

tions in the infrared of optical reflection nebulae by Sellgren. Her suggestion that 10-Å grains may be an important constituent of interstellar dust (as a consequence of these observations) has driven theoretical and observational research in this area in an entirely new direction since the workshop.

A thoughtful paper by Greenberg on the evolution of interstellar grains provoked substantial discussion of grain mantles, and the discussion provides background for papers on ice and other mantle constituents. Both Tielens and Greenberg summarize laboratory and theoretical efforts on this subject. The models are in reasonable agreement with astronomical observations, with the exception of observations in the 6.8- μ m band. Tielens appeals for astronomical observations having greater spectral resolution. It had been thought that the 3.1- μ m ice feature, which is seen in absorption to protostellar objects and various sources in the galactic center, is produced only in regions deep within molecular clouds, perhaps within circumstellar clouds, rather than in the cloud medium itself. Whittet and collaborators have definitively shown that the ice feature is carried in the molecular cloud medium. They present spectroscopic observations of both field stars and embedded stars in the Taurus cloud; the ice-absorption feature was seen in the spectra of both. For $A_V > 5$, the 3.1- μ m optical depth is proportional to A_V , so that the threshold for shielding of ultraviolet radiation is very low. Greenberg and van de Bult provide theoretical grounds for the interpretation of the ice-band observations. The Whittet *et al.* result is interesting in that Greenberg and van de Bult find that interstellar ice mantles form at very low temperatures (~ 10 K).

Supernova shocks destroy interstellar grains. Seab and Shull discuss observable effects of this process on the interstellar extinction curve for high shock velocities. Given a slow enough relative velocity behind the shock, accretion may take place. In a most interesting paper exploring supernovas as a source of interstellar dust, Dinerstein reviews infrared observations of two type-II supernovas that developed warm (800 K) infrared components in the first year after outburst. The components have been thought to result from condensation of dust or heating of preexisting circumstellar dust. A search for 10- μ m dust emission from fast-moving knots yielded controversial results. A blue-shifted line of SIV (10.5 μ m) plus other ionic constituents may account for the 10- μ m flux density that Dinerstein and her collabo-

rators observed. Further infrared spectral observations of supernovas are required to investigate dust condensation.

The greatest asset of the book is the frank discussion of past misconceptions, which were based on incomplete, low-resolution data. Future work on the properties of interstellar dust can only benefit from the authors' explicit statements of observational requirements that must be met in order to answer specific questions.

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Human Paleoecology

Hominid Evolution and Community Ecology. Prehistoric Human Adaptation in Biological Perspective. ROBERT FOLEY, Ed. Academic Press, Orlando, Fla., 1984. xiv, 299 pp., illus. \$37.50. Studies in Archaeology. Based on symposium, Reading, England, Dec. 1981.

This collection of 11 papers is largely the result of a symposium organized by the editor for a meeting of the Theoretical Archaeology Group. Foley personally and in assembling these papers has made a conscientious attempt to further the rapprochement of paleoanthropology and paleoecology. This is a difficult and often elusive goal, so it is not surprising that this book is uneven and only partly successful. Foley's introductory chapter, "Putting people into perspective," provides an excellent brief introduction to community evolution and ecology for prehistorians and raises hopes for a generally stimulating, innovative volume. Unfortunately, much of what follows is—from the perspective Foley establishes—either inconclusive or irrelevant.

The two chapters immediately following Foley's, N. Roberts's "Pleistocene environments in time and space" and C. Stringer's "Human evolution and biological adaptation in the Pleistocene," would fit very well into a much-needed advanced textbook on Quaternary studies. They provide fine, factual reviews of Plio-Pleistocene chronostratigraphy, environmental change, and the process and outcomes of hominid evolution. Both chapters should be assimilated by anyone attempting to deal with the evolution of our lineage. It is, for example, a shame that the implications of the deep-sea oxygen isotope record pointed out by Roberts have still not been universally perceived and taken into account. Stringer's chapter is particularly valu-

able because it not only summarizes the interpretations of many workers in the field of hominid evolution but presents results of some of his latest analyses of body and brain size. Regrettably Stringer avoids attempting to integrate cultural with biological adaptations in his scenario.

Foley's second chapter, "Early man and the Red Queen," is interesting in its definition of key ecological parameters relevant to early hominid evolution but disappointing in terms of actual conclusions. The material presented on adaptive problems whets the reader's appetite for a cohesive model addressing the big question: "why us?" But, as usual, the requisite data are lacking, and one is left with an essay that simply puts the problem into context—albeit elegantly.

There follow two chapters concerned with the currently hot topic of early hominid hunting and scavenging: A. Hill's "Hyaenas and hominids" and R. Potts's "Hominid hunters?" In the wake of work by C. K. Brain and L. R. Binford, long-held theories of Australopithecine and *Homo erectus* big game hunting and G. L. Isaac's more recent food-sharing hypothesis have provided major topics for sophisticated ethological, taphonomic, paleontological, and microwear research. Hill's chapter, though lacking clarity and focus, provides further valuable information on hyena bone-transport behavior. The section on philosophy of science seems a bit contrived and the exposé on Makapansgat provides a sense of *déjà vu*. Potts's is a far more substantial, cohesive, and, ultimately, thoughtful chapter—one of the best of the book, though also inconclusive because of the nature of the data. Potts carefully lays out the basis for the debate and provides intriguing information on the possible significance of consumption of meat (*sensu lato*) among our earliest ancestors. The ecological data on other predators and scavengers (including vultures) are relevant and suggestive. Potts provides data—many of them his—on the context and composition, breakage, cut marks, and associations with artifacts of the Olduvai Gorge bone assemblage. He concludes that the early hominids did sometimes eat meat, but finds it highly unlikely that they accumulated bones at "home bases" (since these would attract other carnivores). His alternative hypothesis of bone and stone caches (located where hominids did not live) is, however, rather strained. J. A. J. Gowlett's chapter, "The mental abilities of early man," provides little new information on this vague, elusive topic, relying as it does

mainly on the supposed sophistication of Oldowan and Acheulean stoneworking techniques. The evidence cited for control of fire in the Lower Pleistocene is questionable, and the relevance in this discussion of well-known long-distance transport of flint in the late Magdalenian is unclear.

A. Turner's chapter, "Hominids and fellow-travellers," like several in this volume, stresses the importance of ecological comparisons between the early hominids and contemporaneous carnivore species. Turner specifically tackles the problem of hominid radiation into temperate latitudes and New World continents, putting it into the context of the migrations of other large mammals. A more detailed example focuses on the glacial population of Britain. Though it makes the case that human dispersals were not unique, this chapter is disappointingly inconclusive concerning the causes and exact mechanisms of the radiations. The enabling relationships Turner sees between social organization and environment are only vaguely sketched. The theme of hominid occupation of Britain is continued in K. Scott's "Hunter-gatherers and large mammals in Great Britain," which provides good detail on environmental conditions and the timing of repeated occupation and abandonment of this marginal region of glacial-age northwestern Europe. It would have been interesting had Scott further pursued the implications of her data on seasonality from the Upper Paleolithic and her information on glacial vegetation types. As they stand, these interesting tidbits are tossed out without follow-up.

After the (unjustified) criticism that studies of regional Upper Pleistocene Russian and Spanish faunas by R. G. Klein and myself, respectively, are not truly regional in character, one would have expected some genuinely innovative results from C. Gamble's chapter, "Regional variation in hunter-gatherer strategy in the Upper Pleistocene of Europe." Instead the regions Gamble creates are justified and defined, some of the parameters of the problem are sketched, variation in cave bear density is described, and interesting contrasts in human distribution patterns between interglacial and full glacial times are discussed, with speculation on local extinctions of human population. If the fact that hunter-gatherers intensified their food acquisition activities late in the Pleistocene is the main conclusion of this paper, I fail to find evidence for its innovativeness in substantively dealing with regional variation in subsistence strategies in Ice Age Europe.

The final paper—A. N. Garrard's "Community ecology and Pleistocene extinctions in the Levant"—seems a bit out of place and almost trivial in this context. It makes the usual case that environmental changes at or around the Pleistocene-Holocene boundary were probably basically responsible for the few extinctions that occurred then in the Near East, although competition with humans may have contributed to the elimination of *Crocota crocuta* and *Panthera leo*.

Though it contains a number of informative, stimulating papers on matters of current interest, this book is spotty and disappointing in its inconclusiveness. Foley and the authors make a concerted effort to relate the chapters to one another, but a more coherent focus by all on the issues defined by Foley would have helped the book as a whole. Most of the authors are, however, to be applauded on the clarity and style of writing. The editing is excellent, without the usual flood of typographical errors now common in Academic Press books of this sort.

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