

of local culture. This book will interest both Californianist anthropologists and scholars interested in linguistic relativity among world-wide languages. I would also encourage any archaeologist working in northwestern California to read this book. Historical linguistics has been enormously influential in terms of developmental models addressing the prehistory of the region, and though O'Neill does not address archaeology *per se*, his lucid explanations of how linguists have established the ancestry of Athabascan, Hokan, and Algonquian languages through comparative studies are extremely useful. If nothing else, the reader will be left with a deep appreciation for the complicated and unique nature of the Hupa, Karuk, and Yurok languages, "as profoundly different as any three unrelated tongues spoken on earth—say, Hebrew, Hindi, and Korean, for instance" (p. 26). I for one was left with even greater respect for native northwestern California speakers and scholars,

many of whom were and are multilingual, and for the native communities that are working hard to revitalize their languages.

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Once & Future Giants: What Ice Age Extinctions Tell Us About the Fate of Earth's Largest Animals

Sharon Levy
New York: Oxford University Press, 2011. xvi, 255 p. : ill., map, 24.95 (paper)

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If one can imagine stepping into a prehistoric world occupied by giant animals (such as mammoths, mastodons, camels, Shasta ground sloths, giant short-faced bears, Brea lions, and saber-tooth cats, known collectively as megafauna), and then can further imagine the introduction of the relatives of some of these species into the modern day wilderness, this well-written book by Sharon Levy will be a joy to read. Levy, an excellent science writer, succinctly reviews two of the main hypotheses for the extinction of some of these beasts near or at the end of the last Ice Age (Late

Pleistocene), and then addresses the issue of rewilding, which is the introduction of comparable taxa, when possible, into selected environments in order to re-establish ecosystems that are reinvigorated, have greater biodiversity, and more closely reflect the trophic levels prior to megafaunal extinctions.

Many forces, some external and others internal, that could trigger extinctions are evident in Earth's history. Proposed explanations for Late Pleistocene extinctions have included climate change and its effect on the environment, the ecological shock of human arrival, nutrient shortages, disease, and even the possibility of a meteor strike, among many others. Levy chooses to place the emphasis in her review of extinction causes on the two main hypotheses—climate change and anthropogenic causes—with the focus on the latter. Both causes have been argued for many decades; however, there is little reason to believe that only one of these hypotheses accounts for all of the species disappearances worldwide. As a result of Levy's anthropogenic focus, much of the discussion is on the extinction of megafauna in Australia and North America. The natural history of woolly and Columbian mammoths in North America and

selected giant marsupials in Australia is far better known than that of many of the other extinct taxa such as shrub ox, Brea lion, or glyptodonts. The only detailed evidence of human predation involves mammoths, a fact that has provided empirical support for Paul S. Martin's "overkill hypothesis" (2005). Thus the arguments for extinction are circumscribed by the data selected.

From the isotopic and fossil record it is known that the transition from the Last Glacial Maximum (LGM), 18 to 21,000 years ago, to the Holocene, ca. 10,000 years ago, was marked by abrupt shifts in climate. The most significant climate reversal was a cold period, termed the Younger Dryas, which began about 12.9 ka. B.P. and lasted for about 800 to 1,000 years. However, the fossil evidence of the Younger Dryas reversal is not global, and its expression in the environment may be enhanced in some regions while diminished in others. With little exception, megafaunal extinctions in North America appear to have taken place prior to or about 12.9 ka. ago, after the fauna had survived hundreds of thousands of years of climatic variation. Was there something about the Younger Dryas climatic reversal that was different enough from earlier such shifts to have caused the extinctions?

Up until a few years ago, extinction was also thought to co-occur with the first arrival of humans in the New World, termed by some as the Clovis First or blitzkrieg hypothesis. We now know that part of that hypothesis is no longer supported, as findings—such as the detailed dating of the Manis mastodon and an associated mastodon rib with a mastodon bone projectile point impaled in it (Waters et al. 2011)—have demonstrated that humans were in North America at least 800 years prior to the period ascribed to the makers of Clovis projectile points. Did the Clovis projectile point makers provide the *coup de grace* to mammoths that were just hanging on?

After summarizing the ongoing debate over Pleistocene extinctions, in the second section of her book (termed "Wild Dreams") Levy covers the issues, many of them controversial, involved in rewilding in a very thoughtful manner. Here she discusses the planned introduction of extirpated species (such as the wolf into Yellowstone National Park, the condor into Arizona, and the unplanned reintroduction of the horse into North America), and summarizes the ideas of the proponents of Pleistocene rewilding. The reintroduction of species to their former ranges has in many cases had profound

and unpredicted effects upon their ecosystems. One example she presents is the role of African elephants in the opening up of new grasslands by their browsing on the taller trees in woodlands from which they had been previously excluded. The effect, in many instances, has been dramatic, with a landscape of decimated woodlands being replaced by grasslands.

Did mammoths have a similar effect on the ecosystems and, in particular, on the vegetation of North America? It is here, in the arena of Pleistocene rewilding, that Levy connects to the extinct megafauna discussed in the earlier chapters of her book. Proposed by Paul S. Martin, the idea of "Pleistocene rewilding has generated enthusiasm, scorn, and a great deal of media hubbub over the idea of lions and elephants loose in the American West" (p.166). Martin has suggested introducing species similar to extant taxa to fill the ecological niches left open by Pleistocene extinctions. Others have even suggested (since researchers now have nearly complete mammoth and ground sloth genomes) that these extinct species be cloned and reintroduced into the wild when possible. But if it was climate or some other effect, and not anthropogenic factors, that originally led to the extinction of these beasts, would we be bringing back species that are no longer compatible with today's world? There is plenty of evidence to indicate that many Pleistocene environments have no modern analogs.

While we may never have answers to many of the issues addressed in Levy's book, they are of importance to archeologists who want to have an understanding of human interactions with the environment, as well as an appreciation of the complexities of ecosystems and the changes they can undergo. Finally, Levy's book should be read as an example of how to write clearly about such wide-ranging, complex issues.

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