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The Pleistocene Hunters Had Help

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## THE PLEISTOCENE HUNTERS HAD HELP

Martin (1966, 1973) has advanced and developed (Mosimann and Martin 1975) the hypothesis that Pleistocene extinctions of the New World herbivorous megafauna were brought about by specialized hunters, freshly across the Bering Straits. They hunted intensely, preying on populations of big mammals that were easy prey because they had evolved in the absence of human-style predators (e.g., glyptodonts, ground sloths, mammoths) and therefore did not genetically recognize the human life form as a predator. This hypothesis often raises the objection among ecologists that it is unlikely that even predaceous humans could thoroughly extirpate large populations of large mammals only by hunting, especially with primitive weapons and without massive habitat destruction. However, there is a generally unappreciated process that could have supplemented the hunters' impact and thereby provided a more thorough local extinction of large herbivores than might have been produced by the hunters acting alone.

An array of large predators (e.g., *Canis*, *Panthera*, *Smilodon*, *Homotherium*, *Acionyx*, *Arctodus*; Kurten and Anderson 1980) subsisted on these herbivores in a situation not unlike that found in the relatively undisturbed habitats occupied by big game in precolonial Africa. If humans were to abruptly reduce the large herbivore density in any one area to low levels by hunting, the large carnivores would have found their usual prey populations severely depressed. Mosimann and Martin (1975) suggested 12 yr as the time required for local extinction. Until the carnivore population were themselves depressed through limited food, they should have provided quite intense or thorough predator pressure on the few remaining large herbivores and their offspring. This suggests a scenario: Nomadic hunters move into a new area, severely deplete the large herbivores, move on to new areas, and leave the starving large carnivores to eliminate the remainder of the large prey. At the time of hunting by specialized humans, the carnivore density may have been even higher than usual, because of abnormally high availability of food in the form of carrion from kills by humans (P. S. Martin, personal communication).

It is likely that such large carnivores would have been especially resistant to decimation by starvation (and thus persist long enough to thoroughly extinguish the herbivores) because experienced individuals, while not able to reproduce on starvation-level diets, are able to subsist on small game, carrion, nonmeat foods, and rare or flighty prey available only to the most competent individuals (Janzen 1976). It is striking in this context that the large herbivorous animals that did survive the extinctions are well known for being very shy, wary, and fleet (deer, small camelids, tapir) and/or have group defenses (caribou, muskox, peccaries, small camelids). Likewise, some of the large carnivores that survived the extinctions are extreme omnivores (coyote, bears, jaguar) or live in part in more

northern latitudes where the extinctions were less thorough (wolves, mountain lions).

It is possible that some of the extinct large carnivores might even have turned their attentions more intensely to humans as prey, as their more usual prey became scarce. Such prey switching might have contributed to the reasons why humans moved on in search of unexploited prey populations, thereby increasing the value of the highly mobile life-style believed to be characteristic of the hunters (Mosimann and Martin 1975) who possibly eliminated much of the New World Pleistocene herbivorous megafauna.

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