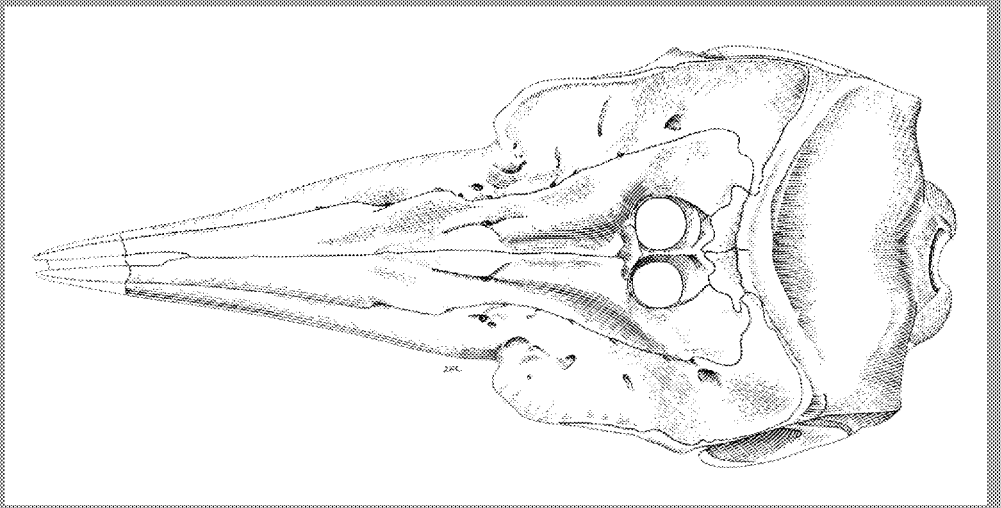
Geology and Vertebrate Paleontology of Western and Southern North America

Edited By Xiaoming Wang and Lawrence G. Barnes



Contributions in Honor of David P. Whistler

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Distribution of Pleistocene *Nothrotheriops* (Xenarthra, Nothrotheridae) in North America

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ABSTRACT. Fossil remains of the extinct ground sloth *Nothrotheriops* have been identified from 69 localities distributed throughout the western and southern United States and Mexico. These occurrences range in age from early Irvingtonian (about 1.7 Ma) to latest Rancholabrean (about 11 Ka). Most of the sites are late Pleistocene in age, and many occur in cave deposits. The paleogeographic distribution of *Nothrotheriops* is related to altitude and latitude. A bivariate plot of the elevation/latitude of localities for *Nothrotheriops* yields a distribution with a defined limit relative to elevation. A similar relationship is found when equatorial equivalent elevation (ee) is plotted against latitude. The maximum elevation for localities decreases with increased latitude and the relationship is proportional to the ee. This site elevation analysis confirms that given an apparently low basal metabolic rate for *Nothrotheriops shastensis*, climate, and specifically the minimum winter temperature, was a significant limiting factor in its geographic distribution. The association of *N. shastensis* and another thermally sensitive species, the extinct vampire bat *Desmodus stocki*, in a number of U.S. and Mexican paleofaunas suggests a similar restriction of both species by minimum winter temperatures.

INTRODUCTION

The extinct ground sloth genus, *Nothrotheriops* Hoffstetter, 1954, first appears in the North American fossil record at about 1.7 Ma in the Leisey Shell Pit 1A assemblage of Florida (McDonald, 1995). The genus is represented by two nominal species, *Nothrotheriops texanus* (Hay, 1916), which is restricted to the Irvingtonian, and *Nothrotheriops shastensis* (Sinclair, 1905), present in the Rancholabrean. *Nothrotheriops texanus* was more widespread than *N. shastensis* (see Akersten and McDonald, 1991), and it occurs in localities as far north as Oklahoma and from California to Florida (Fig. 1; Appendices 1 and 2). *Nothrotheriops shastensis* is restricted primarily to the western United States and Mexico, including the Mojave and Sonoran deserts, the southernmost Great Basin, and the northeastern edge of the Chihuahua Desert, extending south into central and western Mexico.

Nothrotheriops is the smallest of the Pleistocene North American ground sloths, which also include *Megalonyx* (Harlan, 1825), *Paramylodon* (Brown, 1903), and *Eremotherium* (Spillman, 1948). Estimates of adult mean body mass for the genus are 332 kg for the Irvingtonian species and 463 kg for the Rancholabrean species (McDonald, 2005), a difference of about 30%. *Nothrotheriops texanus* differs from *N. shastensis* (including *Nothrotheriops mexicanum* Freudenberg, 1921) in cranial and dental proportions, primarily in the relationship of alveolar length to predental length of the maxilla in the skull and alveolar length to spout length in the mandible (McDonald, 1995). Postcranially the skeletons of *N. texanus* and *N. shastensis* are similar except in size.

Nothrotheriops has been interpreted as a browser. Although no direct evidence for the diet of *N. texanus* is available, dung from *N. shastensis* is preserved in numerous dry caves in the southwestern United States. Analyses of this material have provided much detailed information on the diet of the species (Laudermilk and Munz, 1934, 1938; Martin et al., 1961; Hansen, 1978, 1980; Thompson et al., 1980; Poinar et al., 1998; Hofreiter et al., 1999). The diet of *N. shastensis* was diverse and included xeric vegetation such as globemallow (*Sphaeralcea ambigua* Gray, 1886), mormon tea (*Ephedra nevadensis* Watson, 1879), saltbrush (*Atriplex* sp. Linnaeus, 1753), and yucca (*Yucca* sp. Linnaeus, 1753) and plants associated with more mesic and riparian habitats, such as common reed (*Phragmites communis* Trinius, 1820) and singleleaf ash (*Fraxinus anomala* Watson, 1871) (Hansen, 1978). *Nothrotheriops* was probably better adapted to desert environments than any of the other North American ground sloths.

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