communal boundaries shift dramatically; a private plot of dry land becomes part of the commons when it is submerged.

Attempts to analyze common resource management must distinguish between conservation and incidental effects that may mimic conservation. Hames and Stocks, both analyzing lowland Amazonian populations, use foraging theory to suggest that some behaviors that have the effect of conservation actually may be the result of individual choices, made to enhance efficiency.

Many of these studies emphasize that conservation of communal resources is more likely in a community with shared values and beliefs. Belief systems can work against conservation, however. Boreal forest hunters who believed in the spontaneous regeneration of each slain animal could see no advantage to selective or restrained harvesting (Brightman). Even belief systems that appear to be like our own may operate quite differently. Though fishermen in Papua New Guinea (Carrier) have a thorough ecological knowledge of marine fish species and a system of private tenure, close analysis shows that they do not share the key elements of the bioeconomic model of Western resource management.

Commons managed by local social groups do fail, politically and ecologically, although their record in this respect may not differentiate them from management solutions like those set forth by Hardin. Taylor describes an Irish community that failed to take up an opportunity to purchase and make a commons of salmon-fishing rights. Egalitarian in ideology and defined largely by its opposition to landlords, the community lacked the internal authority and shared values necessary for local regulation. In some cases the failure is helped along by views like those that underlie the Hardin model. In Botswana colonial authorities mistakenly assumed that common grazing rights were based on open access (Peters). By doing so, they unwittingly created an open-access commons (with the predictable ecological consequences) that then had to be "protected" by instituting private property rights.

Together, these studies focus on small groups and small-scale commons, typically those related to subsistence activities of tribal or peasant populations, or localized fisheries. All give some attention to the political and economic systems that encompass and sometimes dominate these groups, preeminently nation-states and capitalism, but one will not find here explicit discussions of macro-scale commons (such as the atmosphere), the population side of the commons dilemma, or the status of commons in socialist nations.

In their summary, McCay and Acheson argue that commons are social institutions, the result of communal activity, conflict, and consensus. Attention to their adaptive features and local, historical context is requisite to understanding their origins, success, and failure. It is a salutary message, well and diversely substantiated, that should gain the attention of anyone concerned with human ecology, population and resource management, or development.

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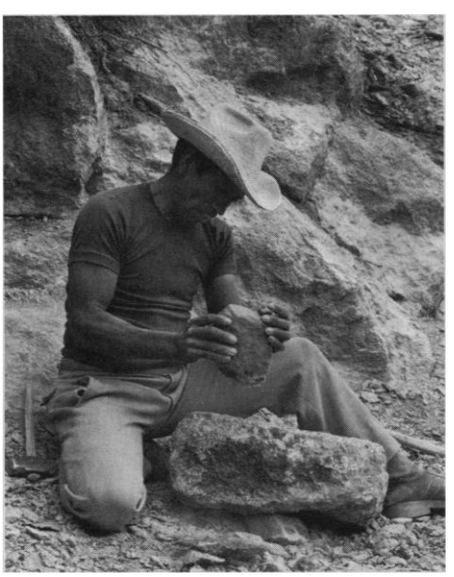
Behavior with Tools

Lithic Studies among the Contemporary Highland Maya. BRIAN HAYDEN, Ed. University of Arizona Press, Tucson, AZ, 1987. xii, 387 pp., illus. $35.

Stone Tool Use at Cerros. The Ethnoarchaeological and Use-Wear Evidence. SUZANNE M. LEWENSTEIN. University of Texas Press, Austin, TX, 1987. x, 228 pp., illus. $42.50.

The origins of prehistoric archeology can be traced to mid-19th-century Europe and an audacious claim that pre-Adamic flint implements had been found in antediluvian French gravels. The enthusiastic pursuit of stone artifacts engendered by this heresy was not to be equaled again for another century. The 1960s and 1970s saw a resurgence of lithic studies that, as evident in these two books, continues in full force today. Many current studies, however, have fallen well short of their advance billing. David Hurst Thomas has aptly characterized such studies as exercises in rainbow chasing. To remedy what he sees as an alarming regression toward atheoretical empiricism, Thomas recommends that lithic specialists focus on establishing a "body of mid-range theory addressed specifically at material consequences of lithic procurement, production, utilization, and discard" ("Contemporary hunter-gatherer archaeology in America," in *American Archaeology Past and Future*, D. J. Meltzer *et al.*, Eds.; Smithsonian Institution Press, 1986, p. 247). This is not a casual recommendation; at issue are the canons of archeological inference.



"Removal of large flakes from the metate blank using two-handed pics. The flake just removed from the dark area on the side of the metate blank can be seen lying amid quarry debris just below the pic. Note the pic used under the metate blank to elevate the edge being worked." [From *Lithic Studies among the Contemporary Highland Maya*]

The epistemological basis of sound inference is the central concern of the two books reviewed here. Hayden *et al.* and Lewenstein demonstrate how current observations of stone tools (or attributes of individual tools) and their patterned distribution in time and space can be translated into reasonable inferences of prehistoric behaviors. These are undoubtedly two of the three most important books on stone artifacts to appear in recent years, the other being Robin Torrence's *Production and Exchange of Stone Tools* (Cambridge University Press, 1986). The three books complement each other nicely and, considered together, provide a comprehensive picture of the state of the art in lithic studies.

Mid-range theory, with its focus on material correlates of behavior, must of necessity be founded upon observations of artifact use. Because ethnographers often fail to do this adequately, archeologists such as Hayden *et al.* have been doing what can be described as "ethnography of material culture for archeologists," generally erroneously called "ethnoarcheology." From their research in Highland Maya communities of Guatemala and Chiapas, Mexico, Hayden and his fellow contributors (Margaret Nelson, Michael Deal, and Gayel Horsfall) describe modern manufacture, use, and discard of manos and metates (stone milling stones), stone choppers and pics (used to manufacture the manos and metates), and glass tools. Implications of these data for current debates in lithic studies, archeology, and social science are addressed convincingly. Among the dozens of issues the authors consider are tool manufacture, use, and discard; quarries, workshops, activity areas, and refuse zones; tool storage and curation; the organization of work and learning behavior; design theory and the material, technological, functional, and social constraints on tool form; and craft specialization, resource monopoli-

"Play items used by children in San Mateo, including a toy pot, a toy mano, and a toy metate. Play manos and metates in poorer households often consisted simply of locally available flat slabs of rock and cobbles on which dirt was ground; scale = 15 cm." [From *Lithic Studies among the Contemporary Highland Maya*]

zation, and the emergence of social stratification. Hayden's chapter "Past to present uses of stone tools" is particularly innovative. By assessing overall tool requirements of modern Maya households he is able to derive a reasonable extrapolation of pre-Columbian tool needs. On the basis of modern tasks he suggests that, pre-Hispanically, tools for working wood should have been the most common, a conclusion verified by rigorous and detailed archeological studies such as that reported by Lewenstein.

A necessary adjunct to Hayden's "ethnoarcheological" approach to mid-range theory is the experimental approach exemplified in Lewenstein's work. Experimentation is necessary to recreate prehistoric behaviors that can no longer be observed or inferred from modern groups. Lewenstein's experiments concerned the use of modern replicas of ancient tools on a variety of materials that would have been processed by Maya Indians living in Belize about 1600 years ago. Detailed study of modifications to modern tools caused by processing various raw materials (such as stone, bone, wood, leather, fibers, and meat) provides the basis for inferring how archeological specimens were used. Technological and functional analyses of these chert and obsidian tools allowed Lewenstein to reconstruct the economic system characteristic of the coastal community of Cerros and to determine the relative unimportance of craft specialization in the evolution of this ancient community.

The singular weakness of these two volumes is inherent in their restricted community focus. Neither considers sophisticated chipped-stone technologies (those requiring apprenticeship) or complex craft organizations engaged in economies of scale and inter-regional exchange. Fortunately these topics are central to Torrence's analysis of production and exchange of obsidian tools in the Aegean. Torrence's reliance on ethnohistory for determining the material manifestations of large-scale production and exchange also complements the ethnographic and experimental approaches of Hayden and Lewenstein. Although all three books are strongly empirical, their express purpose is to evaluate general anthropological theories by means of bridging arguments based upon verified mid-range theory. Unlike most archeological tomes on stone artifacts, these books focus on complex societies and neolithic technologies rather than nomadic hunters and gatherers. Consequently, one of the specific concerns of each is the relationship between production, craft specialization, control of critical limited resources, and the evolution of cultural complexity. The refinement of general theory already necessitated by these pioneering studies bodes well for the future of lithic studies. The end of the rainbow still holds much promise.

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The American Depopulation

Vectors of Death. The Archaeology of European Contact. ANN F. RAMENOFSKY. University of New Mexico Press, Albuquerque, 1988. xvi, 300 pp., illus. $27.50.

The magnitude, timing, and causes of the demographic collapse of Native Americans following European contact elude resolution. Depopulation had readily apparent consequences, however, including the termination of pre-Columbian cultural evolutionary trajectories and the displacement of indigenous peoples by newcomers from the Old World.

In *Vectors of Death* Ramenofsky employs archeological and historical information in an effort to determine when appreciable population decline began, whether it was sudden or gradual, and whether introduced infectious diseases can be implicated in the process. The timing of the depopulation is a central element of her argument. To state the matter simply, epidemics must have played a causal role in population decline if the reduction began before significant direct contact. Furthermore, early depopulation would indicate that ethnohistorical accounts portray unstable cultural systems that are imperfect reflections of precontact conditions.

The discussion focuses on cultures spanning the prehistoric, protohistoric, and historic interface in the Lower Mississippi Valley, central New York, and the Middle Missouri Valley. These regions are best known historically for the organizationally complex Natchez chiefdom, the warlike Iroquois Confederacy, and the eastern Plains village farmers. Different histories of persistence in the face of pressures deriving ultimately from European (and later American) expansion into the interior require explanation.

The late-prehistoric through historic sites are treated as a series of components assigned to several temporal periods. Sites, with few exceptions, are considered to have had single-component occupational histories. The periods can be subsumed further under three general categories. Postcontact sites yield European materials, and the amount and diversity of these items further differentiate the later sites.

Separate tabulations document change over time in the number and size of sites, the area covered by roofs, and the total settlement area. Levels of analytical precision differ according to the effectiveness of these indicators of relative population size as well as the quantity and quality of readily available data. The diachronic trends in settlement characteristics and inferred population size are often ambiguous and subject to biases,