

Vertebrate Remains from an Indiana Cave

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Abstract

Excavation of a shallow sandstone capped cave in Monroe County, Indiana, produced skeletal remains of 13 vertebrate species. These were opossum, bat, black bear, raccoon, gray fox, chipmunk, cottontail, deer, bison, vulture, frog or toad, snake, and tortoise. The bear and bison may be of some antiquity, 125 years Before Present at minimum. The remainder are more recent.

The remains differ from those reported for other Indiana caves in a higher frequency of opossum, a greater variety of sub-mammalian forms, and possibly in the lack of mustelid carnivores.

Only a few surface investigations of vertebrate material from more "typical" Indiana caves have been made (2, 3, 5, 6). One paper reports minor excavation of Pleistocene material (7). The present excavation is the first extensive study of the deposits from any Indiana cave.

Thundermug Bone Cave is located 6.6 miles west-southwest of Bloomington, Indiana (NE $\frac{1}{4}$ of the NW $\frac{1}{4}$ of the SW $\frac{1}{4}$, sec. 17, T8N, R2W, Whitehall Quadrangle, Monroe Co., Indiana). A ridgetop sandstone formation forms the cave ceiling. The cave consists of three main chambers. The entrance room was 9 feet long, 6 feet wide, and 6 feet high; the side room was 10 feet long, 8 feet wide, and 4 feet high; and the lower room an average diameter of about 6 feet with a 10-foot dimension and 15 feet high. Excavation thereafter increased all the room depths.

The fill consisted of sandstone breakdown and limestone solution fragments, well interspersed in a great quantity of dirt. The sequence of events within the cave thus seems to have been a gradual dissolving free of the irregularities of the limestone walls and crumbling and collapse of the sandstone ceiling, accompanied by a gradual filling of the cavern with dirt from the cave entrance.

Bones were found throughout most of the stratigraphic sequence. The deposition of bear bones in the entrance room was mostly secondary, being derived from near the cave entrance. All bones in the lower room, mostly of deer and bear, were in secondary deposits derived from the entrance room. The bones in the side room were apparently at the original locus of deposition, although much disarrayed.

Excavations extended from November, 1964 to July, 1967. The entrance room was excavated to bedrock at 5.5 feet posteriorly, and 7.5 feet to a base of sandstone breakdown and thick clay deposits near the entrance slope. The lower room was dug to bedrock at 1 foot and the side room excavated to 3 feet, a level where bones were absent.

Only partial skeletons were recovered. This is due to bone loss through solution fissures in the floors of the lower and side rooms, as well as to possibilities of only partial skeletons having eroded into the cave (bison?), and partial animals having been dragged in by predators and scavengers.

The shallow chambers of Thundermug are nearer the surface than those of the more typical limestone caves. Consequently the temperature

TABLE 1. Species and frequencies in Indiana cavern studies.

Thundermug	Hahn (6)	Banta (2)	Blatchley (3)
<i>Didelphis marsupialis</i>	1	---	---
<i>Blarina brevicauda</i>	1	---	---
<i>Pipistrellus subflavus</i>	8	abundant	---
<i>Lasiurus cinereus</i>	2	---	occasional
<i>Lasiurus borealis</i>	203	---	thousands
<i>Myotis subulatus</i>	1	---	---
<i>Myotis lucifugus</i>	9-17	few	---
<i>Eptesicus fuscus</i>	---	few	“wallows” and
<i>Ursus americanus</i>	---	“beds”	claw marks
<i>Procyon lotor</i>	---	abundant	few
<i>Vulpes fulva</i>	---	tracks	dens
<i>Urocyon cinereoargenteus</i>	---	evidence	dens
<i>Mustela vison</i>	---	---	several
<i>Mustela novemborensis</i>	---	tracks	present
<i>Felis domesticus</i>	---	---	present,
	---	---	some dens
<i>Peromyscus leucopus</i>	4	abundant	abundant
<i>Microtus pinetorum</i>	---	---	---
<i>Neotoma sp.</i>	4	---	exterminated
	---	---	in Wyandotte
<i>Tamias striatus</i>	---	1	---
<i>Marmota monax</i>	---	1?	---
<i>Sylvilagus floridanus</i>	3	---	---
<i>Odocoileus virginianus</i>	1	---	---
<i>Bison sp.</i>	---	---	---
<i>Cathartes aura</i>	---	---	---
<i>Terrepen carolina</i>	---	---	---
snake	---	---	---
frog or toad	---	few <i>Rana</i>	<i>clamitans</i>
	---	<i>clamitans</i>	present
salamanders	---	present	present



FIGURE 1. Skull of one of the black bears, *Ursus americanus*, recovered.

of the cave is modified more by the above-ground temperature than in a typical cavern in which the temperature of the limestone bedrock exerts a dominant control. Thus in Thundermug summer temperatures were observed to be higher and winter temperatures lower than the approximate 54°F of the average Indiana cavern (1). In addition, the cave is often dry and somewhat south-facing, and manages to filter some dim light into its shallower portions, thus the shallower portions of the cavern probably were attractive to animals which would not ordinarily use the typical cave (*e.g.* vultures). The lower winter temperatures may have contributed to death of some of the animals.

The forms recovered in the excavation are listed within Table 1. (All material collected is on file with the author). Three of the six opossums found had not yet completed the third lower premolar eruption. Vultures often nest in shallow cavities. The Thundermug remains may have been a nesting group, since an adult and two young birds were closely associated.

Indications of scavengers and predators, in the form of crushed or tooth-punctured bone seem to be present among the opossum, raccoon, and cottontail remains. Gnawings on many of the deer and bear bones indicate the presence of small rodents, possibly *Peromyscus leucopus* (Table 1).

Bear seem to have been exterminated from south-central Indiana about 1837, and the bison about 1778 (8). The related deposits presumably are at minimum 125 years old. The bears were at the 2.5 and 3 feet levels, and the bison at nearly 3 feet, indicating some antiquity, although no conclusion can be drawn because the accumulation and erosional history of the cave are not known.

The black bear material is noteworthy. Although historical records are abundant, as is evidence of their former presence such as wallows and scratch marks on trees and cave walls, nothing remains of the bears themselves except for occasional finds of skeletal material (4, 8). The Thundermugs ursids were compared with measurements from other specimens of *Ursus americanus*, and are clearly of the *U. americanus* type (7, 9). Figure 1 illustrates one of the skulls.

In comparing Indiana cavern studies, the scope of the investigations should be taken into account. Both Banta (2) and Blatchley (3) were concerned with the observation of living animals and evidence of their presence. Banta's study was of one cave; Blatchley's of several caves. Hahn's study (6) and the present excavation both concerned past vertebrate faunas. Hahn's (6) collection, from only one cave, seems to be of more recent material than that in Thundermug.

The results from the various cavern studies for Indiana are compared in Table 1. Thundermug included an unusual number of opossums at different stratigraphic levels. This may indicate use of the cave over a long period of time. Bats and carnivores were found in all four studies, although evidence of mustelids was found in both the "observation" studies, and none found in either of the osteological studies. Several of the carnivore types presumably inhabited the cave. In contrast to the possible inhabitants are the accidentally introduced forms. These might include bison, deer, and chipmunk.

In summary, the Thundermug material differs from that of other Indiana caverns studied in the larger number of opossums, greater variety of sub-mammalian forms, and possibly in the lack of mustelid carnivores. These differences may be related in part to the "attractiveness" of the cavern.

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Literature Cited

1. ADDINGTON, A. R. 1926. A preliminary report upon the survey of Indiana caves with special reference to Marengo Cave. Indiana Yearbook for 1926, p. 303-313.
2. BANTA, ARTHUR M. 1907. The fauna of Mayfields cave. Carnegie Inst. of Wash., Pub. No. 67, 114 p.
3. BLATCHLEY, W. S. 1897. Indiana caves and their fauna. 21st Annu. Rep. Dep. Geol. Natur. Resources Indiana for 1896, p. 121-212.
4. COLLETT, JOHN. 1883. List of fossils found at Porter's Quarry, one and one fourth miles west of Rensselaer on the south side of the Iroquois River. 12th Annu. Rep. Indiana Dep. Geol. Natur. Hist for 1882, 1883, p. 73.
5. COPE, E. D. 1873. Report on the Wyandotte Cave and its fauna. Third and Fourth Annu. Repts. Geol. Surv. Indiana for 1871 and 1872, p. 157-182.
6. HAHN, WALTER L. 1906. The mammalian remains of the Donaldson Cave (3 miles southeast of Mitchell). Proc. Indiana Acad. Sci. 22:142-144.
7. HAY, OLIVER P. 1911. The Pleistocene period and its vertebrata. 36th Annu. Rep. Dep. Natur. Resources Indiana, p. 541-784, 1912.
8. LYON, MARCUS WARD. 1936. Mammals of Indiana. Univ. Press, Notre Dame, Indiana, 384 p.
9. MERRIAM, C. HART. 1896. Preliminary synopsis of the American bears. Proc. Biol. Soc. Wash. 10:65-83.