BOOK REVIEWS

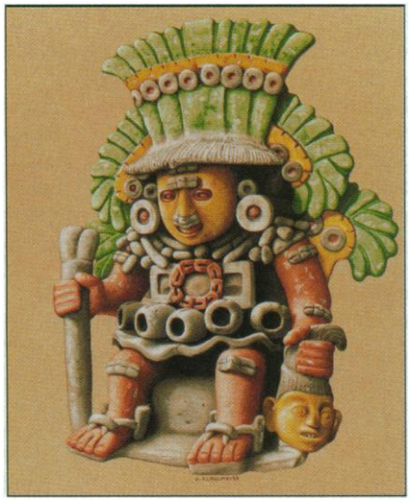
Explaining Civilization

Zapotec Civilization. How Urban Society Evolved in Mexico's Oaxaca Valley. JOYCE MARCUS and KENT V. FLANNERY. Thames and Hudson, New York, 1996 (distributor, Norton, New York). 255 pp., illus. $60 or £42. New Aspects of Antiquity.

Do not let the appearance of this beautifully illustrated, large-format volume lead you to dismiss it as a coffee table adornment. Joyce Marcus and Kent Flannery have put together a serious and thought-provoking book with a new slant on one of archaeology's knottiest questions: how do we account for the rise of civilization in those few instances in the ancient past where it occurred without precedent, where the architects of civilization had no model to guide them in their creation of an urban society the scale, complexity, and accomplishments of which soared far above anything that had preceded? In simple, jargon-free language the authors address this long-standing question by laying out an explanatory framework for the evolution of one of pre-Columbian America's earliest and most impressive, albeit lesser known, civilizations, that of the Zapotec of highland Oaxaca, Mexico.

The reconstruction of Zapotec social and cultural evolution draws upon more than three decades of archaeological research carried out by the authors and their associates in the Valley of Oaxaca and its environs. A number of the many journal articles and several earlier volumes published by the authors as a product of this work are now virtually standard references, widely admired for their astute, sometimes witty insights into archaeological method and theory. *Zapotec Civilization* continues in that tradition. Its readers, professional and casual alike, will admire the way Marcus and Flannery employ their archaeological data to make insightful inferences about the changing technology, economy, social organization, political integration, and even the religion and ideology of the ancient inhabitants of the Valley of Oaxaca.

Even more fascinating, for those who have followed the careers of Marcus and Flannery, are the refinements and alterations in the explanatory models they have contrived over the years to account for the evolution of early civilizations in places such as the Valley of Oaxaca. In this regard, Flannery, as far back as the mid-1960s, had championed an "ecosystem approach" to explanation, aimed at discovering what mechanisms and processes were common to the cultural evolution of civilization in general. Building on the theoretical foundation laid by his anthropological predecessors at the University of Michigan—Leslie White, Elman Service, and Marshall Sahlins, among others—Flannery made the concepts of adaptation and selection from the theory of biological evolution central to explaining why, under certain environmental and cultural conditions, some forms of social, political, and economic institutions tended to develop while others withered away.

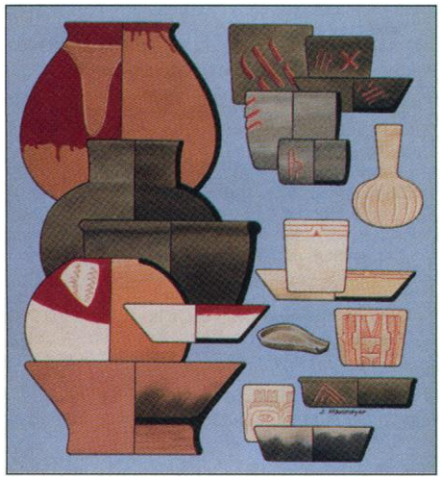


Funerary urn of a Zapotec ruler in his role as warrior (holding a trophy head) from Tomb 103 at Monte Albán. Height, 51 cm. [Painting by John Klausmeyer]

All the while Marcus and Flannery were sensitive to complaints directed at the so-called cultural ecologists that the evolutionary dramas being reconstructed were not crediting the ideas, values, and beliefs of the prehistoric human actors for their role in directing social and cultural change. Ideational factors, manifested in religion, ritual, art, dance, writing, games, and the like were indeed given short shrift as causal elements in models of evolutionary change that viewed cultural subsystems as having arisen almost exclusively out of their adaptive interactions with the natural environment. In a 1972 article "The cultural evolution of civilizations," Flannery acknowledged the humanist critique of the applicability of ecological models to the analysis of complex societies and called for an approach that recognized information exchange through art, religion, and ideology as lying "at the heart of society's environmental and interpersonal regulation." While crediting these ideational elements with causal significance, the ecosystemic model, originally championed by Flannery, continued to embody selection and adaptation in explaining specific sociocultural change. *The Cloud People*, a 1982 book the two edited comparing Zapotec civilization with that of the neighboring Mixtec, attributes the divergent evolutionary paths taken by these societies to the adaptation of each to its local environment, along with nonadaptive cultural "drift" and the influence of neighboring cultures.

In *Zapotec Civilization*, Marcus and Flannery move much deeper into the ideational realm with what they call "action theory," an explanatory framework designed to "give the individual humans, or 'actors,' a greater role to play in social change." Action theory, in the authors' interpretation, maintains the system as an organizing concept, acknowledges the impact of the environment in shaping social and cultural behavior, but places less emphasis on accounting for change in terms of adaptive interactions between cultural and natural subsystems. As Marcus and Flannery conceptualize the process of specific evolution, forceful leaders in any society strive to advance their material or political positions through self-serving actions, and in so doing create change. Drawing on analogies from contemporary societies organized as chiefdoms, the authors, for example, attribute the emergence at about 1200 B.C. of hereditary social inequality in the Valley of Oaxaca to the actions of a few important individuals. These village leaders, having previously relied on personal charisma to garner the economic and political support they required to sustain their positions, succeeded in promoting an ideology endowing them and their descendants with supernatural ancestry. Only they had direct access to the gods upon whom their followers depended. Later in the book, the evolution of a Zapotec state polity at some time between 600 and 100 B.C. is attributed to an aggressive chief whose cunning enabled him to subjugate the other valley chiefdoms, much as the historic Kamehameha, in a 30-year period at the turn of the 19th century, conquered his rivals to become sole ruler of the Hawaiian islands.

Throughout their book Marcus and Flannery refer to alternative modes of explanation



Zapotec pottery of the San José phase (1150–850 B.C.). [From *Zapotec Civilization*; painting by John Klausmeyer]

based on "ecological functionalism" or "selectionist" approaches, and, while crediting each with explanatory value, they fault them for failing to recognize the capacity of aggressive, charismatic leaders to shape the course of history. Along with cultural and natural forces, the actions of such individuals are seen as producing rapid change followed by periods of relative stability in, as anthropologists refer to them, generalized "stages" or "levels" of egalitarian band, ranked chiefdom, and stratified state integration. Because individual action during the periods of rapid transition is singular, the authors acknowledge that action theory has limited value for a comparative study of evolutionary process. The value of action theory, as Marcus and Flannery put it, is that it "responds to complaints that most evolutionary theory makes humans little more than cogs in a machine."

In the end this book leaves us with the perplexing problem of accounting for the fact that, despite the unique actions of its leaders, every civilization of antiquity, from Mexico to Mesopotamia, appears to have advanced through a similar sequence of stages and to have evolved quite comparable political and economic institutions. What, we ask, were the cultural and environmental limits to self-serving individual action in effecting this evolutionary change? This is a question addressed at length by Leslie White almost a half a century ago. Unfashionable as they may be in certain intellectual circles at the moment, such questions are of much broader interest to the general public than that of Zapotec prehistory, for they touch on issues of universal social and cultural behavior. We can, however, begin to answer them fruitfully and move toward a comparative study of evolutionary process only when we have at hand studies of other civilizations as thorough and thoughtful as that which Marcus and Flannery have presented us for the ancient Zapotec.

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Evolutionary Virology

Molecular Basis of Virus Evolution. ADRIAN J. GIBBS, CHARLES H. CALISHER, and FERNANDO GARCíA-ARENAL, Eds. Cambridge University Press, New York, 1995. xx, 603 pp., illus. $94.95 or £65.

The rapid evolution of viruses has important consequences for our everyday lives, and probably for the lives of all other living organisms on Earth. Understanding and controlling influenza, herpes, AIDS, hemorrhagic fever, and many other viral diseases depends on our understanding of viral evolution, particularly at the molecular level. At the same time, evolutionary biologists are realizing that the rapid evolution of viruses provides an unprecedented opportunity to observe and study evolutionary processes directly. Molecular systematics has become the common ground of virologists and evolutionary biologists in the effort to understand where viruses come from, how they interact with their hosts through time, how they evolve, and how they can be utilized and controlled. This book provides an important summary of these molecular systematic investigations of wild viral populations, as well as some insights into the early stages of the marriage between virology and evolutionary biology.

The large number of informative chapters on particular viral groups demonstrates the productivity of the relationship between virologists and evolutionary biologists. For instance, molecular systematic studies are now used routinely to identify, characterize, and monitor new viral outbreaks, often before the virus is even isolated (as in the recent hantavirus outbreak in the United States). Nonetheless, there are also indications that these two kinds of biologists still have a lot to learn from each other. As an example, consider the explanation, given in several chapters, for the differences in the shapes of the phylogenetic trees of different viruses. Samples of some viruses taken through time (such as influenza A orthomyxovirus) produce trees with one dominant, continuing lineage and many short side-branches that quickly terminate; thus, at any one time, there is one principal genotype with relatively minor variation among multiple isolates. Samples of other viruses, such as HIV, produce trees with increasing diversity through time, with continuing divergence among the many branches. The widespread explanation is that the divergent trees are produced because there has "been little or no selection against any lineage," whereas the single-lineage trees are "the result of herd immunity selection for the line that is most antigenically novel" (p. 4). But is this explanation sufficient? Why would immunoselection prevent influenza from diverging along different pathways instead of promoting such diversification? Is there really only one viable region of genotypic space at any time? Population bottlenecking and genetic recombination are among the possible (but not articulated) contributing explanations for the differences in the trees. Even if the recombination rate is relatively low in influenza (as is thought to be the case), it may be sufficiently high to maintain a cohesive lineage, given the global nature of influenza epidemics and opportunities for multiple infection. The amount of recombination realized through time is a function of both molecular and populational processes. In contrast to influenza, opportunities for recombination among divergent lineages in HIV are much less commonplace (although not unknown). The differences in transmission between HIV and influenza thus affect opportunities for recombination, which in turn would affect the shape of the phylogenetic trees. The old dogma that genetic recombination is rare or absent in RNA viruses (except for shuffling elements of segmented genomes) is probably responsible for the prevailing view that excludes a role for recombination in determining the viral tree shapes. The chapter on recombination and its evolutionary effect on viruses with RNA genomes by Michael Lai effectively dispels this myth, even though the implications of his message have not yet been fully assimilated.

Although (or perhaps because) the book reveals some large remaining gaps between virologists and evolutionary biologists, it is very productive reading material for anyone interested in viral evolution. Evolutionary biologists will find that viruses have much to offer on the molecular basis of evolutionary processes, the possibilities for in vivo and in vitro experimental evolutionary systems, and applications of evolutionary theory. At the same time, virologists will get a view of the power and potential of molecular systematics and see why evolutionary biology should be a required component of any molecular biology program. Perhaps this book will also help reverse the long-standing descriptive emphasis in molecular