YELLOW-NOSED COTTON RAT (*SIGMODON OCHROGNATHUS*), A LONG-TIME INHABITANT OF TRANS-PECOS TEXAS AND NEW MEXICO

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ABSTRACT—Pleistocene and Holocene fossils of the yellow-nosed cotton rat (*Sigmodon ochrognathus*) in New Mexico, Trans-Pecos Texas, and southern Chihuahua indicate past presence within the currently occupied geographic range, as well as occurrences at lower-elevation sites. Suggestions that post-Pleistocene colonization may account for occurrence of northern isolated populations cannot be falsified because extirpation followed by recolonization cannot be ruled out; however, current data indicate that such a scenario is unnecessary.

RESUMEN—Los fósiles del Pleistoceno y Holoceno de la rata algodonera nariz amarilla (*Sigmodon ochrognathus*) en Nuevo México, Trans-Pecos de Texas, y el sur de Chihuahua, indican su presencia en el pasado dentro de su distribución geográfica actual, además de su presencia en sitios de menor elevación. Sugerencias de que la colonización post-pleistoceno podría explicar la presencia de poblaciones norteñas aisladas no pueden ser falsificadas, ya que la extirpación seguida por la recolonización no puede ser descartada; sin embargo, datos recientes indican que tal escenario no es necesario.

Davis and Dunford (1987) have made a case for the yellow-nosed cotton rat (*Sigmodon ochrognathus*) colonizing isolated highland patches of oak-piñon-juniper (*Quercus-Pinus-Juniperus*) woodland in Arizona and extreme southwestern New Mexico within the 50-year period preceding their study. To colonize these uplands, gaps in grasslands between suitable habitat must have been crossed.

In a later paper, Davis et al. (1988) turned their attention to northern-affinity, forest-dwelling mammals in New Mexico that likely originally colonized highlands south of the southern-most Rocky Mountains during the Pleistocene. The modern presence-absence occurrences in 12 such mountains and montane complexes were consistent with the current distributions being a combination of local extirpation, vicariance, and post-Pleistocene colonization rather than as a result of vicariance and local extinctions alone.

In 1990, Hollander et al. (1990) extended the known range of the yellow-nosed cotton rat northward in Texas by some 129 km with the trapping of an adult male 5 km NE Guadalupe Mountains National Park Headquarters, Culberson County. The question arises as to whether occupation of the Guadalupe Mountains and other areas of the region is a result of post-Pleistocene colonization or of relictual survival from the Pleistocene.

Also in 1990, Stangl and Dalquest (1990) published criteria to separate the yellow-nosed cotton rat from the hispid cotton rat (*Sigmodon hispidus*) on characters of the upper first molar. For discrimination, they used relative size of the occlusal surface as measured by length and width. Also found useful, but with occasional overlap, was shape of the anterocone (usually curved in occlusal view in the hispid cotton rat and somewhat flattened in the yellow-nosed cotton rat; in lateral view, the anterior of the anterocone tends to slant posteriorly from the alveolus in the hispid cotton rat but be recessed posteriorly in the yellow-nosed cotton rat).

In 1991, Stangl and Dalquest (1991) published a reexamination of fossil first upper molars of cotton rats from Pleistocene deposits in Fowlkes Cave in southern Culberson County, Texas, and from deposits from Pratt Cave, Culberson County, at the southern end of the Guadalupe Mountains. One of 31 upper first molars from Fowlkes Cave was identified as representing the yellow-nosed cotton rat, as was one of 12 from Pratt Cave.

No date is available from Fowlkes Cave, but there are obviously Pleistocene taxa present. Carbon-14 dates from Pratt Cave are Holocene, with the earliest being 2,820 ± 180 years before present according to Lundelius (1979). Harris (1990) has suggested that taxa from Pratt Cave that otherwise are unknown from post-Pleistocene deposits of the region may represent Pleistocene contamination rather than late survival. Thus, the specimen of the yellow-nosed cotton rat potentially could be either Holocene or Pleistocene in age.

Aside from fossil occurrences noted above, the yellow-nosed cotton rat has been recorded from the Pleistocene of U-Bar Cave, Hidalgo County, in extreme southwestern New Mexico (Harris, 1989) and from Holocene deposits in Big Manhole Cave, Eddy County, New Mexico (Lear and Harris, 2007). We now have examined fossil cotton rats from several sites in New Mexico and Texas, using occlusal length and width as primary discriminators, but secondarily using the anterocone character states of Stangl and Dalquest (1990).

Big Manhole Cave, 1,388 m, Eddy County, New Mexico—Reexamination of the single first upper molar from the site confirms the identification at ca. 3,580 ± 75 radiocarbon years before present. The site today is ecotonal between Lower and Upper Sonoran life zones. Lear and Harris (2007) suggested that denser vegetation was present at the site at the time of deposition. However, this could have been because of more mesic conditions than today or because the current scanty vegetation is a result of degradation by historic over-stocking of domestic livestock.

U-Bar Cave, 1,540 m, Hidalgo County, New Mexico—Of nine identified first upper molars, two are of *S. ochrognathus* from late-Wisconsin levels. Molars of *S. hispidus* ranged from mid-Wisconsin to probable Holocene. Presence of the yellow-nosed cotton rat during the late Pleistocene suggests that, contrary to Davis and Dunford (1987), modern presence is not due to historic colonization. However, it should be noted that local, post-Pleistocene extinctions followed by recolonizations in the Holocene cannot be ruled out on the basis of current evidence for any of the sites considered here.

Dust Cave, 1,980 m, Culberson County, Texas—The site is within Guadalupe Mountains National Park. The single first upper molar from this site fits the yellow-nosed cotton rat in all respects. Spruce (*Picea*) needles from the uppermost level (0–7.5 cm) have been radiocarbon-dated at 13,000 ± 730 years before present (Van Devender et al., 1977). The molar is from level 5, stratum 3. Van Devender et al. (1977:111) characterize the environment as "a subalpine forest community of *Picea* sp., *Pinus flexilis*, and *Juniperus communis*."

Lost Valley Site Within Dry Cave, 1,280 m, Eddy County, New Mexico—This site has a bone-carbonate date of 29,290 ± 1,060 years before present, although this likely is too young (Harris, 1987). The single tooth of *Sigmodon* recovered is attributed to *S. ochrognathus*. Deposits appear to represent a relatively mild span within the Pleistocene. Presence of the prairie vole (*Microtus ochrogaster*) indicates relatively good growth of grasses, as does the presence of several other taxa (Harris, 1987).

Pendejo Cave, 1,490 m, Otero County, New Mexico—This cave includes deposits from the present to >55,000 years before present (Taylor et al., 2003). One upper first molar of *S. ochrognathus* is from a mixed layer with dates between 1,780 and 16,410 years before present. Another molar is from deposits dated at 19,180, while a third molar has a minimum date of 14,200 years before present. The eight molars identified as *S. hispidus* are from Holocene or mixed Holocene-Wisconsin strata. Pendejo Cave is in Rough Canyon at the edge of Otero Mesa, which even today supports relatively good grassland. McVickar (2003) characterized vegetation of the late-Wisconsin Rough Canyon, as revealed by woodrat (*Neotoma*) middens, as a piñon-juniper woodland with associated Douglas firs (*Pseudotsuga menziesii*).

Jimenez Cave, 1,450 m, Chihuahua, Mexico—The site currently is in Chihuahuan desertscrub (Messing, 1986). The immediate countryside is flat and several playas are nearby. The cave site is disturbed and no stratigraphic data are available. Dating deposits as late-Pleistocene and Holocene is based solely on faunal remains. Five measurable upper first molars are available; one represents the yellow-nosed cotton rat and four represent the hispid cotton rat.

It appears from its Pleistocene distribution that the yellow-nosed cotton rat was widespread in areas within its modern distribution. More effective moisture during the Pleistocene also produced suitable habitat at lower elevations.

The fossil record is insufficient to reveal whether habitation has been continuous in the currently occupied sites or whether recolonization has occurred after post-Pleistocene extirpation.

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