

Hairy-tailed Mole (*Parascalops breweri*) Remains from South-central Indiana Caves

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Living Hairy-tailed Moles have never been recorded in Indiana. *Parascalops breweri* was on Evermann and Butler's (1894) list of hypothetically occurring Indiana mammals (6). Hahn (1909) cited, but excluded from consideration, two *P. breweri* skins labeled "Bloomington" in the Indiana University collection (12). Lyon (1936) noted that only one of those specimens had a Bloomington label, the other being untagged (17). Those skins are no longer in the Indiana University collection (Dr. Craig E. Nelson, personal communication) and appear to be lost. Some of the "old" Indiana University collection had long been destroyed by dermestids. Other specimens were sent to the Museum of Natural History at the University of Illinois and to the United States National Museum; *P. breweri* skins, however, were not among those materials (letters, Dr. Donald F. Hoffmeister, October 30, 1981 and Michael D. Carleton, November 5, 1981, respectively). Because there were other birds and mammals in the "old" Indiana University collection bearing "Bloomington" labels that could not possibly have come from Bloomington (Dr. Russell E. Mumford, letter October 20, 1981) the mole labels might have likewise been misattributed. Only the Eastern Mole (*Scalopus aquaticus*) has been recovered in present Bloomington area student collecting. *P. breweri* was not listed by McAtee in 1907 (18) nor by Mumford in 1969 (19). The nearest occurrence of *P. breweri* to Indiana is the eastern two thirds of Ohio, southward through Kentucky (Figure 1).

The Hairy-tailed Mole is locally common in woodlands within its range, although it also occurs in open fields. Where it occurs with the Eastern Mole (*Scalopus aquaticus*) it tends to inhabit the woodlands and higher ground, and the Eastern Mole the more open country and lowlands (1; 5). *P. breweri* is active day and night, and will forage outside of its burrow nocturnally (2; 5); because of this, it is an occasional item of owl prey (3). Owl pellets contribute to concentrated deposits of small animal remains in caves (4; 9; 10; 11), perhaps contributing occasional mole bones.

The only previous fossil record of the Hairy-tailed Mole in Indiana was from the Harrodsburg Crevice deposit, Monroe County. Bones of one *P. breweri* (minimum) were associated with remains of 5 extinct mammal taxa (*Canis cf. dirus*, Dire Wolf; *Smilodon fatalis*, Sabertooth Cat; *Panthera onca augusta*, Pleistocene Jaguar; *Equus cf. complicatus*, Horse, and *Platygonus cf. cumberlandensis*, Pecary). Bones of the Spotted Skunk (*Spilogale cf. putorius*), Woodrat (*Neotoma cf. floridana*), and the Plains Pocket Gopher (*Geomys bursarius*) occurred out of their modern ranges (extralocally). A warmer and drier than present short-grass prairie/forest edge environment of Sangamonian (last interglacial) age was proposed (20; 22).

Recent finds of *P. breweri* bones in Monroe and Lawrence County caves indicate that the mole was, at various times at least, present in south-central Indiana. In Anderson Pit Cave, Monroe County, an isolated ledge deposit (north northwest passage, 334 feet from present cave entrance) contained over 60 vertebrate species of Late Pleistocene-early Recent age. This included a fragmented right ulna, upper

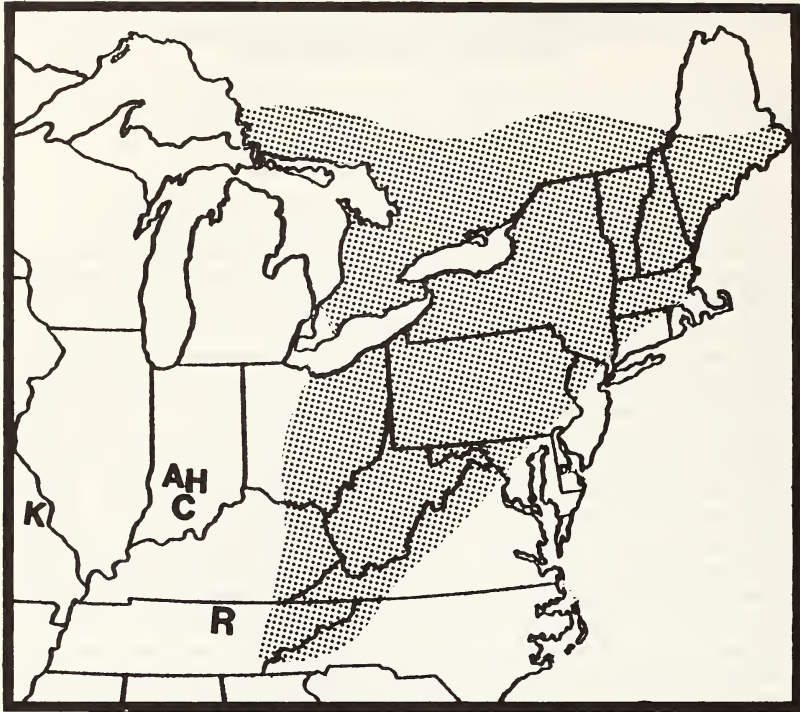


FIGURE 1. Modern range and extralocal fossil occurrence of the Hairy-tailed Mole, *Parascalops breweri*. Modern range: stippled (data from Hall and Kelson, 1959). Fossil sites: K, Crankshaft Cave, Jefferson County, Missouri; H, Harrodsburg Crevice, Monroe County, Indiana; A, Anderson Pit Cave, Monroe County, Indiana (2 sites); C, Carcass Crypt Cave, Lawrence County, Indiana; R, Robinson Cave, Overton County, Tennessee.

premolar, upper M3, and a lower molar (Cat. No. 13-964, Figure 2A) of *P. breweri*. Scutes of the Giant Armadillo (*Dasyurus bellus*) suggest that the deposit is at least 9,550 years old (16). Extralocal animals included the Smooth Greensnake, *Opheodrys vernalis* (15); the Rice Rat, *Oryzomys cf. palustris* (23); the Woodrat, *Neotoma floridana*, and the Thirteen-lined Ground Squirrel, *Spermophilus tridecemlineatus*. Eastern Mole bones (3 individuals minimum) occurred in the upper level of the deposit; *P. breweri* remains were in the lower. A mild-wintered moist climatic period of Late Pleistocene-early Recent age was proposed.

A different ledge deposit in Anderson Pit Cave (south southeast passage, ca. 170 feet from present entrance) produced a travertine encrusted left dentary fragment containing molars 1 and 2 (Cat. No. 13.1-16, Figure 2B). Twenty five extant vertebrate species and floral debris was associated. The Woodrat was the only other extralocal mammal. The deposit is undated.

A *P. breweri* radius (Cat. No. 2-452, Figure 2C) was recovered from Carcass Crypt Cave, Lawrence County, in floor deposits ca. 85 feet inside the pit cave, associated with bones of 35 other vertebrate species, including those of the Eastern

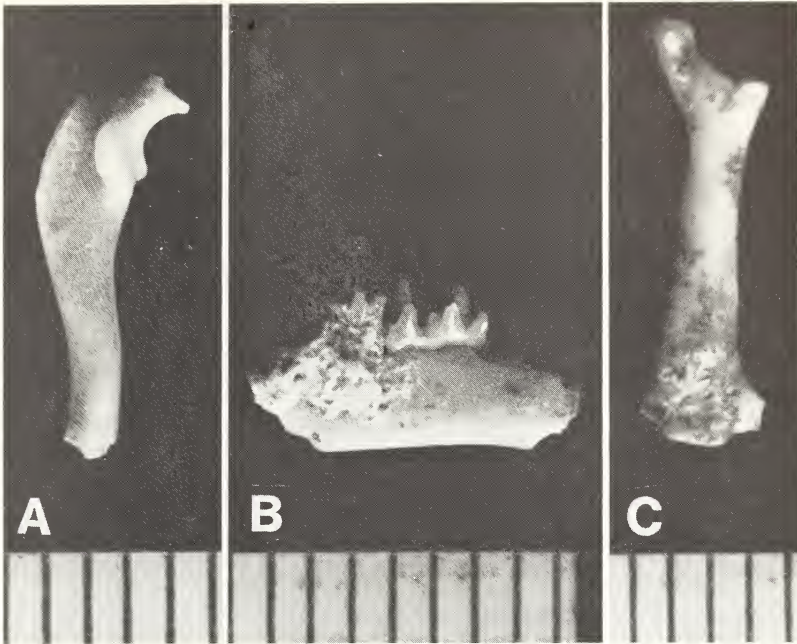


FIGURE 2. *Parascalops breweri* remains from Indiana caves: A, Right ulna fragment (Cat. No. 13-964), Anderson Pit Cave; B, Left dentary fragment (Cat. No. 13.1-16), Anderson Pit Cave. Note adhering travertine; C, Radius (Cat. No. 2-452), Carcass Crypt Cave. Scale in millimeters.

Mole, *S. aquaticus*. Extralocal species included the Woodrat and Spotted Skunk. The Opossum (*Didelphis virginiana*), also recovered, is believed to have entered the region from the south within the past 3 or 4 thousand years (8). Thus, a sub-Recent age is proposed for that deposit.

Two other states have produced extralocal Hairy-tailed Mole fossils (Figure 1). Remains of 15 *P. breweri* (minimum) were recovered from Crankshaft Cave, Missouri. Associated were bones of 7 extinct and several other extralocal mammals. The mixed deposit was thought to have spanned the late glacial to the postglacial warm, dry "xerothermic" period (21).

Remains of 3 *P. breweri* (minimum) were removed from Robinson Cave, Tennessee, along with bones of 5 extinct and several extralocal mammals. A temperate/boreal climate of Wisconsinan (last glacial) age or later was proposed (10).

By its association with extinct and extralocal vertebrates, it is clear that past range adjustments of *P. breweri* were due to climatic/ecological conditions different from those that exist at the fossil sites today. Because the mole presently inhabits cool northeastern climates, it would have expanded its range southward and westward during glacial maxima. Yet its remains also occur with mammals of warmer and/or drier climates (eg. Giant Armadillo; Plains Pocket Gopher); the Harrodsburg Crevice deposit represents a drier, and perhaps warmer, interglacial. "In-

compatible" faunal elements in the Late Pleistocene have been thought by some authors to represent more "equable" climates, where cooler summers and warmer winters might allow integration of boreal, western and southern species (7; 14). However, this Climatic Equability Model cannot fully explain *P. breweri* occurrence in Indiana: the Anderson Pit armadillo site lacks a strong boreal fauna (especially the important shrews and microtine rodents) and the Carcass Crypt remains are only of sub-Recent age. What the fossil faunas do indicate is that *P. breweri* may have had a lingering range reduction following glacial age range expansion. In Indiana the evidence indicates a lingering range reduction from the Illinoian (second to last) Glaciation (in the Sangamonian age Harrodsburg Crevice) and from the Wisconsinan Glaciation (in the Late Wisconsinan-early Recent Anderson Pit armadillo site, and in the sub-Recent Carcass Crypt Cave deposit).

P. breweri bones from Anderson Pit (13-964) are temporarily in the author's collection; all other *P. breweri* material (13.1-16; 2-452) is in the collection of the Indiana State Museum, Indianapolis.

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