Revista Chilena de Historia Natural
57: 107-110, 1984

Commentary

Late Pleistocene extinctions in Chile: A blitzkrieg?

Extinciones pleistocénicas en Chile: ¿un "blitzkrieg"?

JAVIER A. SIMONETTI

College of Forest Resources AR-10, University of Washington
Seattle, WA 98195, USA

ABSTRACT

Martin (1973, Science 179: 969-974) has proposed that the late Pleistocene extinction of large mammals was due to overhunting by Paleolithic man, and that this megafaunal depletion was very rapid in South America. This hypothesis is tested using Chilean archaeological and paleontological data. Available evidence supports the contention that man could have been a factor in the extinction of South American large mammals, but falsifies the hypothesis that extinctions were a sudden event.

RESUMEN

Martin (1973, Science 179: 969-974) ha propuesto que la extinción de los grandes mamíferos hacia finales del Pleistoceno fue consecuencia de la caza intensiva practicada por el hombre paleolítico; Martin también ha propuesto que las extinciones habrían sido particularmente rápidas en Sudamérica. Esta hipótesis es contrastada a base del registro arqueológico y paleontológico chileno. Las evidencias disponibles apoyan la hipótesis que el hombre pudo haber tenido algún papel en las extinciones; sin embargo, esta evidencia sugiere que el papel del hombre habría sido menos drástico que lo planteado por Martin.

In America, the late Pleistocene is characterized by the extinction of terrestrial large mammals; in North America, 34 genera of large mammals disappeared during the retreat of the last glaciation; in South America, 46 became extinct (Kurtén & Anderson 1980, Marshall 1981, Reig 1981).

Numerous causes have been advanced to explain the late Pleistocene extinctions (see Van Valen 1969 and Grayson 1980 for an overview). Two are the most plausible hypotheses. One attributes the extinctions to the climatic and vegetational changes that occurred at the end of the last glaciation; the other considers extinctions to be caused by predation by paleolithic hunters –the overkill hypothesis (Grayson 1980, Martin 1973). These two hypotheses have internal weakenesses but that of overkill seems to be most consistent with a large part of the available data; the debate however, is far from being settled (Grayson in press, Lewin 1983).

Appraisals of the South America megafaunal extinction support the contention that man could have been at least partially responsible for this event (Marshall 1981, Martin in press, Patterson & Pascual 1972; see Miller 1980 for an evaluation of several alternative hypotheses). Martin (1973, in press) has proposed that the overkill was particularly rapid in South America; indeed, the blitzkrieg version of the overkill hypothesis has been advanced to account for the role that man could have played in the megafaunal extinction (Martin 1973, in press). In Martin's terms while "overkill represents human destruction of a species without regard to any time frame, blitzkrieg represents the very rapid destruction of a previously unhunted fauna". More specifically, "blitzkrieg [is] a version of overkill which maximizes speed and intensity of human impact and minimizes time overlap between the first human invader and the extinction of native fauna" (Martin in press). The blitzkrieg should have occurred during the first millenium after the arrival of man into America, time in which early man would have spread from unglaciated Canada to Tierra del Fuego (Martin 1973, in press).

(Received 12 September 1983. Accepted 17 May 1984.)

The chronological constraints of the blitzkrieg model make it suitable for testing. In this regard, a perusal of the Chilean literature provides results consistent with the overkill hypothesis but that falsify its blitzkrieg version.

Uncontestable evidence indicates that man was inhabiting Chile by about 12,000 yr ago; the oldest known records are those from Tuina-1 (10,820 B.P.) and San Lorenzo (10,400 – 10,280 B.P.) in northern Chile, Quereo (11,370 B.P.) and Tagua-Tagua (11,380 ± 320 B.P.) in central Chile, and Fell's Cave (10,720 ± 300 B.P.) and Marassi (9,500 ± 210 B.P.) in southern Chile (Montané 1976, Núñez 1980 and references therein). An earlier occupation, between 12,000 and 14,000 yr ago, has been claimed based on findings at Monte Verde, south-central Chile (Dillehay *et al.* 1982). This date however, is open to question considering that the radiocarbon dating of cultural deposits was performed on material less reliable than charcoal.

Early man not only coexisted with the Pleistocene fauna but also hunted it; several archaeological sites bear unequivocal evidence of the association of man with large mammals such as *Cuvieronius humboldti* (Fisher, 1814) (see Montané 1972 for a review). The fossil record indicates that only suitable human prey, i.e. big game and its predators became extinct. Twelve out of 15 genera of large mammals disappeared at the end of the Pleistocene in Chile (Table 1). The extinctions seem to have been synchronous with human arrival, and no megafaunal extinctions have been detected during preceeding glacial-interglacial periods (Marshall 1981). Moreover, neither small mammals nor plants, or any other group of organisms is known to have

TABLE 1

Pleistocene mammals of Chile. Data from Tamayo & Frassinetti (1980 and references therein), R Feito (unplublished data) and, JA Simonetti & JR Rau (unpublished data). *Indicates extinct genera or species. Nomenclature follows Tamayo & Frassinetti (1980).

Mamíferos pleistocénicos de Chile. Datos de Tamayo & Frassinetti (1980 y referencias incluidas), R Feito (datos no publicados) y, JA Simonetti & JR Rau (datos no publicados). *Indica género o especie extinta. Nomenclatura de acuerdo a Tamayo & Frassinetti (1980)

EDENTATA

Megatheriidae
Megatherium medinae *
Mylodontidae
Glossotherium lettsoni *
Mylodon darwini *
Mylodon sp*
Scelidodon chiliense *
Scelidodon sp *
LITOPTERNA
Macrauchenidae
Macrauchenia sp*
PROBOSCIDEA
Gomphotheriidae
Cordillerion hyodon *
Cuvieronius humboldti *
CARNIVORA
Canidae
Canis avus *
Canis sp
Canidae undetermined
Felidae
Panthera onca *
Mustelidae
cf *Conepatus* or *Lyncodon*
Ursidae
Arctodus pamparum *

PERISSODACTYLA

Equidae
Equus curvidens *
Equus sp *
Hippidion sp *
Onohippidium saldiasi *
Onohippidium sp*
ARTIODACTYLA
Camelidae
Lama guanicoe
Lama wedelli *
RODENTIA
Cricetidae
Akodon lanosus
Auliscomys micropus
Oryzomys longicaudatus
Phyllotis darwini
Phyllotis sp
cf *Phyllotis* sp
Myocastoridae
cf *Myocastor*
Octodontidae
Aconaemys sp
Ctenomys cf *fulvus*
Ctenomys magellanicus
Ctenomys sp
Octodon sp
cf *Octodontomys*
Spalacopus sp

become extinct at the end of the Pleistocene in South America. For instance, the food plants of *Mylodon darwini* Owen, 1840 survive until today (Moore 1978). This extinction pattern supports the overkill hypothesis. Not only the climatic but all other alternative hypotheses fail in explaining the apparent selectivity of the late Pleistocene extinctions (see Miller 1980 for a review). It should be mentioned however, that a proper evaluation and test of such hypotheses is still pending (Grayson 1980, in press).

The available Chilean data then, support the contention that early man could have been a factor in the disappearance of the Pleistocene large mammals. Regarding to the intensity of man's role, the archaeological record falsifies the blitzkrieg model of overkill. As stated, the blitzkrieg is supported only if presently extinct megafauna did not survive beyond the first millenium after the entrance of man into South America (Martin 1973, in press). The appropriate test for this model is to analyze the time elapsed between the first appearance of man and the last one of the megafauna. Evidence from Quereo and southern Chile do not fit the blitzkrieg model. As mentioned, the earliest archaeological record at Quereo indicates that man was already present 11,370 yr ago; the last appearance of a large mammal, *C. humboldti*, at Quereo is over 2 millenia after man was inhabiting that place (Núñez 1980, Paskoff 1971). Remains of *M. darwini*, supposedly younger than 5,600 yr B.P. have been recovered in southern Chile, a place inhabited by man at least since 10,700 yr ago (Bird 1970, Saxon 1976). The mid-Holocene survival of *M. darwini* has been advanced on stratrigraphic evidence; even when redeposition has been discarded (Saxon 1976), this date should be cautionarily considered until radiocarbon dating verifies it. The temporal overlap between man and megafauna revealed by these data are beyond the chronological framework of the blitzkrieg; consequently, the model is falsified. If the claims for an earlier occupation of Chile (see Dillehay *et al.* 1982) turns out to be correct, the blitzkrieg model of the overkill hypothesis would be rejected on even more solid grounds.

The rejection of the blitzkrieg model does not imply that its parental overkill hypothesis must be rejected too. Unfortunately, the heuristic value of this hypothesis has been diminished due to a series of modifications through ad hoc hypotheses, in such a way that its implications are no longer falsifiable (Grayson 1980, in press). Even though, the agency of man is still a plausible explanation for the late Pleistocene extinctions. However, as far as the archaeological and paleontological records are correct, the role of man seems to have been less dramatic than Martin (1973, in press) assumes.

ACKNOWLEDGMENT

I am indebted to R. Feito and J.R. Rau for making their unpublished data available to me. D.K. Grayson, W.G. Spaulding and R.D. Taber provided critical comments on the manuscript.

LITERATURE CITED

BIRD JB (1970) Paleo-indian discoidal stones from southern South America. American Antiquity 35: 205-209.

DILLEHAY TD, M PINO, EM DAVIS, S VALASTRO Jr, AG VARELA & R CASAMIQUELA (1982) Monte-Verde: radiocarbon dates from an early-man site in south-central Chile. Journal of Field Archaeology 9: 547-549.

GRAYSON DK (1980) Vicissitudes and overkill: the development of explanations of Pleistocene extinctions. Advances in Archaeological Method and Theory 3: 357-403.

GRAYSON DK (in press) Explaining Pleistocene extinctions: thoughts on the structure of a debate. In: Martin PS & RG Klein (eds) Late Pleistocene extinctions. University of Arizona Press, Tucson.

KURTEN B & E ANDERSON (1980) Pleistocene mammals of North America. Columbia University Press, New York.

LEWIN R (1983) What killed the giant mammals? Science 221: 1036-1037.

MARSHALL LG (1981) The great American interchange: an invasion induced crisis for South American mammals. In: Nitecki MH (ed) Biotic crisis in ecological and evolutionary time. Academic Press, New York: 133-229.

MARTIN PS (1973) The discovery of America. Science 179: 969-974.

MARTIN PS (in press) Late Pleistocene extinctions: the model of blitzkrieg and overkill. In: Martin PS & RG Klein (eds) Late Pleistocene extinctions. University of Arizona Press, Tucson.

MILLER S (1980) Human influences on the distribution and abundance of wild Chilean mammals: prehistoric - present. PhD dissertation, University of Washington, Seattle.

MONTANE JC (1972) Las evidencias del poblamiento temprano de Chile. Pumapunku 5: 40-53.

MONTANE JC (1976) El paleoindio en Chile. Actas XLI Congreso Internacional de Americanistas (México 1974) 3: 492-497.

MOORE DM (1978) Post-glacial vegetation in the south Patagonian territory of the giant ground sloth, *Mylodon*. Botanical Journal of the Linnean Society 77: 177-202.

NUÑEZ L (1980). Cazadores tempranos en Andes meridionales: evaluación cronológica de las industrias líticas del norte de Chile. Boletín de Antropología Americana 2: 87-104.

PASKOFF R (1971) Edad radiométrica del mastodonte de Los Vilos. Noticiario Mensual, Museo Nacional de Historia Natural (Chile) 117: 11.

PATTERSON B & R PASCUAL (1972) The fossil mammal fauna of South America. In: Keast A, EC Erk & B Glass (eds) Evolution, mammals and southern continents. State University of New York Press, Albany. 247-309.

REIG OA (1981) Teoría del origen y desarrollo de la fauna de mamíferos de América del Sur. Monographiae Naturae, Museo Municipal de Ciencias Naturales "Lorenzo Scaglia" 1: 1-162.

SAXON E (1976) La prehistoria de Fuego-Patagonia: colonización de un habitat marginal. Anales del Instituto de la Patagonia 7: 63-74.

TAMAYO M & D FRASSINETTI (1980) Catálogo de los mamíferos fósiles y vivientes de Chile. Boletín del Museo Nacional de Historia Natural (Chile) 37: 323-399.

VAN VALEN L (1969) Evolution of communities and late Pleistocene extinctions. Proceedings of the North American Paleontological Convention E: 469-485.