

tic in approach. The longest paper, by D. E. Dumond, is a conventional but long-overdue synthesis of Alaskan prehistory. His attempt to separate fact from possibility in this crucial area will be appreciated far beyond Alaska. At the other extreme Rogers deliberately avoided any discussion of Alaskan economic history while urging his audience to develop its teaching and research. This was the main theme of the conference: the need to collect historical material and to write more and better Alaskan history. Thus Morgan Sherwood: "The literature is strewn with non-histories, irresponsible duplications, 'how-to' books and just plain sloppy and superficial research." In the same vein spoke the Director of the Washington University Press: "Too many of the manuscripts submitted to us are *provincial* — concerned only with local events and lacking in greater significance. Other works suffer essentially from being antiquarian in which the author is concerned with tracking down the origin of ultimately *meaningless* or trivial detail." Good rousing stuff (intended for a wider audience?) but the same theme pervades Tompkins' quieter piece. This appears at first as a straightforward recapitulation of the mainstream of Alaskan history, but at almost every stage he indicates the need for more detailed work and suggests ways in which it might be tackled.

A second theme which can be distinguished is one which Sherwood has advanced in the past: that the belief of Alaskans that they were neglected by the U.S.A. for almost a century after the Purchase may be true in an absolute sense, but in this respect Alaska did not differ from many other areas. Hinckley in the present volume dismisses some manifestations of this traditional belief in uniqueness as "balderdash" and he was followed more politely but equally vigorously by Dr. Nichols, despite interference from her eccentric alarm-clock. The same point was also taken up less explicitly by R. W. Paul, whose discussion of pioneer groups elsewhere in the American West showed several possible similarities with Alaskan experience.

In summary, this was clearly a conference with a difference. At two dollars, its proceedings are a bargain for anyone concerned with Alaskan history or historiography.

C. I. Jackson

PLEISTOCENE EXTINCTIONS: THE SEARCH FOR A CAUSE. EDITED BY P. S. MARTIN AND H. E. WRIGHT, JR. *Volume 6 of the Proceedings of the VII Congress of*

*the International Association for Quaternary Research. New Haven: Yale University Press, 1967. 6½ x 9½ inches, 453 pages including subject index. \$15.00.*

Superimposed on a background noise of many smaller extinction blips throughout the Pleistocene there is a dramatic spike at the close of the last glaciation. The extinction encompassed every continent and was felt in virtually every community of large terrestrial vertebrates. An understanding of its causes is important to biologists as well as to paleontologists and archaeologists because of its effect on the modern communities and the fact that it occurred such a very short time ago — at a time when men, much like ourselves, lived where Sydney, Paris, Dallas, and Nome stand today.

Community ecologists have not recognized or at least understood that modern large vertebrate communities are only a ragged remnant of the complexity that existed a few thousand years ago. Just out of reach of recorded history it was a different world, quite outside of our present frame of animal association. Lions were feeding on antelope in the tundra-steppes north of the Brooks Range in Alaska and camels were grazing along the muddy Yukon River. Horse and mammoth herds left their tracks over most of North America. A faunal list of the vertebrates living in the Great Plains, when the Paleoindians chatted by their campfires, reads like the African savannas. Nor were these species rare elements in the community; rather, if proportions in the fossil record can be taken at face value, they were the dominant members. Therefore, it may be wrong to think of modern communities as *balanced wholes*, as if they represented a delicate balance that has undergone precision adjustment and custom fitting for millions of years. From historical evidence we know that they represent various early stages of healing from the giant gash caused by the late Pleistocene extinction. This is especially true of the Arctic.

Despite the importance of this phenomenon to understanding modern organisms the questions of its causes went largely unexplored until the last decade. Mainly as a product of Paul Martin's article in 1958<sup>1</sup> and the controversy it generated, the discussions of late Pleistocene extinction are coming into full bloom. This symposium volume edited by Martin and Wright, taken together with a recent article by Axelrod<sup>2</sup>, represents the present status of our knowledge about the extinction and provides an excellent review of the theories that attempt to explain it.

The causes of the extinction are still unresolved (if resolving a problem can be defined by having presented such a convincing argument that the majority of knowledgeable people in the discipline subscribe to it). But the issues are becoming very clear. There are two ideological camps: one uses man as the main explanation and the other evokes climatic changes. Within these two categories there are a number of subcategories. Martin and the rest of the Arizona school argue for *prehistoric* overkill by man. They point out that man's peak in large vertebrate hunting technology corresponds with the time of the extinction, and that his preying upon many of the very species that became extinct was more than coincidence. Mehringer, Jelinek, Haynes, and Edwards either support Martin or some variant of the overkill theory. Some of the others argue that climate was the most significant factor. Guilday picks post-glacial dessication. Slaughter elaborates on his theory: that upsets in reproductive physiology or *out-of-step* mating so affected the population dynamics of these species that they could not evolve fast enough to adjust. Vereschagin and Hester contend that it was the species adapted to the periglacial environment that became extinct when that environment disappeared, though Vereschagin feels that man may have made some contribution. Axelrod (in the separate article I mentioned earlier<sup>2</sup>) constructs a theory based on the decline in high *equability* (which is essentially defined as the gradient away from coldness and dryness). Several papers on the extinction patterns in specific areas seem somewhat away from the more general tone of the rest of the volume, but do add relevant information.

Another point of contention discussed in this volume, which will surely be resolved in the very near future, is the exact date of the extinction. The Arizona school feels it was around 11,000 B. P. Some others place it at around 8,000 B. P. If it is the former, it means that the extinction took place before the actual climax of the last glaciation. The 8,000 B. P. date more closely corresponds to the radical post-glacial climatic changes. Although the dates themselves are not exactly critical to the two schools of thought, they do lend strong support to ideas of their respective proponents.

The main criticism voiced against man's predation or the *overkill* theory is the difficulty in imagining any hunting technique possessed by Paleoindians of such high efficiency as to wipe out entire large vertebrate communities. Special terrain needed for *cliff drives* is very limited. Fire may actually in-

crease the potential biomass (at least for most of these species) rather than lowering it. Nor does the theory which proposes that the extinct species did not recognize man as a predator have many followers. From what we know about the living relatives of the species that became extinct, they depend heavily on experience and readily learn to recognize new forms of danger. At least the Holarctic communities had a long history of adjusting to complex changes in predation patterns. The entire overkill theory, as plausible as it is in other respects, suffers from this one glaring question: How could they have done it? No doubt mammoth and mastodon productivity could have been upset very easily by a new predation on adults, but other species (if their modern counterparts are any clue) had exceptionally high annual productivity potentials (between 20-30 per cent) and a large component of their mortality was density dependent.

The objections to the climatic theories are as great. The rich glacial fauna of the Arctic tundra-steppes lived in a very cold-dry environment as Péwé, Colinvaux, Hopkins, Matthews, myself and others have pointed out. The large mammal community in the Arctic appears to have been most successful when the cold-dry climate was at its maximum during the full glacial. Also, to contend that all of the grasslands that would support, say, horse in North America were completely eliminated is to propose a change so immense that evidence seems to be lacking. The same communities (e.g. *Rancholabrean*) were exposed to a Sangamon interglacial rebound of even greater magnitude without experiencing a striking extinction peak. Other criticisms of these and other theories are dealt with in the book.

The arguments and the different theories are presented very well, and one is swayed back and forth while reading through the summaries of evidence favouring each position. It is an example of *hypothesis testing*, science functioning at its best. The uninitiated and the novice can beware. Anything published relevant to the problem will be pounced on with intense scrutiny several orders of magnitude beyond that meeting usual scientific fare. And one can be assured that many thousands of hours will be spent over the next few years focused specifically at solving this particular puzzle, and testing each hypothesis from every possible angle.

The book also contains a wealth of paleobiological information, previously unavailable from one source. The zoological impoverishment of the present communities has been sufficiently dwelt upon for the first

time for us to glimpse the complex communities of which ours were once a part. It is an astonishing picture. Slaughter estimates that about 95 per cent of the North American megafauna became extinct at the end of the last glaciation. After that piece of information it is more than redundant to point out the importance of the extinction and its causes to most biologists who work with modern terrestrial organisms.

The only criticism I can find with the book is that it has a bias slanted toward the southern Great Plains and Southwestern United States. Although the reason for this bias can be explained historically, it is a handicap to think of the extinctions primarily from that focal point, when paleoclimatic, palynological, and faunal histories are much better known in other parts of the world, such as Europe, where the same extinctions

also occurred. Hopefully, the heat of the controversy will soon spread there and elsewhere.

It is a book that belongs in the library of anyone who has more than casual interests in synecology, biogeography, archaeology, Pleistocene geology or paleontology.

*R. D. Guthrie*

---

<sup>1</sup>Martin, P. S. 1958. Pleistocene ecology and biogeography of North America, in: *Zoogeography*. C. L. Hubbs, Editor. Publication 51, American Association for the Advancement of Science. pp. 373-420.

<sup>2</sup>Axelrod, D. I. 1967. Quaternary extinctions of large mammals. *University of California Publications in Geological Sciences*, 74:1-42.

Published for the Arctic Institute of North America by McGill-Queen's University Press,  
Montreal

Copyright Canada 1969 by the Arctic Institute of North America

*Indexed in the Canadian Periodical Index*

*Authorized as Second Class Mail, Post Office Department, Ottawa*

Printed in Canada