Vignettes: Nonuniversality

It is commonly said, especially by boosters of science, that its language is international and is mutually comprehensible around the world. But, of course, the facts are otherwise.... Take the names for certain of the standard chemical elements. In German these were built up from vernacular roots, in English from classical roots—thus, *Wasserstoff*, "hydrogen"; *Sauerstoff*, "oxygen." As it happens oxygen was given its name by Lavoisier (*oxygène*, roughly "acid maker") on the mistaken notion that it was an essential ingredient of acids. In English, the *oxy-* root has for all practical purposes lost any connection with acidity; it is used only to indicate the presence of oxygen. But in German the word for acid is *Säure*, and the spurious connection of oxygen, Sauerstoff, with acids is constantly maintained; it is as though in English one always said "acidogen" for "oxygen." German chemists, of course, are not fooled by its name into thinking that oxygen behaves differently than it does .... But surely, the associations, the connotations, the idea of the kind of thing one is dealing with, is different in the two cases.

—*David Locke*, in *Science as Writing* (Yale University Press)

In some ways modern science can be seen as the push to erase individual, craft skill from the scientific workplace, to ensure that no idiosyncratic local, tacit, or personal knowledge leaks into the produce. Anyone should be able to reproduce scientific results if they can afford the equipment and follow the recipe. Research findings that are purely personal or irreplicable are just not science. Yet recent work in the sociology of science and engineering keeps discovering traces of craft in the modern scientific commodity. Some lab technicians have "golden hands"...; some engineers are "wizards"...; some physicists have "physical intuition."

—*Susan Leigh Star*, in *The Right Tools for the Job: At Work in Twentieth-Century Life Sciences* (Adele E. Clarke and Joan H. Fujimura, Eds.; Princeton University Press)

leoecology of Terrestrial Plants and Animals," conveys the approach well. The book was written by a consortium of workers (35 in all, designating themselves The Evolution of Terrestrial Ecosystems Consortium) interested in the history of the terrestrial realm; each chapter has a different mix of authors. The heart of the book, accounting for about three-fifths of its length, begins with the records of the earliest terrestrial fossils known, nonvascular plants from the Ordovician, and proceeds to describe successive states of terrestrial ecosystems up to the present. The discussion of each time slice is accompanied by paleotopographic and paleotectonic maps. This is a wonderful read; the breadth of expertise represented by the authorship serves to bridge the various disciplines involved and to provide an integrated account of the evolving systems.

A number of fascinating puzzles are presented. For example, the earliest terrestrial animal assemblages known, which are arthropods of late Silurian and early Devonian ages, contain predators and detritivores but few if any herbivores, which only came to prominence in the late Carboniferous. Thus these animals were linked to plants chiefly through detritus, or perhaps through decomposer microorganisms, for perhaps 80 million years. Meanwhile, in the late Devonian, tetrapods appear, and they seem to be chiefly predators, including insectivores, so that arthropod detritivores form the most likely link between the tetrapods and plants. Tetrapod herbivores finally become common late in the early Permian. What, one wonders, took herbivory so long to become well established?

Other striking problems in plant-animal relations are provided by Mesozoic plant associations and tetrapods. For example, the early (to mid-Triassic) herbivorous tetrapods were generalized browsers on plants largely within a meter or so of the ground, but the large sauropods of later Mesozoic times presumably browsed many meters high and may have lived in herds. Yet the trees of that time did not produce abundant foliage and were probably slow-growing. Even though dinosaur metabolism may have been low, it is difficult to account for the energetic base required to support bands of such giant herbivores.

These examples are chosen from among many because they involve one of the book's more interesting features, the display of the relations between successive waves of producers and consumers. The inclusion of the invertebrate record as an integral part of terrestrial biotic history is certainly laudable. The marine record, for all its relative completeness, lacks a fossil record of the evolution of primary producers that can be interpreted with any confidence to yield information about its effects on the evolution of the consumers. Although the terrestrial and marine systems may exhibit rather different patterns of energy transfer, data from at least one environmental realm are most welcome to all concerned.

The early chapters of the book are less successful. These consist of an outline of the basic aims and principles of paleoecology and a review of the nature of the record—processes of taphonomy in particular—and of the methodology deemed best suited for evaluating it. This account is if anything weighted toward plant fossils, which have received less study than animal fossils, and thus it fills an important need. But these chapters, especially the first, seem to suffer rather than gain from the multiple authorship, although the treatments are thorough. Perhaps what is missing is a certain purity of viewpoint that is often found when an individual author is forced into the disciplines of scholarship. Theoretical topics seem not to fare well when expounded by committees.

At any rate I learned a great deal from this book and recommend it highly. Certainly it will be a landmark in terrestrial paleontology. Because it brings together and integrates our knowledge of the broad history of a major ecological realm, it will interest all those who care about the history of life.

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A Backwater Reconsidered

Wealth and Hierarchy in the Intermediate Area. FREDERICK W. LANGE, Ed. Dumbarton Oaks Research Library and Collection, Washington, DC, 1992. xii, 463 pp., illus. $36. From a symposium, Washington, DC, Oct. 1987.

This book brings under discussion the long-debated but still intriguing question of whether the evolution of societies is unilineal or multilineal. Using archeological data from Central America and northern South America, the authors discuss whether societies always change from simpler to more complex forms and how such changes are reflected in archeological remains. This brings out some fundamental questions

about human society: Is wealth always converted to power? and Is the state a universal stage in the evolution of society? These broad questions make up a small but rewarding part of the book, which is filled with supporting evidence on chronology, prehistoric settlement, burial features, and artifact types.

The basis for the publication was a symposium convened to reconsider scholarship on the Intermediate Area toward the end of a decade of proliferating research. The Intermediate Area in archeological terms is the geographical region between the high civilizations of North and South America, from Honduras and El Salvador in the north to Colombia and Ecuador in the south. The contributors agree that there is evidence of substantial economic wealth in this region prehistorically but that unlike the Aztec and Inca to the north and south, state-level society did not develop. Archeologists have tended to view the Intermediate Area as lacking some characteristic that would have permitted or promoted the rise of the state, and the individual authors present a number of arguments against this perspective. The papers discuss differences from region to region over time in the development of wealth and complexity, which are commonly believed to be prerequisites of social hierarchy, centralized rule, and the state.

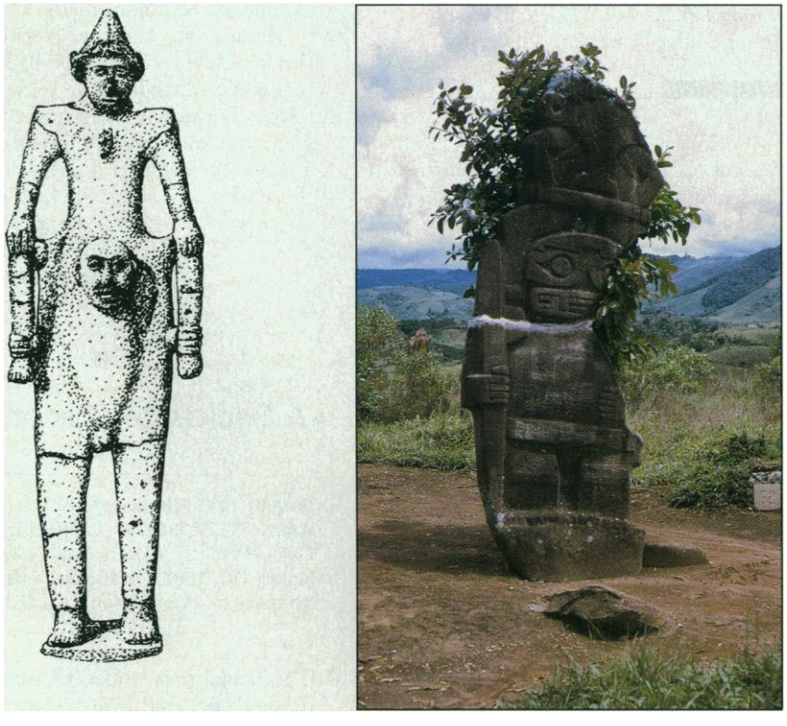
Sheets decries the definition of the Intermediate Area in terms of negatives and proposes a definition in terms of positive achievements. These include avoidance, rather than absence, of the state and instead of slowness to change the development of smaller, simpler, and more enduring forms of society than existed elsewhere. These strengths are attributed to "efficient" (as contrasted with intensive in other regions) adaptation to a highly diverse environment and resource base. Such a conclusion resonates with present discourse over whether biodiversity is worth preserving. The choice of "efficiency," a concept more closely related to optimal foraging theory and cultural ecology than to theory of state formation, can be contrasted with studies of complex prehistoric societies in which intensive exploitation and redistribution of a few resources, usually land, water, and grain, is stressed. Sheets's perspective also suggests the extent to which research is shaped by society. Models that posit state society as a logical or necessary end point may be as much reflections of the fact that we all live in states today as aids to understanding ancient society.

Hoopes also works to dispel unilineal views of the past. He disputes the perspective suggesting there was a common ancestral culture from which all Intermediate Area societies developed. Reviewing the Early Formative (approximately 3000 to 1000 B.C.), he concludes that groups in the Intermediate Area "may not have shared a common cultural ancestry, cosmology, or subsistence practices much beyond the Paleoindian period."

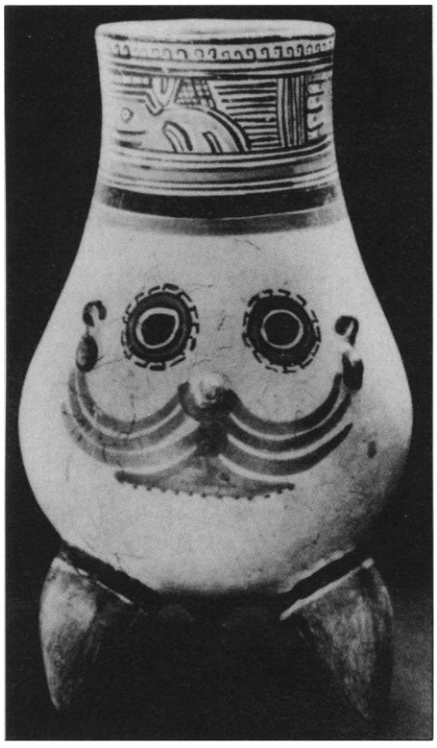
Focus on the earliest periods of human habitation of the Intermediate Area in a volume on wealth and hierarchy may seem confusing, since the clearest examples of ancient wealth expressed in gold are only as recent as the first millennium A.D. Societies of the earlier millennia, however, provide information on change over time that is unique to archeology and critical to understanding later cultural evolution. Cooke and Ranere, in their discussion of the prehistory of Central Panama, find long-term stability in settlement and note that most change in technology, settlement, and economy appears to be a result of cumulative local changes, a complex feedback system that was not measurably influenced by the state-level societies to the north and south. Cooke and Ranere propose there may be continuity from at least 7000 years ago to the surviving Buglé people of contemporary Panama, a remarkable record in this changing world.

Interpretations of the copious data vary, however. For northern Costa Rica, Lange notes, "The fact that major differences in mortuary artifact presence or absence are observed among different cemeteries rather than within one cemetery suggests that principal distinctions were on a community-by-community or subregional basis," implying largely egalitarian society. Drolet, in describing the Diquis region of southern Costa Rica, evaluates a similar arrangement differently: "Distinct funerary zones were maintained around the periphery of each community, and within these, there were numerous cemeteries of different sizes and internal complexity. These funerary divisions imply differential placement of domestic groups from within the village and a rather rigid system of social ordering for cemetery use paralleling the pattern of residential separations in the community."

Such disputation shows the progress that has been made in studies of the prehistory of the Intermediate Area, where previous volumes presented data so sparse and disparate that common themes were almost impossible to debate. Much credit for the present work goes to Lange, who organized this conference and the 1980 Santa Fe conference on



"Master-slave" figures from the Intermediate Area. In the figure at left, "the conical hat may be an insignia of special status. The upper figure wears a pendant in the form of a human." In the statue at right, from Alto de Lavapatas, San Agustin, Colombia, "the lower figure wears a mask depicting a supernatural being and carries a staff of the kind used in dances. The upper figure is wearing an animal mask, perhaps a peccary or a tapir." So-called master-slave figures, showing one figure carrying another on its shoulders, are "one of the most often-cited evidences of hierarchy in Intermediate Area societies," but although "there can be no doubt that these figures show a physical hierarchy, . . . it is quite possibly a quite ephemeral one." [From K. O. Bruhns's chapter in *Wealth and Hierarchy in the Intermediate Area*; drawing by Tom Weller]



Jicote human portrait head from the archeological subarea of Mesoamerica known as Nacoya, around A.D. 1350. In this period (Middle Polychrome) "a basic shift in socioreligious patterning and behavior is reflected in the transition from individualistic/realistic portrayals to more highly abstracted/standardized renditions of human portrait heads" such as is shown here. [From F. W. Lange's chapter in *Wealth and Hierarchy in the Intermediate Area*]

the archeology of Central America mentioned frequently in the text. The earlier conference established common time and space dimensions and research concerns across what is now called the Intermediate Area. The present volume exhibits a leap forward in data collection and a move away from traditional models of migration and diffusion. This more independent approach to assessing ancient society must be seen as one result of Lange's indefatigable organizing skills, which he has used to improve communication among archeologists with similar interests. This has resulted in the present inclusive work, with contributors representing virtually all North American research projects under way in the Intermediate Area today. A future goal must be to integrate the growing contributions of Central and South American researchers and institutions more fully into the burgeoning sphere of scholarly communication so well represented by this book.

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