

**The Pleistocene Vertebrate Collection of the
Indiana State Museum with a List of the
Extinct and Extralocal Pleistocene Vertebrates of Indiana**

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Introduction

In 1869 the Indiana General Assembly established a Department of Geology and Natural Science within the State Board of Agriculture. It was headed by the State Geologist, who, in addition to making a geological survey of the State, was also to maintain a "cabinet" for the collection, identification and exhibition of "specimens of the ores, building stones, clays . . . quadrupeds, birds, fishes . . ." and other items of the natural history of Indiana and surrounding states and countries (7). The "cabinet" was first housed in the "old" and later the present State Capital building in Indianapolis. In 1919 the office of the State Geologist became known as the Division of Geology (within the Department of Conservation), and the "museum" collections were shuffled from room to room, resulting in damaged and lost specimens. Between 1926 and 1930 the collections were placed into storage in the basement (31; 32; 75; Logansport, Ind. Pharos-Tribune, Nov. 20, 1926). By the 1940's the Museum occupied an end of the basement, with two-thirds of its collections stored in crates and boxes in basements of other State owned buildings; records were chaotic, with few entries since 1926 (70). In 1945 the Division of Geology (now the Geological Survey) relocated on the Indiana University campus, Bloomington, and the Museum specimens remained in Indianapolis within the Division of State Parks (7). Though administrative interest in the Museum rose in 1945 and 1958 (75), the collections were again placed into storage in 1960 (74; 75). With demolition of the State House "Annex" pending in 1960, much of the geological collection (including Pleistocene bones) housed in its basement was moved into the State warehouse on Kentucky Avenue (74). Warehouse storage space became filled, and the remaining geological collections were to be left in the "Annex" to be disposed of by the wrecking contractor (letter, R. D. Starrett to R. H. Shaver, Nov. 21, 1960). Personnel from the Indiana Geological Survey, thus informed, salvaged on two trips the visible fossils from the "Annex" where the "floor of the storage room was a four-to-six-inch sea of fossil and a few other geologic specimens, labels, and containers . . ." (letter, R. H. Shaver to R. D. Starrett, Feb. 27, 1961; letter, W. J. Wayne, June 1, 1983). Wayne had seen no fossil bones among the Survey salvaged specimens. Starrett related (oral communication, Nov., 1983) that all materials had been removed from the "Annex" before it was demolished. Even at the warehouse "boxes appeared to have been opened by unauthorized persons and objects disappeared" (74). In 1967 the Museum relocated in the former Indianapolis City Hall, its present location. Around 1970 the Division of Museums and Memorials was created, with a mandate "to preserve, exhibit and interpret the cultural and natural history of Indiana for present and future generations" (75). Collections and staff have grown and exhibits have proliferated. It was not until 1982, however, that the natural history collections were fully transferred from warehouse storage into the Museum.

Little has been published upon the content of the State Museum collections. Thompson (1889) published a list of catalogued specimens (primarily of invertebrate fossils, modern mollusks and building stones) (77). The Pleistocene vertebrate remains received an excellent description by Hay (1912), in a paper still widely referred to today (22).

Cope and Wortman (1885) had described Indiana specimens supplied by the State Geologist, but it is not clear if they were part of the State "cabinet" collection (9). Lists of Museum acquisitions appeared in the first through fourteenth Annual Reports of the Department of Conservation (W. N. Logan, 1920-1932).

Natural history collections of the Museum are now being curated, and their importance assessed. The Pleistocene vertebrate remains form the basis of this paper. Unpublished records of especially Mastodons and Mammoths are presented, with descriptions of the remains, indicating their availability as comparative materials for future investigations.

Methods

Matching records to specimens was often difficult, it not impossible. Records prior to 1967 are incomplete. A few accession logs and a list from the 1923-1932 period supplied most of the information on specimens. Several systems of cataloguing had been used (often with duplicated numbers), and specimens were usually unmarked, or marked with numbers for which there was no data. Several specimens, however, did have labels affixed. Some specimens could be matched with their descriptions in Hay, 1912 and 1923 (22;23).

Remains of individual animals were grouped, judging by preservation, color, similarity of impacted sediments, period of growth, size and preservatives formerly used. Fractured and damaged bones were reconstructed with epoxy (Elmer's Super-Fast, E609). Mammoth teeth had dried out, with lamellae often separated at the brittle cementum; these, and the Mastodon teeth, were reconstructed with white glue (Elmer's). Ancient bones and especially teeth need to be stored in a humidified atmosphere (C.T. Madden, written commun., May 21, 1981).

Several preservatives have been used on the bones. The Stroh Mastodon bones (71.983.73) had been coated with a hard, dark finish. These have now split, exposing the crumbling interiors; they need further conservation. The Waterloo Mammoth (71.967.22) had been coated with an Alvar-acetone solution, and the Reeker Mastodon (71.976.36) bones soaked in a solution of white glue and water; all appear hard and well preserved. The fossil Black Bear materials (71.981.14) had been reconstructed with white glue (Elmer's), and soaked in progressively stronger solutions of polyurethane (in mineral spirits); they are exceptionally hard and durable. The Kolarik Mastodon materials (71.980.50) were saturated with polyethylene glycol ("Carbo-wax"), and freeze-dried (12); they are in excellent, natural-appearing condition. Bones from the Place Mastodon (71.983.74), stored for a year before being donated to the Museum for conservation, were soaked in "Carbo-wax" and freeze-dried. Some bones preserved well, but others with progressive disintegration were only stabilized or displayed a "flaky" outer surface, some due to shrinkage. The Swanson/Reichart Mammoth bones (loan) were soaked in "Carbo-wax"; they appear to be stabilized, and some bones have dried hard.

The Mastodon/Mammoth teeth, reconstructed with white glue, will be impregnated with polyurethane in a vacuum chamber. Many of the bones, reconstructed with epoxy, will be soaked in glyptol and acetone, a method currently used at the Field Museum of Natural History, Chicago (oral communication, William Simpson, Chief Preparator, Geology Dept., Jan. 5, 1983). New catalogue numbers are now affixed to specimens and all known data recorded. All of the bones and teeth were measured, with some of the data presented in Tables 1,2, and 3. Mammoth teeth were measured, following the methods of Maglio (43).

TABLE 1. Mammut americanum tooth measurements, ISM collection (mm.)¹

CAT#	Placement	Length	Width	Maximum width across:				Tetartoloph(-id)
				Protoloph(-id)	Metoloph(-id)	Tritoloph(-id)		
71.981.60	LM3	181 + (mx.184)	ca. 101	102 + (mx.107)	99 + (mx.104)	98	ca. 84	
71.981.61	LM3	160	93	93	92	81	66	
71.981.62	LM3	168	ca. 100	e 99 +	—	90	78	
*71.981.91	LM3	154	96	96 + (mx.98)	95	e 84	70	
*71.976.36.1	LM3	203	106	102	103	104	94	
*71.967.41	RM3	185	108	100	107	105	82	
71.981.66	RM3	191	97	92 + (mx.95)	95	90 + (mx.92)	85	
71.981.68	RM3	—	115 +	—	115	—	—	
71.983.64	RM3	—	104 +	e 100	104	—	—	
71.981.63	LM2	115 + (mx.118)	93	—	91	e 91 (mx.93)	—	
71.981.65	LM2	—	ca.97(mx.99)	90	ca.95(mx.98)	—	—	
71.981.59	LM1	100 + (mx.102)	78	ca.74	77	76	—	
*71.981.70	Lm3	197	ca.100(mx.102)	e 95(mx.97)	—	e 97 (mx.100)	—	
71.983.120	Lm3	117	87	81	89	86	75	
71.981.64	Rm3	194	—	—	—	—	89 + (mx.92)	
71.983.62	Rm3	199	97	89	97	98	90	
71.981.67	Lm2	110	86	—	82	88	—	
71.983.63	Rm2	—	85	—	85	—	—	
*71.981.94.1	Lm1 (or dp4)	87	64	59	64	63	63	

1. Terminology from Saunders (71)*; documented specimen; e, estimate; mx, maximum estimated measurement.

TABLE 2. Mammuthus tooth descriptions, ISM collection (measurements in mm.).¹

Cat#	Placement	LF	ET	LT	P	NOP	L	W
71.981.50	Lm3	8.8	1.79	8.98	? + 19	14	241 +	90 + ⁶
71.981.35	Rm3	9.6	1.71	7.80	x24x	21	296	103 ⁵
71.981.48	Rm3	8.0	1.63	7.88	? + 23	? + 17	280 +	93 + ⁹
*71.968.83.55	Rm1(or DP4)	9.8	1.70	7.83	x10	x10	129	81 ⁶
71.981.49	LDP4(or M1)	12.1	1.30	4.68	x12x	x8	118	60 ⁷
71.981.51	DP4(or M1)	10.0	1.40	—	x9 +	3	—	62 ⁸
*71.981.36	Lm3	8.2	1.40	7.3	24	17	339	106 ¹⁵
71.981.34	Rm3	8.2	1.92	7.8	x23	x14	317	105 ¹⁵
*71.981.45	Lm3	6.9	1.71	8.59	—	ca.18	—	100 + ⁷
71.981.37	Lm2	8.4	1.44	6.58	x16	x6	223	73 ¹⁴
*71.981.42	Lm3	9.2	1.27	—	x10 +	ca.12	—	92 ⁹
71.981.47	Rm2?	8.8	1.47	6.62	—	—	—	—
*71.981.38	Rm1(or m2)	6.6	2.03	9.26	+ 11x	+ 8	+ 188	77 ^V
71.981.52	Rm1(or m2)	9.0	1.52	6.84	—	10 +	—	67 + ⁹
71.981.53	Lm1(or 2,3)	8.9	ca.1.62	—	—	—	—	—
71.983.68	Lm1(or 2,3)	9.8	1.56	7.37	—	—	—	74 + ⁵
71.981.39	Lm1	7.1	2.28	10.35	x12x	x12x	196	ca.78 ⁶
*71.981.40	Rdp4(or m1)	11.9	1.09	4.32	x10 +	ca.6	109 +	59 ⁹
71.981.43	Ldp3	10.4	1.14	6.48	x6x	x6x	69	53 ⁴
71.981.41	?L molar	5.6	3.14	10.29	—	—	—	—
71.981.46	molar	5.6	2.23	8.63	—	—	—	—

1. LF, Lamellar Frequency (no. plates /100 mm.: average of 4 measurements from apex and base, lingual and labial sides); ET, Average Enamel Thickness (perpendicular to enamel surface); LT, Average Lamellar Thickness on Occlusal Surface; P, Number of Plates (x, indicates small terminal folds fused to the base of true plates; +, indicates incomplete specimen); NOP, Number of Plates within the Occluded Portion; L, length (perpendicular to average lamellar plane); W, Maximum Width (taken at plate indicated by superscript: plates numbered from front in Arabic, from rear in Roman numerals); measurement criteria from Maglio (43); *, indicates documented specimen.

TABLE 3. *Mammut americanum* and *Mammuthus* sp., selected postcranial measurements (mm.).¹

	<i>Mammut americanum</i> ²				<i>Mammuthus</i> sp. ³		
	K-----	S-----	P-----	R	Cl-----	S/R-----	Pr
Tibia							
Total length-----	626	687+ mx.697	653	—	922	743	649
Proximal end, transverse width (normal to plane of posterior edge of femur facets)-----	254	255	235	—	292	258	194+ mx.201
Proximal end, anteroposterior depth (perpendicular to plane of posterior edge of femur facets)----	205	189	176	—	232	—	169
Distal end, transverse width-----	187	193	187	—	239+ mx.245	—	171
Distal end, anteroposterior depth (normal to posterior edge)-----	140	149	151	—	193	—	132
Least transverse width of shaft----	99	93	95	—	134	108	105
Least circumference of shaft-----	300	290	292	—	384	330	285
Fibula							
Greatest Length-----	595	661	—	—	—	—	605+ mx.614
Proximal end, greatest antero- posterior diameter-----	83	87	—	—	—	—	54+
Distal end, greatest antero-poster- ior diameter-----	134	144	—	—	—	—	97
Middle of shaft, greatest antero- posterior diameter-----	55	60	—	—	—	—	48
Middle of shaft, transverse dia- meter-----	30	31	—	—	—	—	24
Femur							
Greatest length-----	1079	1104	—	—	—	—	—
Transverse diameter of proximal end, from outer face of greater trochanter to inner side of head, normal to long axis of shaft-----	343	392+	—	—	—	—	—
Greatest anteroposterior diameter of head-----	172	185	—	—	—	—	—
Least transverse diameter of shaft-----	146	166	—	—	—	—	—
Anteroposterior diameter of shaft at above position-----	90	90	—	—	—	—	—
Greatest transverse width of distal end (normal to articular sur- face)-----	272	295	—	—	—	—	—
Greatest width across condyles (normal to line drawn between posterior tips of condyles)-----	247	ca.263	—	—	—	—	—
Least circumference of shaft-----	383	404	—	—	—	—	—
Scapula							
Greatest length from coracoid process to top of scapula, along axis of spine-----	897 (824)	—	(771)	—	—	—	—
External distance from inner border of glenoid cavity to top of spine-----	864 (786)	—	(729)	—	—	—	—

TABLE 3.—Continued

	<i>Mammut americanum</i> ²				<i>Mammuthus</i> sp. ³		
	K-----	S-----	P-----	R	C1-----	S/R-----	P r
Greatest anteroposterior length of glenoid cavity-----	209	—	211	233	—	—	—
Greatest transverse width across glenoid cavity-----	131	—	134	150	—	—	—
Humerus							
Greatest length (greater tubercle to tip of lateral condyle)-----	886	—	—	—	—	—	—
Distal end, transverse width-----	276	313	—	—	—	—	—
Distal end, width across condyle facets-----	224	255	—	—	—	250	—
Distal end, anteroposterior depth (of medial condyle)-----	198	231	—	—	—	213 + mx.220	—
Least transverse diameter of shaft, normal to plane of anterior edge of distal condyles-----	125	143	—	—	—	—	—
Anteroposterior diameter of shaft, perpendicular to point to least diameter and normal to posterior face of shaft-----	117	120	—	—	—	—	—
Least circumference of shaft-----	396	443	—	—	—	—	—
Ulna							
Total length-----	737	—	—	—	—	—	—
Proximal depth, normal to line drawn between tips of radial and coronoid processes, taken at right angles to main axis of shaft-----	297	344	—	—	—	291	—
Least thickness, posterior surface of semilunar notch (at median ridge) to Margo dorsalis-----	168	177	—	181	—	184	—
Width, in plane of articulation, across radial and coronoid processes (floor of semilunar notch)---	235	251	—	274	—	250	—
Least transverse diameter of "neck" of olecranon (measured from above)-----	60	81	—	84	—	91	—
Greatest width across radial process	85	86	—	90	—	96	—
Greatest width across coronoid process-----	155	119	—	ca.136	—	112	—
Length of olecranon, from inner semilunar notch to greatest expansion of olecranon process-----	210	226	—	—	—	202	—
Least transverse width of shaft----	104	110	—	—	—	—	—
Least circumference of shaft-----	340	349	—	—	—	—	—
Radius							
Greatest length-----	651	—	—	626	—	—	—
Proximal end, long diameter-----	113	—	—	112	—	—	—
Width of shaft at middle (normal to flat side)-----	54	—	—	51	—	—	—
Distal end, greatest width-----	163	—	—	151	—	—	—

1. mx, maximum estimated measurement; brackets () indicate measurements taken without superior epiphysis in position.
2. K, Kolarik Mastodon (71.980.50); S, Stroh Mastodon (71.983.73); P, Place Mastodon (71.983.74); R, Reeker Mastodon (71.976.36); Misc., radius Cat#: 71.983.76.
3. C1, large *Mammuthus* tibia (71.983.71); S/R, Swanson/Reichart Mammoth loan; Pr, small Mammoth bones (71.983.72).

Abbreviations used: L, left; R, right; I,C,P,M, upper incisor, canine, premolar and molar, respectively; i,c,p,m, lower teeth; DP,dp, upper and lower deciduous premolars, respectively; vertebrae: C-, cervical, T-, thoracic, L-, lumbar; ribs: L#, left rib, R#, right rib; Mc, Mt, Metacarpal, metatarsal; mm., millimeters; m, meters; mx., maximum estimated measurement; ISM, Indiana State Museum; Cat#, ISM catalogue number; SNA, specimen not apparent; B.P., Before Present (1950 A.D.).

Systematic List of Specimens and Records

Data is presented in four categories: I. Documented specimens; II. Records that cannot be matched with specimens; III., Loans: for exhibition or study and IV., Undocumented specimens. Many of the specimens described by Hay (22, 23) are now lost, or are not apparent among similar materials (SNA).

I. Documented Specimens

Castoroides ohioensis, Giant Beaver

CAT#: 71.981.71 LOCALITY: Boone Co., IN; on the farm of Jas. A. Pratt, near Jamestown. OCCURRENCE: Jaws found in earth thrown out by dredging machine in 1909. MATERIALS: L,R, dentaries with all molars; incisors broken off (Fig.1). DONOR: A.E. Deatley, Lizton. PUBLISHED RECORDS: (6; 22; 23; 28).



FIGURE 1. Right dentary of *Castoroides ohioensis* (71.981.71), Boone Co., IN. A, lateral view. B, occlusal view of tooththrow. Scale in centimeters.

Ursus americanus amplidens Pleistocene Black Bear

CAT#: 71.981.14 LOCALITY: Parker's Pit Cave, NE1/4/NW1/4/SE1/4, Sec. 36, T3S, R2E, Corydon West Quad., Harrison Co., IN. OCCURRENCE: Bones partially encased in flowstone, deep within cave. MATERIALS: Partial skeleton, heavily

fragmented; several teeth. DONOR: Greg McNamara, Oct. 9, 1981. PUBLISHED RECORDS: (68). COMMENTS: Radiocarbon age of $29,970 \pm 1290$ years B.P. (UGa-4741); materials under study by the author.

Mammut americanum, American Mastodon

1. CAT#: 71.981.70 LOCALITY: Northwestern Orange Co., IN. OCCURRENCE: Materials found "in a valley and about 4.5 feet below the surface". MATERIALS: L mandible with m3. Hay recorded 3 teeth in the jaw in 1912. DONOR: Marion F. Mathers, October 13, 1905 (found in 1903). PUBLISHED RECORDS: (22; 23).
2. CAT#: 71.981.69 LOCALITY: Found near Danville, ?Illinois. OCCURRENCE: Unknown. MATERIALS: Very worn, fragmented molar. DONOR: Dr. Vinnage. PUBLISHED RECORDS: (22; 23). COMMENTS: Hay (22) records a worn m2 as being from near Danville, IN; the old label attached to the specimen, however, appears to indicate Danville, Illinois.
3. CAT#: 71.983.73 LOCALITY: ?LaGrange Co., IN.; unearthed near Stroh. OCCURRENCE: Unknown. MATERIALS: L humerus, distal 1/2; R ulna, proximal 1/2; L McIII; L McIV; R femur; R tibia (Fig. 2); R fibula; vertebra L-1; sacra

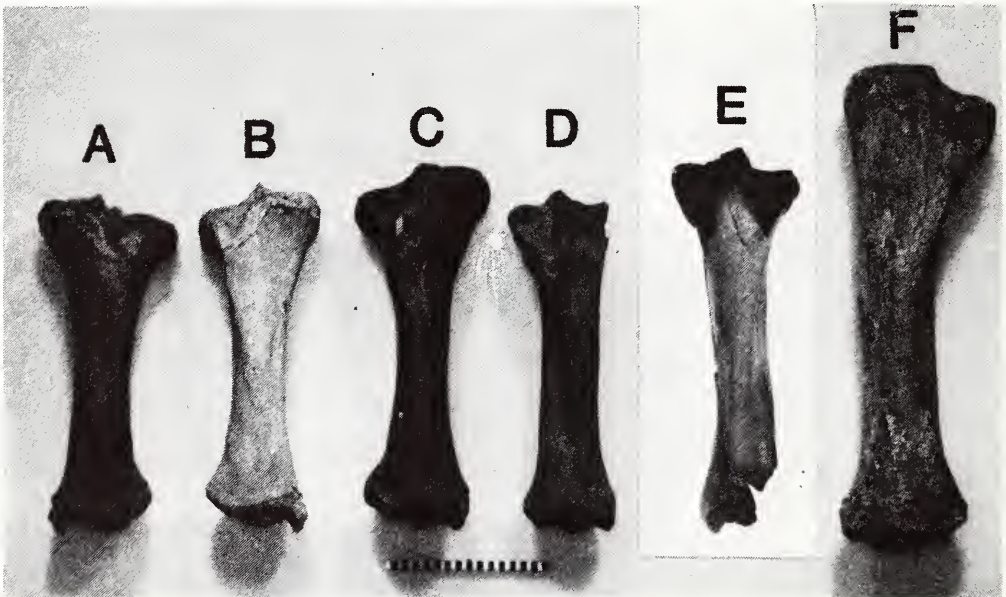


FIGURE 2. *Proboscidean tibiae in the ISM collection. Mammut americanum*: A, Kolarik locality, L tibia (71.980.50); B, Place locality, R tibia (71.983.74); C Stroh locality, R tibia (71.983.73); D, *Mammuthus cf. primigenius*, locality unknown, R tibia (71.983.72); E, *Mammuthus jeffersonii*, Swanson/Reichart loan, L tibia; F. *Mammuthus cf. columbia/imperator*, locality unknown, L tibia (71.983.71). Scale in centimeters.

no. 1; caudal vertebra; Rib L#6, proximal 2/3. DONOR: Loaned, Wabash Portland Cement Co., July 28, 1925. PUBLISHED RECORDS: (30). COMMENTS: A tooth was originally included; it cannot be located (SNA).

4. CAT#: 71.967.41 LOCALITY: Dubois Co., IN. OCCURRENCE: Found in White River at Haysville, Feb., 1967. MATERIALS: RM3 in maxilla portion. DONOR Virgil Carroll and Nelson Cohen, July 12, 1967 (found by Tom Osborne). PUBLISHED RECORDS: Unknown.

5. CAT#: 71.976.36 LOCALITY: SE1/4/NE1/4/SW1/4, Sec. 18, T20N, R8E, Anderson North Quad., Madison Co., IN. OCCURRENCE: Skeleton disturbed while excavating a gravel pit. Bones occurred in mollusk-rich blue clays, overlain by peat (personal communication, Martha Reeker, Nov. 28, 1983). Museum staff recovered bones from spoil heaps, along with elements of a White-tailed Deer (71.983.95) and Canada Goose (71.893.96). MATERIALS: Fragmented skull with LM3, heavily worn RM2, anterolateral root of LM2; ?jugal section; styloid process; fragments of tusk; thyro-hyoid; T-2 spine, T-4, T-6 (or 7, 8), T-7 (or 8,9), T-9 (or 10-11), T-ca.14 (neural arch), T-ca.16 (centrum), T-ca.17; indet. neural arch; neural spine epiphysis, anterior thoracic vertebra; L#1, L#2, L#6 (or 7; proximal 3/4), L#9 (or 10,11; proximal 2/3), L#ca. 15 (or 16, 17; proximal end), R#4, R#ca.6 (or 7,8,9; distal 1/3), R#ca.8 (or 9), R#ca.9 (or 10; proximal 1/4), 3 sections of rib; R scapula; R ulna, proximal end; ?ulna, proximal fragment; proximal epiphysis section of femur head; patella; 2 medial phalanges. DONOR: Mr. and Mrs. Noel Reeker, Spetember 28, 1976. PUBLISHED RECORDS: Unknown. COMMENTS: Local residents retained some of the teeth (RM3 and tusk tip) and bones.
6. CAT#: 71.980.50 LOCALITY: SE1/4/SW1/4/SE1/4, Sec. 36, T32N, R2W, Bass Lake Quad., south-central Starke Co., IN. OCCURRENCE: Skeleton discovered while digging a pond in a bog area. The partially articulated bones occurred in a sandy muck overlying mollusk-rich, blue calcareous clays. Plant macrofossils and fish bones were associated, as well as a caribou antler (71.980.50.154), of uncertain context. MATERIALS: Much of the skeleton of one individual, lacking skull, jaws, anterior vertebral column and parts of the R rear leg (Fig. 2). DONOR: Andrew Kolarik, Aug. 12, 1980. PUBLISHED RECORDS: (11;12). COMMENTS: A major report, including radiocarbon dates, pollen profiles, and a description of the vertebrates, is in progress.
7. CAT#: 71.981.91 LOCALITY: Wayne Co., IN.; found in the Whitewater Valley near Richmond. OCCURRENCE: Unknown. MATERIALS: LM3. DONOR: Ruth Kellum-Dinsen and Robert W. Kellum, Nov. 12, 1981; found in mid-1800's by Jesse Kellum. PUBLISHED RECORDS: Unknown.
8. CAT#: 71.981.94.1 LOCALITY: North of Crawfordsville, Montgomery Co., IN. OCCURRENCE: Found in "gravely" sediments in a ditch during construction of interstate I-74 in the 1960's. MATERIALS: Lm1 (possibly Ldp4). DONOR: Jack Householder, Dec. 29, 1981. PUBLISHED RECORDS: Unknown.
9. CAT#: 71.983.74 LOCALITY: SW1/4/SW1/4/SE1/4, Sec. 15, T35N, R1W, Hamlet Quad., St. Joseph Co., IN (1 1/2 miles W.N.W. of Walkerton). OCCURRENCE: Bones removed by owner while digging a pond; backfill piles were graded, and the site is now unapparent. Bones may have occurred in the peat/loam levels that had overlain the mollusk-rich, calcareous clays (with some fish bone). MATERIALS: Axis; C-3, C-4, C-6, C-7; T-1, T-2, T-4 (or 5), T-5 (or 6), T-6 (or 7), T-7 (or 8,9,10), T-8 (or 9,10,11), T-ca.13, T-ca.14, T-ca.16, T-ca.17; L-1, L-2, L-3, 3 anterior caudals; ribs: L#2, L#5, L#6, L#7 (or 8; proximal 1/2), L#ca.8, L#ca.10 (or 11-14; distal 1/2), L#ca.11 (or 12; proximal 1/2), L#.13 (or 14,15), L#ca.15 (or 16,17; proximal 1/2), L#ca.17 (or 18,19; proximal 1/2), R#1, R#2, R#3, R#4, R#5, R#6 (or 7; distal 1/2), R#ca.8 (proximal 1/3), R#ca.9, R#ca.10, R#ca.11 (or 12), R#ca.12 (or 13,14; proximal 2/3), R#ca.13 (or 14,15; proximal 1/2), R#ca.14 (or 15; proximal 1/3), R#ca. 15 (or 16), R#ca.17 (or 18,19); sternebra (manubrium); R scapula; Mcl; L,R McIII; L,R McIV; L,R McV; L,R cuneiform; R magnum; L innominate, acetabular area with rami sections; patella; R tibia (Fig. 2); R calcaneum; R astragalus; MtI; R MtIII; R MtV; 2 proximal phalanges. DONOR: Elburt F. Place, Sept. 27, 1982; secured by Gary D.

Ellis, Dept. of Historic Preservation and Arthur Mirsky, Dept. of Geology, Indiana-Purdue University, Indianapolis. PUBLISHED RECORDS: Unknown.

Mammuthus sp., Mammoth

1. CAT#: 71.981.38 LOCALITY: Morgan Co., IN.; 1 1/2 miles southeast of Monrovia. OCCURRENCE: Found on a gravel bar in Sycamore Creek. MATERIALS: Rm1 (or 2), posterior portion. DONOR: David M. Hobson, Jan. 11, 1911. PUBLISHED RECORDS: (22; 23; 38). COMMENTS: Hay (22) incorrectly locates Sycamore Creek; it is southeast of Monrovia (Hay, 1923, is correct). Hay records the tooth as a Rm3; the tooth that appears to fit the description is a Rm1 (or 2). The specimen was unlabeled.
2. CAT#: 71.981.40. LOCALITY: Randolph Co., IN.; near Windsor. OCCURRENCE: Found in bed of Stoney Creek. MATERIALS: Rdp4 (or Rm1). DONOR: S.B. Templin, Winchester, IN., Aug. 20, 1983. PUBLISHED RECORDS: (22; 23). COMMENTS: Hay (23) refers to a Rdp3 (now regarded as dp4) or m1, as being in the collection at Earlham College; earlier (22) he referred the Windsor specimen to a Rm3 at the State Museum. The Rdp4, unlabeled, fits Hay's description. There are no records of the Windsor specimen at Earlham College (John Iverson, Director Joseph Moore Museum, oral communication, Nov. 28, 1983).
3. CAT#: 71.981.45 LOCALITY: Vigo Co., IN.; on a farm 3 1/2 miles north of Terre Haute. OCCURRENCE: Found at a depth of 18 feet. MATERIALS: L m3. DONOR: Earl Conover (found 1896 on the farm of Aaron Conover). PUBLISHED RECORDS: (22; 23; 38;). COMMENTS: The specimen was unlabeled; several lamellae are missing from the mid-section of the tooth.
4. CAT#: 71.967.22 LOCALITY: NE 1/4/SW1/4/SW1/4. Sec. 20, T35N, R13E, Waterloo Quad., Dekalb Co., IN. OCCURRENCE: Discovered during construction of interstate I-69. Remains were articulated in mollusk-rich, calcareous clays 8-10 feet below the surface. Jack Householder, who excavated the bones, believes that much of the missing skeleton may have been disturbed during previous installation of drainage tiles (personal communication, Nov., 1983). Other bones may have been located by probing 60-100 feet to the northeast, but were not excavated. MATERIALS: axis, C-6, C-7; T-1 through T-15; ribs: L#1 through L#12, L#13 (proximal 3/4), L#14 through L#17, R#1 through R#9, R#11, R#12, R#15, R#17; sternebra; superior epiphysis of R scapula. DONOR: Elbert Forest; secured on highway right-of-way by Jack Householder, 1967. PUBLISHED RECORDS: Unknown. COMMENTS: Identified as *Mammuthus* sp. by the author.
5. CAT#: 71.968.83.55 LOCALITY: Madison Co., IN. OCCURRENCE: Unknown. MATERIALS: RM1 (or RDP4). DONOR: Earl Townsend, Dec. 24, 1968; found in 1841. PUBLISHED RECORDS: Unknown.
6. CAT#: 71.981.36 LOCALITY: NW 1/4/SW1/4/NW1/4, Sec. 21, T19N, R5E, Riverwood Quad., Hamilton Co., IN. OCCURRENCE: Found in White River bottom. MATERIALS: Lm3. DONOR: Mr. and Mrs. Leland S. Gordon, Dec. 31, 1975; secured by Jack Householder. PUBLISHED RECORDS: Unknown.
7. CAT#: 71.981.42 LOCALITY: NW 1/4, Sec. 12, T18N, R4E, Noblesville Quad., Hamilton Co., IN. OCCURRENCE: Found in gravel pit. MATERIALS: Lm3, anterior 1/2. DONOR: Mr. Beaver, 1978-79; secured by Jack Householder. PUBLISHED RECORDS: Unknown. COMMENTS: Posterior 1/2 of tooth retained by owner.

Mammut americanum, American Mastodon/*Mammuthus* sp., Mammoth

1. CAT#: 71.983.88 LOCALITY: Orange Co., IN; unearthed near Orleans. OCCURRENCE: Unknown. MATERIALS: Section of tusk. DONOR: Unknown.

PUBLISHED RECORDS: This may be the tusk referred to by Hay (22). COMMENTS: This tusk also fits the description of the Belt Railroad specimen (22).

2. CAT#: 71.983.85 LOCALITY: Marion, Grant Co., IN. OCCURRENCE: Found in Boots Creek, south of the 14th Street. MATERIALS: 2 ribs: L#7 (or 8,9); R#4. DONOR: R.E. Hulley, Sept. 24, 1923. PUBLISHED RECORDS: (29).

3. CAT#: 71.983.87 LOCALITY: ?Jasper Co., IN. OCCURRENCE: Unknown. MATERIALS: Axis centrum (juvenile). DONOR: Dr. Loughridge, Rensselaer, Jasper Co., IN. PUBLISHED RECORDS: Unknown. COMMENTS: Specimen had label affixed.

Odocoileus virginianus, White-tailed Deer

CAT#: 71.983.95 LOCALITY: Reeker Mastodon Locality (71.976.36; see above). MATERIALS: Antler portion; 2 antler tines; R scapula; R humerus; R radius; L tibia; R Mt, proximal section and 2 Mt shaft sections. PUBLISHED RECORDS: None.

Rangifer tarandus, Caribou

CAT#: 71.980.50.154 LOCALITY: Kolarik Mastodon Locality (71.980.50; see above). OCCURRENCE: Found in sediments ?below Mastodon. Antler removed by Andrew Kolarik when digging pond, after completion of Mastodon dig. Stratigraphic position uncertain. MATERIAL: R antler, lacking most of terminal tine. PUBLISHED RECORDS: (12).

Cervus elaphus, Wapiti

CAT#: 71.981.72 LOCALITY: ?Jasper Co., IN. OCCURRENCE: Unknown. MATERIALS: R antler, basal section. DONOR: Dr. Loughridge, Rensselaer, Jasper Co. PUBLISHED RECORDS: (21; 22; 23; 38). COMMENTS: There is no evidence to presume that the antler is of Pleistocene age as suggested by Lyon (38).

Branta canadensis, Canada Goose

CAT#: 71.983.96 LOCALITY: Reeker Mastodon Locality (71.976.36; see above). MATERIALS: L humerus shaft section. PUBLISHED RECORDS: None.

II. Records that Cannot be Matched with Specimens

Castoroides ohioensis, Giant Beaver

LOCALITY: Madison Co., IN.; found near Summitville. OCCURRENCE: Unknown. MATERIALS: R I in premaxilla. DONOR: T.F. Cartwright. PUBLISHED RECORDS: (6; 22; 23; 38). COMMENTS: Specimen not in ISM collections.

Mammut americanum, American Mastodon

1. LOCALITY: Southern Jackson Co., IN: Judah's Creek (a branch of Mill Creek). OCCURRENCE: Found on creek bank. MATERIALS: "Large molar tooth". DONOR: James Duncan. PUBLISHED RECORDS: (10; 22; 23). COMMENTS: Other bones disintegrated upon exposure. SNA

2. LOCALITY: Marion Co., IN; at Pennsylvania and 30th streets, Indianapolis. OCCURRENCE: Recovered by workmen while excavating for a sewer. MATERIALS: Rm3. DONOR: Charles Dennis. PUBLISHED RECORDS: (22; 23). COMMENTS: SNA; 71.981.64 might possibly be the tooth.

3. LOCALITY: Putnam Co., IN; found near Greencastle. OCCURRENCE: Unknown. MATERIALS: Rm3. DONOR: John G. Sweeney. PUBLISHED RECORDS: (22; 23). COMMENTS: SNA; 71.983.62 might possibly be the tooth.

4. LOCALITY: From near Greenfield, ?Hancock Co., IN. OCCURRENCE:

Unknown. MATERIALS: Two "Mastodon teeth". DONOR: Lewis A Kiefer, March 7, 1927. PUBLISHED RECORDS: Unknown. COMMENTS: SNA.

5. LOCALITY: LaPorte Co., IN. OCCURRENCE: Unknown. MATERIALS: "6 mastodon bones from LaPort Co.". DONOR: Miss Oran Hay, Sept. 16, 1929; from the collection of Frank Hay, Bass Lake. PUBLISHED RECORDS: (32). COMMENTS: SNA.

6. LOCALITY: Unknown. OCCURRENCE: Unknown. MATERIALS: "3 pieces mastodon teeth". DONOR: William Hauck, Sept. 19, 1930; collection of John A. Bense, 5 miles south of Greencastle, IN. PUBLISHED RECORDS: (33). COMMENTS: SNA; might possibly include 71.981.78 fragments.

7. LOCALITY: Whitley Co., IN.; Blue River Valley. OCCURRENCE: Found in gravel pit. MATERIALS: "Mastodon tooth". DONOR: V.Y. Chittick. PUBLISHED RECORDS: Unknown. COMMENTS: SNA.

Mammuthus sp., Mammoth

1. LOCALITY: Carroll Co., IN.; found near Bringhurst. OCCURRENCE: Unknown. MATERIALS: m3. DONOR: John Flora. PUBLISHED RECORDS: (22; 23; 38). COMMENTS: SNA: 71.981.34 has some similarities to the tooth described by Hay (22; 23).

2. LOCALITY: Jackson Co., IN.; near Brownstown. OCCURRENCE: Taken from a stream. MATERIALS: 2 teeth; 2 tusks; part of lower jaw; fragments. DONOR: Recovered by Ralph Esarey and assistants, Bloomington; donated Nov. 23, 1929. PUBLISHED RECORDS: (33). COMMENTS: SNA.

3. LOCALITY: Unknown. OCCURRENCE: Unknown. MATERIALS: "Mammoth Tooth." DONOR: Clint Perry, Indianapolis. PUBLISHED RECORDS: (28). COMMENTS: SNA.

4. LOCALITY: Unknown. OCCURRENCE: Unknown. MATERIALS: "Portion of the tooth of a mammoth." DONOR: J.M. Larsh, Indianapolis. PUBLISHED RECORDS: (28). COMMENTS: SNA.

Mammut americanum, American Mastodon/*Mammothus* sp., Mammoth

LOCALITY: Marion Co., IN.; near the Belt Railroad. OCCURRENCE: Unknown. MATERIALS: Section of tusk about 600 mm. long and 100 mm. in diameter. DONOR Americus Fish. PUBLISHED RECORDS: (22). COMMENTS: Hay (22) identified the tusk as that of a Mastodon. The description is similar to that of 71.983.88, thought to be from Orange Co. SNA.

Cervus elaphus, Wapiti

1. LOCALITY: Newton Co., IN.; near Foresman. OCCURRENCE: Unknown. MATERIALS: "1 antler, length about 1200 mm. and base diameter 94 mm.; 5 tines." DONOR: D.E. Howe, 1884. PUBLISHED RECORDS: (21; 22; 23; 38). COMMENTS: Specimen not in ISM collection. There is no evidence to presume the antler to be of Pleistocene age, as suggested by Lyon (38).

2. LOCALITY: Marion Co., IN.; at west Morris Street on Eagle Creek. OCCURRENCE: Recovered 45 feet below the surface by the Kaster Gravel Co. MATERIALS: Antler. DONOR; R.C. Kaster, Sept. 6, 1924. COMMENTS: SNA.

?*Odocoileus virginianus*, White-tailed Deer and *Equus* sp., Horse

LOCALITY: Decatur Co., IN. OCCURRENCE: Found in a gravel pit. MATERIALS: "Jaw of a horse and deer antlers". DONOR: McNeely Bros., St. Paul, IN. PUBLISHED

RECORDS: (33). COMMENTS: SNA. Information insufficient to presume Pleistocene age.

III. Records of Loans to ISM: for Study or Exhibition

Mammut americanum, American Mastodon

1. LOCALITY: Marion Co., IN.; north of Raymond Street, Indianapolis. OCCURRENCE: Unknown. MATERIALS: "Mastodon tooth". LOANED BY: A.D. Wixson, Oct. 16, 1924. PUBLISHED RECORDS: (30). COMMENTS: Museum records locate the tooth south of Raymond Street.

2. LOCALITY: Dekalb Co., IN.; Keyser Township, 2 miles south of Garrett. OCCURRENCE: Found while probing ground for drain tile. Bones associated with wood, in a marly clay. MATERIALS: Partial skeleton. LOANED BY: Found on highway right-of-way in 1934. PUBLISHED RECORDS: (34; 38; 72). COMMENTS: Owner later claimed the skeleton.

3. LOCALITY: ?Owen Co., IN.; near Gosport. OCCURRENCE: Plowed up in field. MATERIALS: RM2. LOANED BY: William Stapelkemper, 1982 to Gary Ellis, archaeologist, Division of Historic Preservation. PUBLISHED RECORDS: Unknown. COMMENTS: The tooth, examined by the author, had a length of 110 mm. and a width across the metaloph of 83.5 mm.

Mammuthus jeffersonii, Jefferson's Mammoth

LOCALITY: SW 1/4/SW 1/4/NW 1/4, Sec. 21, T21N, R7E, Alexandria Quad., Masidon Co. IN. (1 1/2 miles S.W. of Orestes). OCCURRENCE: Fragmented bones were discovered in landfill 1 mile west of Alexandria (SW 1/4/SE 1/4/SE 1/4, Sec. 15, T21N, R7E, Alexandria Quad., Madison Co.) by Vern Swanson. The fill apparently came from the excavation for a pond on the Reichart property, though no bones were actually located there. The bones were associated with a clayey silt matrix, including some blackened gravel. Mollusks and other vertebrates were lacking in sediment samples washed through a 1.5 mm. sieve. MATERIALS: Cranial fragments; tusk fragments; 2 caudal vertebrae; L posterior rib, proximal section; R scapula, glenoid cavity area; R humerus, distal shaft; L humerus, distal articulation; L ulna, proximal articulation; L scaphoid; L lunar; L trapezium; pelvic section, including part of acetabulum; R femur, lateral shaft section; L tibia (Fig. 2); (?)R fibula shaft and many fragments. LOANED BY: Vernon Swanson and Brian Reichart, Dec., 1983. PUBLISHED RECORDS: None. COMMENTS: Materials were conserved, photographed and measured at the ISM. Assigned to *M. jeffersonii* on length of tibia (743 mm.; Table 3).

IV. Undocumented Specimens

Mammut americanum, American Mastodon

Fourteen undocumented teeth and their measurements are included in Table 1. Many are quite fragmentary. CAT#: 71.981.60 (LM3) and 71.981.63 (LM2) are from the same individual.

ADDITIONAL MATERIALS: CAT#: 71.981.78, 4 fragments of teeth;

CAT#: 71.983.83, atlas; CAT#: 71.983.76, R radius.

Mammuthus sp., Mammoth

Fifteen undocumented teeth and their descriptions are included in Table 2. Many are just fragments. Three tooth sections (71.981.52, 71.981.53 and 71.983.68) may be from the same individual.

ADDITIONAL MATERIALS:

1. CAT#: 71.983.69 MATERIALS: 3 separated lamellae of a tooth.
2. CAT#: 71.983.71 MATERIALS: atlas; lumbar vertebra, L-2 (possibly L-1); L

dentary, outer face section; L tibia (Fig. 2) and Lm2 (71.981.37). COMMENTS: The immense bones suggest *Mammuthus columbi* or *imperator*. The tooth characters, however, indicate a more “progressive” Mammoth, perhaps a European form. The remains appear not to be from Indiana.

3. CAT#: 71.983.72 MATERIALS: R tibia (Fig. 2); R fibula; R calcaneum; R astragalus. COMMENTS: The small elephant bones are probably from *Mammuthus primigenius*; they are probably not from Indiana.

Mammut americanum, American Mastodon/*Mammuthus* sp., Mammoth
CAT#: 71.983.86 MATERIALS: rib R#6 (or 7, 8, 9). EXPENDABLE MATERIALS: A L femur diaphysis, glenoid cavity area of a scapula, fragmented humerus, thoracic vertebra and several fragments were too poorly preserved and documented to be catalogued into the collection.

Family Megalonychidae/Myodontidae, Sloth sp.

CAT#: 71.983.75 MATERIALS: L rib, posterior area of column. COMMENTS: *Megalonyx jeffersonii* and *Glossotherium harlani* are the sloths of the region (26). The rib compared well with, but was from a smaller individual than the large *M. jeffersonii* cast skeleton (of the Darke Co., Ohio specimen) in the Cincinnati Museum of Natural History.

Other Materials

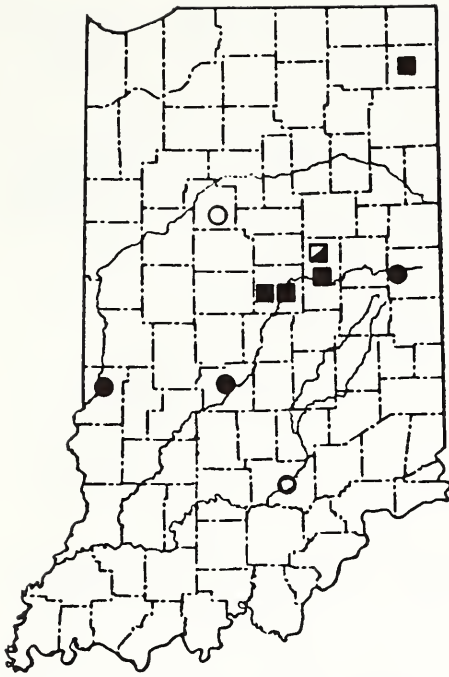
A left dentary of a horse (71.981.74) and several bovid bones (cf. *Bison bison*), thought to be of Holocene age, are not treated here.

Discussion

The ISM Pleistocene vertebrate collection consists primarily of the remains of large mammals, especially those of Mastodon and Mammoth. Proboscidean localities are summarized in Figures 3 and 4.

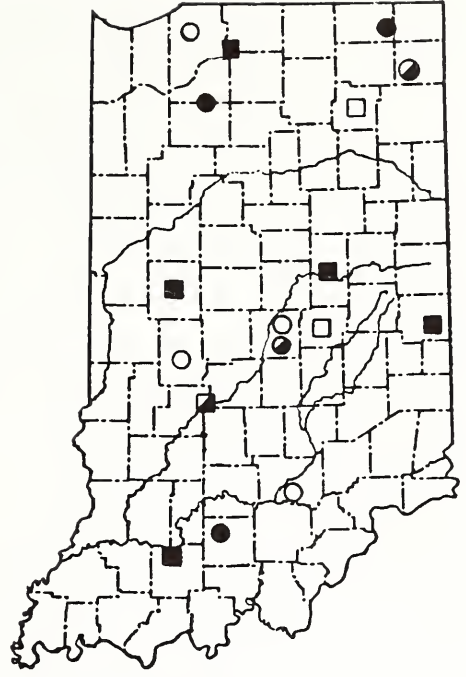
Most of the Mastodon (*Mammut americanum*) teeth were of the medium and small size range (Table 1) when comparing M3/m3 measurements with those from Missouri (71) and from the collections at the University of Michigan (73). Two teeth (71.976.36.1; 71.981.68), however, were of large size. The Reeker Mastodon had the largest bones, followed by the Stroh, Kolarik and Place Mastodons (Table 3; Figure 2). In general, limb bones compared with the medium size of those from Missouri (71). Teeth and bones from the Christensen Mastodons, Hancock Co., IN. were also from small to medium-sized individuals (19). The Mastodon appears to display sexual dimorphism as well as geographic variation in size (19).

North American mammoths have had a chaotic taxonomic history. Hay (22; 23), using the dental criteria of earlier workers, separated regional mammoths into *Mammuthus primigenius* (Woolly Mammoths) and *M. columbi* (Columbian Mammoths) (58). In 1922 Osborn reassigned the specimens formerly designated as *M. columbi* (with vague characters of the type specimen) to a new species, *M. jeffersonii* (Jefferson’s Mammoth, type specimen from Jonesboro, IN) (57). More recently, regional mammoths once assigned to *M. primigenius* as well as *M. columbi* are all believed to be *M. jeffersonii* (26; 40; 73; letter, C.T. Madden, Aug. 6, 1981). Some authors consider *M. jeffersonii* to be a progressive subspecies of *M. columbi* (4; 18; 43). Maglio (43) iterates that species delineation is arbitrary in a continuously evolving “species lineage”, and that it is more important to assign an individual within the evolutionary sequence.



Mammothus sp.

FIG. 3



Mammut americanum

FIG. 4

LEGEND

- Specimen (unpublished) ● Specimen (published)
- SNA (unpublished record) ○ SNA (published record)
- ▣ Loan (unpublished record) ◐ Loan (published record)

FIGURE 3. AND 4. *Specimens and records of Mammoths (Mammothus sp.) and Mastodons (Mammut americanum) in the collections of (or previously on loan to) the Indiana State Museum. SNA = particular specimen not apparent among similar specimens (no catalogue numbers present).*

The small *Mammothus primigenius* (shoulder height ca. 2.8 m.) is a late arrival from the Beringia; it inhabited the tundra and conifer areas in northern North America. The M3/m3 had 20-27 plates (P), a lamellar frequency (LF) of 7-12 and an enamel thickness (ET) of 1.0-2.0 mm. (43). *M. jeffersonii*, 3.2-3.4 m. at the shoulder, inhabited the prairies of much of temperate North America; progressive populations had M3/m3 with 24-30P, LF of 7-9 and an ET of 1.5-2.0 (43). *M. columbi* was abundant in many environments in northwestern North America, and western and southern United States (P = 15-22; LF = 4.1-8.3; ET = 1.1-3.4) (41;42). *M. imperator*, the largest North American mammoth (to 4.0 m. at the shoulder) inhabited the southern and southwestern United States; its teeth has fewer plates, a lower LF and thicker enamel than those of *M. columbi*. Specimens occur that are intermediate between all of the species.

Most of the ISM teeth fall within the range of characters of *M. jeffersonii* and *M. primigenius* teeth (Table 2). Because most have characters that approximate the average of *M. jeffersonii*, the only mammoth definitely identified from the region, they probably represent that taxon. Cary Madden, examining photographs, observed that most appeared to represent *M. jeffersonii* (letter, Aug. 6, 1981). *M. primigenius*, however, might possibly be included. A lower molar (71.981.41) with very coarse

characters is assigned to *M. cf. columbi*. As taxonomies become more refined, the data presented may allow better assignment to species.

Tibiae (with epiphyseal union completed) fall into three sizes (Fig. 2). The ratio of tibia length (735 mm.) to shoulder height (3.2 m.) of the Jonesboro *M. jeffersonii* (22; 56) is 23%. Accordingly, the Swanson/Reichart tibia (743 mm.) represents an animal of similar size (*M. jeffersonii*), the small tibia (71.983.72) (646 mm.) an animal 2.8 m. (*M. cf. primigenius*) and the large tibia (71.893.71) (918 mm.) an animal 4.0 m. (*M. cf. columbi/imperator*). The latter two are probably not Indiana specimens. Future work will determine if the Columbian Mammoth once ranged into Indiana.

In overview, most of the materials in the ISM collection are from donations of large "spectacular" bones. Little field recovery was done by staff on undisturbed sites. Because of this, paleoecological interpretations involving radiocarbon dates, pollen analysis, and the interpretation of mollusks, sediments and associated microfauna are lacking (exception: Kolarik Mastodon locality). Little taphonomy can be studied on such disturbed sites to understand how and why the animals accumulated.

What has been recorded is the identifications and locations of the animals; this adds to the knowledge of distribution and abundance. Materials have been given complete listing, indicating the available comparative specimens for future workers. Measurements have been given, and others kept on file, to help establish a data base on the range of variation in size of regional proboscideans.

An up-to-date list of the Pleistocene vertebrates now known from Indiana is appended. The occurrence of Pleistocene vertebrates in Indiana was summarized by Cope and Wortman (1885), Thompson (1886), Hay (1912 and 1923), Moodie (1929) and Lyon (1936) (9; 76; 22; 23; 47; 38). Kurten and Anderson (1980) summarized decades of Pleistocene mammalogy (26). They included, however, few references to Indiana materials. Many new taxa have been recovered since the accounts of Lyon. (1936).

Late Pleistocene faunas are in general composed of extinct, extralocal (taxa occurring out of their modern ranges) and modern resident species, as noted by Lundelius (35) for central Texas. Only extinct and extralocal taxa documented by fossils will be listed for Indiana. Taxa that should have occurred in Indiana, though have not yet been adequately documented by fossils (eg. *Bison latifrons*, Giant Bison and *Ursus arctos*, Grizzly Bear) are not included. The list includes locations by county with primary (though not exhaustive) literature. This will enable workers to add the Indiana range data to the total species distribution. Listings preceded by the number of localities are believed to be complete. A double asterisk (**) follows the names of persons presently studying or supplying information on particular specimens.

Extinct Vertebrates of the Indiana Pleistocene

Mammalia

Family Megalonychidae

Megalonyx jeffersonii, Jefferson's Ground Sloth. 3 LOCALITIES: Daviess (Sparling **, *M. cf. jeffersonii*); Martin (1); Vanderburgh (22; 23; 27; 38). A Switzerland Co. record (82) is poorly documented.

Family Dasypodidae

Dasypus bellus, Beautiful Armadillo. 3 LOCALITIES: Daviess (78; 79); Monroe (65; Richards**); Lawrence (Richards**).

Family Castoridae

Castoroides ohioensis, Giant Beaver. Numerous LOCALITIES: (1; 6; 13; 19; 22; 23; 38; 48; 49; 50; 51; 53; 78; 79).

Family Canidae

Canis dirus, Dire Wolf. 2 LOCALITIES: Monroe (54; 60; 81); Vanderburgh (TYPE SPECIMEN: 22; 23; 27; 38).

Family Ursidae

Ursus americanus amplidens, Pleistocene Black Bear. 1 LOCALITY: Harrison (68; Richards**).

Arctodus simus, Giant Short-faced Bear. 1 LOCALITY: Fulton (68; Richards and Turnbull**).

Family Felidae

Panthera onca augusta, Pleistocene Jaguar. 1 LOCALITY: Monroe (54; 60; 81).

Family Machairodontidae

Smilodon fatalis, Sabertooth. 1 LOCALITY: Monroe (54; 60; 81).

Family Mastodontidae

Mammuth americanum, American Mastodon. The most numerous of regionally recorded material. Numerous LOCALITIES: (eg. 8; 11; 12; 15; 17; 19; 22; 23; 25; 38; 39; 44; 46; 52; 62; 72; 80; 84).

Family Elephantidae

Mammuthus jeffersonii, Jefferson's Mammoth. All Indiana *Mammuthus* are provisionally assigned to this taxon. Numerous LOCALITIES: (eg. 8; 22; 23; 38; 55; 56; 57, TYPE SPECIMEN; 59; 63; 83; 85).

Family Tapiridae

Tapirus haysii, Hay's Tapir. 1 LOCALITY: Vanderburgh (22; 23; 27; 38).

Family Equidae

Equus cf. *complicatus*, Complex-toothed Horse. 3 LOCALITIES: LaPorte (37; 38); Monroe (60); Vanderburgh (22; 23; 27; 38).

Family Tayassuidae

Platygonus vetus, Leidy's Peccary. 2 LOCALITIES: Lawrence (22; 23; 38); Monroe (54; 60; 81).

Platygonus compressus, Flat-headed Peccary. 3 LOCALITIES: Allen (20); Marion (Munson**); Wabash (9; 22; 23; 38).

Mylohyus nasutus, Long-nosed Peccary. 5 LOCALITIES: Daviess (78; 79); Gibson (TYPE SPECIMEN: 9; 22; 23; 38); Jennings (ulno-radius in the Joseph Moore Museum, Earlham College); Monroe (2 localities: Munson**).

Family Camelidae

Camelops sp., Camel. 1 LOCALITY: Harrison (Richards**).

Family Cervidae

Cervalces scotti, Stag-Moose. 3 LOCALITIES: Allen (14); Pike (69); St. Joseph (16).

Family Bovidae

Bison antiquus, Ancient Bison. 1 LOCALITY: Knox (22; 23; 38; 45).

Symbos cavifrons, Woodland Musk-ox. Several LOCALITIES: (eg. 22; 23; 36; 37; 38; 61; there have been additional recent finds in Knox, Kosciusko, Marion, Owen and Parke counties: Munson**).

**Extralocal Vertebrates: Living Taxa that Ranged into Indiana
during the Late Pleistocene**

Mammalia

Family Talpidae

Parascalops breweri, Hairy-tailed Mole. 3 LOCALITIES: Lawrence (66, probably Holocene); Monroe (2 localities: 60; 66).

Family Soricidae

Sorex arctius, Arctic Shrew. 1 LOCALITY: Harrison (Richards**).

Sorex fumeus, Smoky Shrew (large). 1 LOCALITY: Harrison (67; Richards**).

Family Cricetidae

Oryzomys cf. palustris, Marsh Rice Rat. 3 LOCALITIES: Harrison (2 deposits, probably Holocene: 65); Monroe (65); Vanderburgh (Holocene: 2; 3).

Clethrionomys gapperi, Boreal Red-backed Vole. 4 LOCALITIES: Daviess, Harrison (2 localities) and Lawrence: (Richards**).

Phenacomys cf. intermedius, Heather Vole. 3 LOCALITIES: Lawrence, Harrison (Richards**); Parke (Fay**).

Family Cervidae

Rangifer tarandus, Caribou. 2 LOCALITIES: Hancock (19, 46); Starke (12).

Family Bovidae

Ovibos moschatus, Muskox. 1 LOCALITY: Wayne (22; 23; 38).

**Extralocal Vertebrates: Living Species with Reduced Ranges in Indiana
since the Late Pleistocene.**

Reptilia

Family Colubridae

Opheodrys vernalis, Smooth Greensnake. 1 LOCALITY: Monroe (24).

Family Anguidae

Ophisaurus cf. attenuatus, Western Ophisaur. 1 LOCALITY: Greene (Richards**). Age unknown.

Mammalia

Family Talpidae

Condylura cristata, Star-nosed Mole. 1 LOCALITY: Daviess (Richards**).

Family Geomyidae

Geomys cf. bursarius, Plains Pocket Gopher. 3 LOCALITIES: Harrison, Lawrence (Richards**); Monroe (60).

Family Sciuridae

Spermophilus tridecemlineatus, Thirteen-lined Ground Squirrel. 2 LOCALITIES: Lawrence (Richards**); Monroe (66).

Family Cricetidae

Neotoma floridana, Eastern Woodrat. Numerous LOCALITIES: (5; 60; 64); new localities: Jefferson, Jennings and Shelby counties (Richards**).

Family Mustelidae

Martes pennanti, Fisher. 3 LOCALITIES: Daviess (78); Harrison (Richards**); Tippecanoe (18th century: Martin**).

Spilogale putorius, Spotted Skunk. Several LOCALITIES: (5; 60; 64; 66; Richards**). Some are of Holocene age.

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