

How to reproduce in the most complete way the testimony of the rock may appear a difficult task, and it is solved differently according to the nature of the pictures, i.e. whether they are carved or painted. Photography, both in color and black and white, is a common method, as are different ways of tracing and drawing. It is of course essential that the recording methods do not harm the pictures.

Dating rock art is a difficult task, unless the rock face is sealed with datable layers. Most sites, however, are found in open air. A common method is to compare different motifs with datable artifacts or to use style analysis. In North America decorated rocks have been dated by means of measuring patina or growth of lichens. Both methods are burdened with many sources of error, however. Part of the problem of dating is to establish connection between rock art and other archaeological remains from a certain area. This usually proves very hard to do.

Researchers encounter even greater difficulties where interpretation of the rock pictures is concerned. The most common approach is to construct models based on data from ethnography and history of religions. The hypotheses thus arrived at, however, are not easy to test, one is merely able to calculate their probability.

The problem of preserving the rock art for the future is also common to the two continents. An outstanding example is the cave of Lascaux which, due to the serious deterioration, was closed to the public only a couple of decades after its discovery. Both natural forces and human activity and imprudence work together to destroy the work of past generations. Even in Norway, where ancient monuments are protected by law, one is fighting against vandalism as well as nature. It is obvious therefore that a solution of the preservation question is urgently needed on both continents.

The four books at hand demonstrate clearly that both in North America and Europe the main aim for the publication of rock art is the description of motifs and sites, including a pictorial documentation. Both Wellmann and Castleton present catalogues of information about rock art sites and regions. Total information is the key word also for the French publishing team. But as the cave of Lascaux represents a totally different context compared with the usually open air sites of North America, a broader spectrum of topics is treated. Although Meighan and Pontoni and their collaborators use a different methodological approach, they are still confronted mainly with an informative task.

There is no doubt about the value of mutual information about rock art the world over. On the contrary, research cannot continue without it. But describing data must never be the ultimate aim of rock art research. Therefore I find it pleasant to regard the efforts of the present authors to explain the rock pictures in their cultural surroundings.

Reviewed by Karl W. Butzer, The University of Chicago

Vita-Finzi is one of a few geomorphologists with a sustained interest in geo-archaeology, spanning historical and prehistoric sites in the Mediterranean Basin, the Near East, and Mexico. This handsome volume is addressed to archaeologists without earth science training, and is intended to stimulate interest in and awareness of a wide range of landscape features critical to proper archaeological interpretation. At the outset, the author explains that he will not deal with climatic change but with the topography, substrate, and the environmental dynamics contemporaneous with archaeological sites. Successive chapters cover identification of past land surfaces and shorelines, "land potential" (as defined by soil or sediment texture), geomorphic processes responsible for generating sediments, local ancillary sources elucidating geochronology, "external sources" (such as worldwide changes of sea level), and, finally, "integration," by means of a regional example from northwestern Greece. A diverse group of 53 excellent photographs provides a profitable experience for the initiated, although many interesting features are not identified in the captions and may escape the attention of some readers. The sections lack any sort of scale and are primarily of impressionistic value.

This volume will please those inclined to enjoy a breezy romp through a loosely organized sequence of sites in some of the world's more attractive environments. For those expecting a systematic introduction to geo-archaeology, *Archaeological Sites in their Setting* will prove a singular disappointment. The presentation is descriptive, anecdotal, and often superficial. The author jumps from theme to theme and site to site, with greater concern for a smart turn of phrase or strings of atrocious puns than for demonstrating a sequential research strategy of instructional value. I read the book through without a clear understanding of its rationale and had to reconstruct the author's guiding logic with the aid of a second reading. This process was painless, since the entertainment value is high, but I would hesitate to turn an archaeology major loose on the book without a set of directions: he or she might conclude that geo-archaeology was a game of mix-and-match to be played after a long, hard day in the field, with a beer in hand.

There are substantive problems as well. I was mildly surprised to learn that the interdisciplinary approach "stresses the separateness of disciplines" (p. 8), and some of us may be miffed to know that we disdain to let earth scientists loose on our sites because of their hankering for "geographical determinism" (p. 10). I was disarmed to be told that "catchment analysis was formulated as a surveying device" (p. 29), although I subsequently noticed many unexplained maps with 5 and 10 km concentric circles. I continue to wonder why "land potential" categories (a fine idea *per se*) of good vs. rough grazing vs. arable lands are pertinent in evaluating Upper Paleolithic catchments where the concentrations of

deer and gazelle are of primary concern. It would seem to me that the geo-archaeologist should devise real terrain maps which incorporate data on local relief and surface roughness (not just elevation) as well as the texture of surficial sediments or the presence of lithosols on rocky outcrops. Such information could then be usefully keyed—differently—for the evaluation of foraging and agricultural opportunities. Certainly such criteria would have significance both for predicting the nature of a late Pleistocene vegetation mosaic (considering pertinent topographic changes) and assessing soil moisture or erodibility.

There also are numerous examples of ambivalence in regard to procedures. On page 10 we learn that a fossil beach is almost impossible to identify without fossil mollusca, whereas on page 96 we read that sediment facies such as beach deposits can indeed be identified by textual criteria and by their geomorphic context. On page 122 we are told that progressive fining of alluvial deposits in Mexico indicates a shift from a flash-flood to a seasonal or perennial flow regime, whereas on page 130 suspended sediments are invoked to argue that the late prehistoric Nile was reduced to a "negligible flow" (an argument that would also need to be applied to the historical Nile).

Vita-Finzi introduces an intrinsically useful concept—contrasting "parent-daughter" sediment facies—to compare catchment surface soils with alluvial strata. However, application is facile, because even small catchments are surprisingly complex in terms of surficial sediment, depending on whether slope or bottom soils contribute most of the mobilized sediments, while B horizons commonly differ as much from C horizons as alluvial facies do among themselves within a single stream outcrop. The second critical issue is evaluating alluvial facies in the intermediate phase of mobilization with respect to surface runoff—as controlled by ground cover, sediment caliber and supply, and rainfall patterns—a phase that Vita-Finzi chooses to ignore. Alluvial facies constitute only one symptomatic variable of a far more complex systemic relationship. Another persistent oversimplification is the assumption that prehistoric alluviation units represent uniform time blocks of 40 millennia or so (e.g., pp. 37, 69, 103).

Perhaps the most fundamental problem concerns scientific integration. Although Vita-Finzi cannot be faulted for excessive procedural rigor, his book is a classic example of archaeological geology, rather than geo-archaeology. This is surprising because, more than most, Vita-Finzi has always worked in close association with archaeologists and is unusually sensitive to the articulation of archaeological features in their physical context. But he fails to focus on cultural factors in site formation, on bio-physical disturbance and modification of cultural residues, or on the unique potential of this research mode in archaeological survey. There is no proper discussion of the processes of human intervention in the soil landscape and the hydrological cycle. Repeatedly, when the direct or indirect impact of land use are implicated, he insists on the primacy of

climatic impulses, contriving excuses why the onset of recent alluvial cycles differs significantly within a region (commonly in relation to settlement histories), e.g., proximity to potsherd concentrations (p. 122) or shifting cyclonic belts (p. 155). In fact, Vita-Finzi seems to believe in a simple alluviation phase, dating ca. A.D. 500–1500, synchronous on two hemispheres, and attributed to the only significant climatic change in the Holocene record (see *Nature* 263, 1976, 218–219). Most geo-archaeologists and geomorphologists will note this interpretation with a tinge of amazement. This is all rather unfortunate, because sites were part of landscapes that once were an integral part of a human ecosystem. The reciprocal relationships between people and their potential resources are as real as the degraded landscapes so commonly created in the course of intensive land use.

To me, geo-archaeology implies archaeology, done primarily by means of earth science methods, techniques or concepts. The idea is to elucidate the environmental matrix intersecting with past socio-economic systems and thus to provide a special expertise for an understanding of the human ecosystems so defined. This task is not an easy one, nor one likely to provide firm answers in the near future. But we are indeed obligated to continue to develop better interdisciplinary procedures in order to facilitate more objective interpretation.

Maritime Archaeology. KEITH MUCKELROY. Cambridge University Press, New York and London, 1979. x + 270 pp., illus. \$37.50 hard cover, \$9.95 paperback.

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This book is not another general discourse on archaeology underwater but constitutes instead the first real attempt to give comprehensive definition to a newly emerging subdiscipline within archaeology. The scope of this subdiscipline is the subject of the book's first four chapters; its theoretical basis, the subject of the remaining four chapters.

Muckelroy opens his first chapter with some general definitions. He calls the subdiscipline maritime archaeology and defines it as "the scientific study of the material remains of man and his activities on the sea." He sees nautical archaeology as a specialty closely related to maritime archaeology but devoted to technology, that is, to all forms of watercraft and ancillary equipment, including harbor facilities. Watercraft deposited in graves, often stripped of sailing gear and structurally modified, fall within the scope of nautical archaeology but are, he says, outside maritime archaeology's area of concern.

These definitions present problems. Muckelroy himself later includes within the geographical scope of maritime archaeology all navigable bodies of