process known as cation exchange. Since these compounds are rapidly fixed to the mineral surfaces of soil particles, they tend to remain stable and immobile for very long periods. Archaeologists have studied the proportional relationships of P and many other elements for reconstructing land use practices (Wells 2004).

As Holliday points out, the study of human impacts on soils is one of the oldest applications of soil studies in archaeology. However, Holliday misses the chance to acknowledge Charles Darwin as possibly one of the first “geoarchaeologists” concerned with soil-forming factors and the deposition of cultural materials (Feller et al. 2003). In Darwin’s last—and largely neglected—book, *The Formation of Vegetable Mould Through the Action of Worms, With Observations on Their Habits*, Darwin ponders the question of how archaeological remains become buried over time. In answering this question, he measured the effects of earthworms on an ancient Roman villa near his home. He concluded that “archaeologists ought to be grateful to worms” because they “protect and preserve for an indefinitely long period every object... dropped on the surface of the land, by burying it beneath their castings” (Darwin 1881:146). This was a significant, if often ignored, contribution at the time, which would have added to Holliday’s chapter on human impacts—if only to contextualize the range of soil studies in archaeology.

With a comprehensive and timely bibliography, this book is certainly core reading for geoarchaeologists, but is also essential for all archaeologists and pedologists—as a classroom textbook or field guide. Indeed, the significance of Holliday’s book is the way in which it manifests transdisciplinary research that exposes the linkages between social and natural sciences.

References

Darwin, Charles. 1881. *The Formation of Vegetable Mould Through the Action of Worms, With Observations on Their Habits*. John Murray, London, UK.

Feller, Christian, George G. Brown, Eric Blanchart, Pierre Deleporte, and Sergey S. Chernyanskii, 2003. Charles Darwin, Earthworms and the Natural Sciences: Various Lessons from Past to Future. *Agriculture, Ecosystems and Environment* 99:29-49.

Wells, E. Christian. 2004. A Brief History of Archaeological Soil Chemistry. *Newsletter of the International Union of Soil Science and the Soil Science Society of America* 11:2-4.

Books Available for Review

Please contact the book review editor, Stacey Lengyel (slengyel@srirm.com), if you are interested in reviewing any of the following books:

Bell, Ellen E., Marcello A. Canuto, and Robert J. Sharer (editors). 2003. *Understanding Early Classic Copan*. University of Pennsylvania Museum Press, Philadelphia.

Fagan, Brian. 2005. *Chaco Canyon: Archaeologists Explore the Lives of an Ancient Society*. Oxford University Press, Oxford, UK.

Lucas, Gavin. 2005. *The Archaeology of Time*. Routledge, New York.

Monaghan, G. William and William A. Lovis. 2005. *Modeling Archaeological Site Burial in Southern Michigan: A Geoarchaeological Synthesis*. Michigan State University Press, East Lansing.

Richards, Janet. 2005. *Society and Death in Ancient Egypt: Mortuary Landscapes of the Middle Kingdom*. Cambridge University Press, Cambridge, UK.

Yoffee, Norman. 2005. *Myths of the Archaic State: Evolution of the Earliest Cities, States, and Civilizations*. Cambridge University Press, Cambridge, UK.

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Upcoming Conferences

Colleen P. Stapleton, Associate Editor

2005

Aug. 28-31, 5th International Bone Diagenesis Meeting, University of Cape Town, South Africa. Contact: Julia Lee Thorp, jlt@science.uct.ac.za, Convenor & Chair of the Organising Committee. General information: www.cmc.uct.ac.za/conferences/2005/boneddiag/info.html.

Aug. 31-Sep. 3, 3rd International Conference on the Application of Raman Spectroscopy in Art and Archaeology, University Pierre et Marie Curie, Paris. General information: <http://www.ladir.cnrs.fr/ArtRaman2005/>. Contact: Conference Secretariat, LADIR - UMR 7075 CNRS - Université Pierre et Marie Curie, Paris 6, 2 rue Henri Dunant, 94320 Thiais, France. Phone: (33 or 0) 1 49 78 11 14, fax : (33 or 0) 1 49 78 11 18, email: ArtRaman2005@iscsa.cnrs.fr.

Sep. 12-16, 14th ICOM-CC, The Hague, The Netherlands. Contact: Congress ICOM-CC 2005, Floortje Kok, Keizersgracht 497, PO Box 76709, 1070 KA Amsterdam, The Netherlands, tel: +31 20 305 45 20, fax: +31 20 305 45 00, email : icom-cc2005@icn.nl. General information: www.icom-cc2005.org/intro/harikete/.

Sep. 12-16, 22nd International Meeting on Organic Geochemistry, Seville, Spain. "New Trends in Organic Geochemistry," including studies from archaeology, biochemistry, and DNA. General information: www.imog05.org.

Sep. 12-16, 15th International Conferences on Secondary Ion Mass Spectrometry, University of Manchester, UK. Includes one day symposium on Archaeometry, Cosmochemistry and Geology. General information: <http://www.meeting.co.uk/confercare/simsxv/info.htm>.

Sep. 19-23, 14th Meeting of the Association of the European Geological Sciences, Turin, Italy. Website, <http://www.maegs14.com>.

Sep. 19-20, Glass Science in Art and Conservation, Universidade Nova de Lisboa, Portugal. Contact: Mrs. Ana Maria Alonso Martins, Departamento de Conservação e Restauro, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa Monte de Caparica, 2829-516 Caparic, Portugal, Ph/FAX: 351 212948322, amam@fct.unl.pt. General information: http://www.apvidro.org/Glass_2005.html.

Sep. 26-29, Archaeometallurgy Session, Materials Science & Technology 2005 (MS&T '05), Pittsburgh, PA, USA. The third in a series of multidisciplinary annual conferences held by and for professionals in the metals and materials community. Sponsored by TMS, the Association for Iron & Steel Technology, ASM International, the American Ceramics Society, and the American Welding Society. Session organizers: Mike Notis, Heather Lechtman, Pam Vandiver, Martha Goodway. Contact: TMS Meetings Services, 184 Thorn Hill Road, Warrendale, PA, 15086; tel: (724) 776-9000, ext. 243; fax: (724) 776-3770; e-mail: mtgserv@tms.org. General info: www.matscitech.org.

Sep. 28-29, Metallurgy in Southeast Europe from Ancient Times till the End of 19th Century, Sozopol, Bulgaria. Union of