tocene is remarkably vague, especially in view of the wealth of skeletal remains that have been recovered in Belgium, France, Germany, Gibraltar, and Italy. It is still unclear whether Neandertals evolved locally into a.m. *Homo sapiens* or were replaced by populations of the latter from Central Europe, the Near East, or North Africa. Stringer *et al.* (p. 115) conclude that "western Europe has no good evidence for the actual origins of a.m. *H. sapiens*." In particular, they recognize no western European fossil specimen with a morphology intermediate between Neandertals and modern humans. Further, the skeleton from Saint-Césaire, France, evidences that Neandertals were contemporaneous with a.m. *Homo sapiens* in Europe. Hence they favor Africa as the probable birthplace and launching area for a.m. *Homo sapiens*.

Not so, say Wolpoff *et al.* in a long-winded, unillustrated essay. Instead they propose that there was local continuity between Middle Pleistocene, Late Pleistocene, and Recent hominids in Europe, as well as in China and Indonesia–Australasia (which are the foci of their survey). They fit a respectable number of new specimens from Australia, China, and Java into the scheme of Weidenreich and Coon and disavow the racist overtones of the latter.

The existence of *Homo erectus* among Middle Pleistocene fossils from Europe (in contrast with Asia and Africa) is equivocal. Wolpoff *et al.* argue that this is because scientists have misunderstood morphological features that are regionally specific to Europe. They propose that we should either set an arbitrary temporal boundary between *Homo erectus* and *Homo sapiens* or cladistically sink *H. erectus* into *Homo sapiens*. They do not choose between the alternatives. Surely the dating game must advance greatly before the former would be practicable.

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Scavenging in the Paleolithic

Faunal Remains from Klasies River Mouth. LEWIS R. BINFORD. Academic Press, Orlando, Fla., 1984. xxii, 287 pp., illus. $39.50.

Archeologists commonly assume that hominids extending back to at least the beginning of the Middle Paleolithic have been fully capable hunters, taking large and small mammals alike. This view is incorporated into most analyses of archeological sites that date to this time span and even plays a role in explanations of the extinction of a variety of large Pleistocene mammals.

In *Faunal Remains from Klasies River Mouth*, Lewis R. Binford takes issue with this deeply entrenched idea. During the past decade, Binford has produced a series of works dealing with the analysis of animal bones from a wide range of sites spanning much of the Quaternary. These studies have focused on the derivation of "mid-range theory," propositions treating the relationship between the static archeological record and the dynamic processes that formed that record. In the present work the results of Binford's previous studies and a newly devised set of methods are used to probe the Klasies fauna for its dynamic behavioral message.

Located on the coast of South Africa, the Klasies River Mouth caves were excavated during the late 1960's by J. Wymer and R. Singer; these workers' substantial monograph on these sites appeared in 1982. In addition, detailed analyses of the mammals from these sites have been published by R. G. Klein. Of the several sites, Binford focuses on Cave 1, in which stratified deposits contained Middle Stone Age occupations dating from about 120,000 to sometime before 40,000 years ago.

Binford's analysis of the Cave 1 mammals directly challenges the belief that our Middle Stone Age (and Middle Paleolithic) ancestors were fully efficient hunters. Instead, he argues that, as recently as 40,000 years ago, hunting was confined to opportunistic kills of small (<90 pounds) mammals and to the taking of the young of large mammals. Larger creatures were scavenged, not hunted.

The difficulty in making such an argument is easily stated: how do you recognize scavenging from fragmentary bones and teeth? Klein has argued that demographic data can provide such information, but Binford rejects this approach, arguing that attributes of the bones themselves be used to detect hunting and scavenging. Relying heavily on his own field observations, Binford argues that, as a result of presumed differences in the state of the carcass at the time of initial processing, these two tactics result in different patterns of bone breakage and different distributions, and kinds, of dismemberment marks across bones. Other attributes also play a role: for instance, bones from scavenged mammals should be more heavily gnawed by carnivores than those from hunted ones.

Binford examines the Klasies Cave 1 fauna in light of these criteria. The patterning he finds is impressive. Deep hack marks, whose nature and placement he finds indicative of dismemberment of scavenged, dry carcasses, are confined to mammals whose live weight exceeded 150 pounds; the lighter cut marks, whose placement suggests processing of a fresh carcass, are largely confined to mammals beneath this size. Carnivore gnaw marks follow much the same pattern: largely absent on the small mammals, fairly common on the big ones. Other observations fall in line. Body parts of large mammals introduced into the site were primarily of marginal value as regards the amount of food they would have provided, whereas parts of greater utility are characteristic of the small mammal assemblage. The results are fascinating: they suggest a scavenging component to the diet of the Middle Stone Age occupants of Cave 1.

But Binford is often better at presenting exciting ideas than at analyzing data in a convincing way; Klasies is no exception. Take, for instance, his argument that the Cave 1 bones were introduced by people in the first place. It is essential, if he is to use this fauna to distinguish between hominid hunting and scavenging, that it be known that hominids were the hunters or scavengers. This issue, however, is not addressed convincingly. For example, Binford excludes leopards as a significant contributor to the fauna through a comparison between body part distributions within the Cave 1 fauna and distributions from known leopard lairs provided by C. K. Brain. Because these two data sets differ in significant ways (for example, cranial parts are much more common in Brain's lairs), Binford concludes that leopards played no major role in accumulating the Klasies fauna. Unfortunately, the crucial data on modern leopards Binford uses are not to be found in the cited tables of Brain's book: Brain does not provide the kind of anatomical detail used by Binford, and the numbers of skeletal elements are widely different (for example, 21 maxillae given by Binford, fewer than six cranial fragments by Brain).

Given that the Cave 1 fauna from the Middle Stone Age spans tens of thousands of years, it is curious that Binford treats it as a single analytic unit. Wymer and Singer carefully describe the stratigraphy of the site; Klein's data are given in terms of the strata they identified.

Binford, however, argues that because skeletal-part frequencies do not seem to vary significantly across levels and because he is interested in "macroscale" patterning, a fauna spanning nearly 100,000 years can be treated as if it represented a single depositional event.

The absence of stratigraphic detail harms Binford's analysis. As he notes in a critique of G. Isaac's home-base model of early hominid organization, "The positioning of the system in space ensures that the content of sites, *particularly stratified sites*, will appear variable . . . between occupational episodes" (p. 199; emphasis mine). Yet Binford attempts to show that scavenging was characteristic of the entire Klasies Middle Stone Age by showing that there is evidence for such behavior in the fauna as a whole. Without his evidence arrayed stratigraphically, his argument is not convincing. There are, after all, only some 60 hack marks involved, and without stratigraphic data we do not know if these were confined to a single level or if they occur throughout the Middle Stone Age strata. Although gnawing is far more common, lack of stratigraphic information prevents us from judging whether or not hack marks and gnawing covary through time. That the Middle Stone Age was characterized by scavenging is simply not established.

That Binford ignores stratigraphy in his basic analysis is the more remarkable in that he also examines shifts in the relative frequency of hunting and scavenging through time. Lacking a stratigraphic analysis of his own data, Binford turns to a very different measure of changing subsistence tactics: the animals themselves. Large mammals become evidence of scavenging, small ones of hunting, and changing frequencies of the two, drawn from Klein's work, are held to reflect changing frequencies of hunting and scavenging by the Middle Stone Age occupants of Cave 1. From this, Binford concludes not only that Klein's attempts to reconstruct past environments using the Cave 1 mammals are misdirected but also that hunting becomes more, and scavenging less, important through the sequence. This is a long leap from the argument that some of the Cave 1 mammals were scavenged, the large mammals themselves now becoming the evidence for scavenging. The circularity could have been avoided had the Klasies fauna not been treated quite so much as if it were a fully modern one.

Though it is difficult to agree with Binford that he has placed our view of the Middle Stone Age in a "dynamic mode," it is certainly true that *Faunal Remains from Klasies River Mouth* is an important book. The flawed analysis aside, Binford makes an intriguing case for scavenging and presents a method for detecting scavenging that is superior to anything that has come before. More important, he provides a way of thinking about the Middle Stone Age, and the Middle Paleolithic, whose value far eclipses problems in the analysis. This is a provocative book (and a number of my colleagues have been provoked) and must be carefully read by archeologists regardless of their chronological interest. It is certain to affect the way we think about the past, and certain to generate much new knowledge not only about the past but also about how the archeological record is to be approached.

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Pleistocene Extinction Reexamined

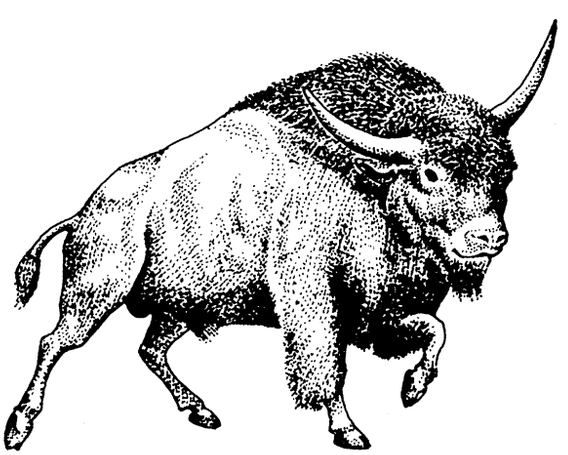
Quaternary Extinctions. A Prehistoric Revolution. PAUL S. MARTIN and RICHARD G. KLEIN, Eds. University of Arizona Press, Tucson, 1984. x, 892 pp., illus. $65.

Why did so many animals become extinct near the end of the last glacial period? Were they killed off by human hunters, or did they die out because of climatic change? Scientists in many disciplines have grappled with these questions for more than a century, and the problem has taken on a sense of urgency as the rate of extinction has accelerated in modern times.

Unlike the acknowledged parent book, *Pleistocene Extinctions: The Search for a Cause* (P. S. Martin and H. E. Wright, Jr., Eds., Yale University Press, 1967), which was an International Union for Quaternary Research proceedings volume, *Quaternary Extinctions* was born of informal manuscript requests "without the benefit of any preceding symposium or conference" (p. x). Forty-seven contributors have provided 38 chapters grouped into seven sections that are introduced by brief editorial comments: Historical Background and the Beasts Themselves (three chapters); A Close Look at Significant Sites (five chapters); The Theoretical Marketplace: Geologic-Climatic Models (seven chapters); The Theoretical Marketplace: Cultural Models (six chapters); Asia and Africa: Modest Losses (five chapters); Australia, New Zealand, and the Island Pacific: Severe Losses (nine chapters); and An Overview (three chapters).

Many of the observations that might be made in a review of the book are already provided in the three overview chapters, each of which is an excellent synthesis. For example, L. G. Marshall (chapter 36) tabulates the viewpoints of the contributors, finding that 11 of the papers attribute extinction directly or indirectly to human hunting or other activities, 10 attribute extinctions directly to climatic change, and the others that seek to explain extinction describe some combination of factors. The contributors might seem rather evenly divided between artificial and natural causes of extinction, but if the problem could be solved by a show of hands we would not need a book of 900 pages. Indeed, Marshall concludes that extinction is a "miasmatic problem" (p. 803) and that it is unlikely that a global explanation can be valid for all landmasses.

D. K. Grayson makes two of the finest contributions to this volume. The first is an outstanding historical review (chapter



"*Bison latifrons*, the extinct long-horned bison of the North American late Pleistocene." [From E. Anderson, "Who's who in the Pleistocene: a mammalian bestiary," in *Quaternary Extinctions*]