

Description of the fossil bones of the Megalonyx, discovered in 'White Cave,' Kentucky / by R. Harlan.

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Publication/Creation

[Philadelphia] : [publisher not identified], [1831]

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*Description of the Fossil Bones of the Megalonyx,
discovered in "WHITE CAVE," Kentucky. By
R. HARLAN, M. D.*

[Read March 8th, 1831.]

MEGALONYX laqueatus.

For many years it was ascertained that the collection of fossils in the cabinet of the late Mr. Clifford of Kentucky, contained some of the remains of a Megalonyx. On the death of this gentleman, his whole collection passed into the hands of Mr. Dorfeuille, proprietor of the Cincinnati Museum,—who added a very extensive collection of fossils of almost every variety, principally from the Basin of the Mississippi. During the summer of 1829, this collection was offered for sale; when my estimable friend *John Price Wetherill*, Esq. with that distinguished liberality which he has so repeatedly displayed towards the sciences and those who cultivate them, authorized me when on a visit to Cincinnati in the autumn of the same year, to purchase these invaluable reliques, which, together with other admirable contributions in this department, he has caused to be arranged in the cabinet of the Academy of Natural Sciences of Philadelphia.

The fossil bones which form the immediate subject of the present dissertation were labelled "White Cave," Kentucky; being one of those saltpetre caves

so numerous in the limestone formation, in the states of Kentucky, Tennessee, and Virginia. One of them named the "Mammoth Cave," Kentucky, is said to extend thirteen miles, and runs under Green River. During the late war the United States government was supplied with nitre from these caves, which salt, it is said, is not regenerated so soon as usual in other countries; the atmosphere within them is exceedingly dry and antiseptic; Indian Mummies, which consist of human bodies simply desiccated, together with their ornaments, have been frequently discovered in a state of high preservation; and bones of the existing species of animals have occasionally been observed.*

* From a communication received from my intelligent friend Dr. Black, late of Kentucky, we copy the following extract relative to the *White Cave*.

"The Cave is located in Edmondson County, Kentucky, on the Southern bank of *Green River*—130 miles distant, following the course of the stream, and 50 miles, in a direct northern line, from the Ohio river—120 miles S. W. of Lexington. It penetrates the second or upper bank of the river nearly at its summit, about half a mile from the mouth of Mammoth cave. The entrance dips a little below the horizon, and is 8 or 10 feet deep, and is only sufficiently large to admit of the simultaneous ingress of one person feet foremost. The first chamber is of an irregular elongated oval shape, with a low, flat, uneven roof, seldom allowing a grown person to stand erect. Water continually dropping from the ceiling keeps the floor very wet, this is irregular, and covered with a thin layer of alluvial soil—mud or clay and gravel. The second chamber differs from the first in having the ceiling covered with quill-like stalactites, and its floor more level, is intersected with small channels of running water, so transparent, as to be scarcely perceptible.

Along with the remains of the *Megalonyx*, we have received portions of skeletons of the *Bos*, the *Cervus*, the *Ursus*, and a metacarpal bone of the human species. The remains of the Bear alone appear to be nearly as ancient as those of the *Megalonyx*. Strictly speaking, these bones are not fossilized; they retain a very considerable quantity of animal matter, but are much more brittle and lighter than recent bones; most of the articulating surfaces are still more or less covered with cartilage: they are mostly of a yellow ochreous colour: it is stated that they were found on the surface of the floor of the cave; whilst those of the *Megalonyx Jeffersonii* were buried two or three feet beneath the surface, and are completely fossilized; they are still in very good preservation in the cabinet of the American Philosophical Society.

The remains of the new *Megalonyx*, consist of two claws of the fore feet; a radius, humerus, scapula, one rib, and several remnants; os calcis, tibia, a portion of the femur; four dorsal, and one lumbar vertebræ; a portion of a molar tooth; together with several epiphyses: the bones being portions of the skeleton of a young animal, are occasionally imperfect at their extremities.

The third chamber is more regular than either of the others, and is chiefly distinguished by an irregular pile of limestone, which has evidently fallen from above, and very probably closes the passage to other chambers. Saltpetre, so common in other caves, has not been detected in this."

In the same collection there are a humerus nearly perfect, and a metacarpal bone of an adult animal of the same species, disinterred subsequently at that almost universal cemetery of fossil quadrupeds, "Big-bone lick."

The bones of the fore arm and fore foot, together with a single tooth of the "*Megalonix Jeffersonii*" discovered in 1796 in a cavern in Green Briar county, Virginia, (vid. Cuvier Anim. foss. vol. v. part 1. ed. 3. p. 160.) are the only portions of the skeleton of this genus hitherto obtained. On comparison of the similar parts of the skeleton of the new animal, they will be found to display strong characters of specific distinctions.

In addition to the *Megatherium* and *Megalonix*, so elaborately described by Baron Cuvier in his "Ossemens fossiles," this author has furnished us with indications of the existence of two other fossil quadrupeds of the order Edentata; one of these he refers to the genus "*Manis*," but of immense magnitude, when compared to the largest of that genus now existing, if we may judge from the size of an ungueal phalanx, which was disinterred in the vicinity of Eppelsheim, canton of Alzey, on the Rhine. This fossil quadruped may have been twenty four feet long.

The other fossil to which the Baron alludes, is an armadillo, (*Dasypus*) more than ten feet in length, lately discovered in the alluvium of the "Rio del

Sauce'' in the vicinity of Montevideo; this animal was evidently covered with scales, and its femur, which weighed seven pounds, is said to resemble in every respect that of the armadillo.

With these preliminary remarks, we proceed to the description of the bones in question, commencing with those which we are enabled to compare with similar bones of its kindred species: these latter being already minutely and accurately described in the Anim. foss., it is only necessary to note the points of dis-similitude.

1. The largest claw or ungueal phalanx, which appears to belong to the medius, in general contour resembles that of the *M. Jeffersonii*; but is much thicker and stronger, being one half as high as it is long, measured posteriorly; and is more curved at the point, and more abruptly arched above;—the inferior osseous plate or tubercle, is globular, and protuberant, and in place of two foramina as in *M. J.*, the vessels entered a notch, at the posterior base of the tubercle, and run in a direction parallel to the axis of the bone, but the artery soon divides, one branch penetrating the substance of the bone, within the osseous sheath, another running upwards between the bone and nail; as is demonstrated by a groove and foramen. The osseous sheath, which rises upward and appears to have spread from the tubercle, is broken off from both sides. The articulating surface, and the whole

aspect of the bone, denotes a much more powerful instrument than the same bone of the adult species to which it is allied. Vid. table of dimensions at the end of this paper, and pl. 12. fig. 1 and 2.

2. The second claw or that of the annular finger, is smaller, and proportionably more slender, and bears the same comparison as the first to the annular claw of the *M. Jeffersonii*, but is a much more interesting specimen on account of the *preservation of the nail itself*, which is of a compact lamellated corneous structure, of a reddish ferruginous tint, and adheres closely to the bone beneath, and to the osseous sheath above, which is fractured and removed on the exterior side, and shows the nail passing upwards and backwards as far as the articulating eipiphysis, pl. 12. fig. 3. The inferior or cutting edge of the claw or nail is canaliculate, as in the *Bradypus tridactylus*.—At the inferior portion of the claw, the corneous substance is three tenths of an inch in thickness.

On the interior surface the osseous sheath is perfect, and extends above the dorsum of the bone, vid. pl. 12. f. 4. This phalanx is much more curved than that of the *M. Jeff.* and differs also in its relative proportions; its height is about one third its length. Vid. table of dimensions.

All the claws in this species, as well as in those of the *M. Jeffersonii*, were evidently furnished with osseous sheaths, but are broken in the specimens of the last named species; a fact which could not be so

readily ascertained by examining the plaster casts of the bones alone; in which respect again the *Megalonyx* is more closely allied to the sloth.

3. The contour of the superior head of the *radius* is circular, as in the *Megalonyx Jeffersonii*;—and in its general aspect this bone resembles that of the last named species, but is proportionably thinner, narrower, and longer;—cartilaginous matter remains adhering to the articulating surfaces. The epiphysis from the radio-carpal extremity is lost. Vid. pl. 12. fig. 5. anterior, and fig 6. posterior view.

4. The fractured *molar tooth*, appears to have belonged to the inferior maxilla on the right side; the crown is destroyed; a part of the cavity of the root remains. The body is compressed transversely, and presents a double curvature, which renders its anterior and exterior aspects slightly convex; the posterior and interior gently concave; these surfaces are all uniform with the exception of the interior or mesial aspect, which presents a longitudinal rib or ridge one half the thickness of the long diameter of the tooth; with a broad, not profound, longitudinal groove or channel along each of its borders. It is from this resemblance to a portion of a fluted column, that the animal takes its specific appellation.

The crown would resemble an irregular ellipsis widest at the anterior portion.—The tooth consists of a central pillar of bone surrounded with enamel, the former of a dead white, the latter of a ferrugin-

ous brown colour: the transverse diameter is more than two thirds less than its length, whilst that of *M. Jeffersonii* is only one third less—the antero-posterior diameter is one half its length in the former, and two thirds less in the latter. The proportions of this tooth are consequently totally at variance with that of its kindred species. (Vid. pl. 12. fig. 7. 8. 9. *a.* exterior,—*b.* interior,—*c.* crown.)

5. *Os humeri*.—The portions of the skeletons of this genus, which remain to be described, being heretofore unknown, our means of comparative observation as regards its kindred species are at an end; among its congeners however, there exists ample means of comparison. In the *form* of the humerus of the *Orycteropus*, for example, we find the almost exact counterpart of that now under notice. (Vid. Anim. foss. vol. 5. part 1. pl. 12. fig. 2. Ed. 3.)

It has already been remarked that the individual whose bones are above described, was at death a young animal, perhaps one third less than the adult size; consequently the epiphyses are generally separated, and in some instances lost: this is the case with the arm bone. Being in possession of a larger and much more perfect specimen of a fossil humerus of the same species from Big-bone-lick, we shall draw our descriptions from this;—merely remarking of the former, that it bears the same relative proportions to the radius, as is observed in the same

parts in the *Orycteropus*. *Myrmecophaga Capensis*.—Pall. (Vid. Table of dimensions.)

The humerus from Big-bone-lick, is nineteen inches long, and is of the colour and consistence of the bones of the Mastodon from the same locality. Like the same bone in the *Myrmecophaga* and *Orycteropus*, it is distinguished by the extreme length of the internal condyle, in order to afford origin to the large muscles which move their enormous claws. This internal condyle is also distinguished by a large foramen, for the transmission of nerves and blood vessels, and to relieve them from the pressure to which they would be subjected by the action of the large muscles in their vicinity. This foramen is characteristic of all the species included in the order Edentata, with the exception of the *Sloth* and *Megatherium*. The shaft is strongly marked with longitudinal ridges and depressions; its superior head by a large external and internal protuberance; its lower head, together with the radio-humeral articulating surface, is broad and flat, with a depression or cavity on the posterior part, for the coronoid process of the ulna. The external condyle is partially fractured, but judging from the apparent curvature at its superior border, its outline is precisely the same as that of this condyle in the *Orycteropus*. (Vid. pl. 13. fig. 10. from Big-bone-lick. Fig. 11. White Cave, Kentucky.)

6. *Scapula*.—As a counterpart for this bone we might refer to its almost miniature likeness, the scapula of the *Myrmecophaga jubata*, to which it bears a closer resemblance than to that of any other animal. In both, the bone is nearly as high as broad; and both are perforated by a distinct foramen, in place of a notch, near the anterior and inferior angle; but they differ in the relative position of the superior and posterior angle, in the relative lengths of the different borders, and in the relative length of the acromion process. The posterior border is nearly rectilinear in the present instance, and curved in the Ant-eater. The acromion process is nearly on a line with the anterior border of the glenoid cavity, in the former; whereas this process projects below, and before this border in the latter. In both, the acromion projects a considerable distance from the coracoid process, with which it has no connection. The anterior border of the megalonyx scapula being broken, we have by dotted lines, attempted its restoration in the figure. The glenoid cavity is an ellipsis, nearly twice as long as it is broad. It is most probable that the new animal, like the *Orycteropus*, was destitute of clavicle, in which respect they differ from the *Megatherium*, the little Ant-eater, and the Sloth. (Vid. Tab. of dimens. and pl. 13. fig. 12. which may be compared with the humerus of the *Orycteropus*, pl. 9. fig. 6. vol. 5. pl. 1. ed. 3. Anim. foss.)

7. A metacarpal bone, which probably belonged to the same animal from which we have derived the humerus, was lately obtained by Mr. Cooper from Big-bone-lick, for a cast of which we are indebted to Dr. Dekay;—it is proportionably shorter and thicker than the metacarpal bone of the index finger of the *M. Jeffersonii*, to which it bears a general resemblance; it differs also in the diagonal or oblique position of the articulating surface of its inferior head, and in the greater size of its tuberosities; from the marks on its superior or carpal head, it must have belonged to the right fore-foot, and is part of a skeleton of an animal much larger and more powerful than the *M. Jeffersonii*. (pl. 13. fig. 13. back view, fig. 14. anterior articulating surface.)

8. *Ribs*.—The first rib of the left side has its inferior extremity broken off;—it is characterized by the extreme width of its superior head; the largeness and proximity of the two articulating surfaces; and the deep furrows for the lodgement of muscles.—pl. 13. fig. 15. The remaining rib is in a state of perfect preservation; it is much thicker in proportion to its length than that of the *Rhinoceros*; the superior extremity is marked, for a small distance, with a furrow for the intercostal arteries, on both the anterior and posterior borders:—the distal extremity is narrow; it appears to be one of the anterior false ribs, left side. (Tab. dims.—and pl. 14. fig. 16.)

9. *Vertebræ*.—These consist of four dorsal and one lumbar; pl. 13. fig. 17. appears to be one of the posterior dorsal. The general resemblance is to that of the *Megatherium*; but the spinous process is not so long; all the processes have lost their epiphyses. The lumbar vertebra is larger and heavier, as usual. The bodies of all are perforated by one or two large foramina, running from the base to the spinal canal. (Vid. Tab. of Dimens. pl. 13. fig. 18.)

10. *Femur*.—An epiphysis, comprising the inferior head, is the only portion of this bone preserved; this however is very important, as it enables us to construct the knee joint, which in this animal presents remarkable characters. When it is recollected that the whole order of the *Edentata*, like that of the *Monotremata*, are characterized by their abnormal physical developments, the peculiar structure observed in the new fossil animal will appear less surprising.

The internal condyle is very considerably larger and projects further downwards than usual; where it is received into a rather deep concavity of the tibia. The external condyle is smaller and represents a segment of a flattened sphere, the longest diameter of which is in the antero-posterior direction; the depressed surface looking obliquely inwards, toward the internal condyle, from which it is separate nearly two inches. The pulley-like surface for the ac-

commodation of the rotula, is large, and strongly marked, though not deep. This portion belonged to the femur of the right side. Vid. Tab. Dimens. and pl. 14. fig. 19.

11. *Tibia*.—This bone is in a good state of preservation with the exception of the inferior head, which is deprived of its epiphysis. The depression on the superior head for the reception of the internal condyle, is nowise remarkable, except for its unusual depth; it would admit of extensive motion without liability to luxation. The central ridge which divides the head does not extend across the surface: the articulating surface is convex; and on its outer border, in place of the usual depression for the reception of the external condyle there exists a segment of a *flattened sphere*, projecting upwards nearly on a level with the central ridge, and in a manner isolated from the other portions of the articulating surface, leaving a considerable portion of the anterior and exterior part of this surface, irregularly raised, not covered with cartilage, and bearing marks of tendinous insertions. This sphere is rather more depressed than the external condyle, on which it moves; and projects posteriorly, much beyond the border of the interior articulating cavity. On the exterior and rather posterior lateral portion of this sphere, there is a rough and honey-comb appearance, evidently intended for the attachment, by ankylosis, of the superior head of the fibula,

which must have occupied a position nearly posterior as well as exterior to the tibia. The body of the tibia is uniform anteriorly and depressed; gradually narrowing and compressed towards the middle, and again enlarging at the inferior portion: posteriorly the body of the bone presents a broad ridge, causing a considerable projection at the upper part, and descending in a straight line from the sphere in the centre of the bone, and disappears before it reaches the middle of the tibia. By referring to the tab. of dimensions, and pl. 14. fig. 20 and 21. being an interior and posterior view—and to fig. 22. being a view of the articulating surface, a more correct idea of this anomalous structure will be obtained, than can be given in a description. The tibia is of the left leg.

12. There is an articulating epiphysis, which appears to have been attached to the inferior head of a tibia; but is unlike any portion of bone of that kind that has come under my observation. It presents a large articulating surface, still covered with dark coloured cartilage; there is a short internal maleolus, separated from the articulating surface anteriorly by a deep groove for the passage of a strong tendon, and two other grooves, situated laterally and rather posteriorly; there is also a small articulating surface projecting obliquely upward and outward from the exterior border; the bone is convex anteriorly, and concave posteriorly. It appears too large to have formed a part of the tibia just described, pl. 14. fig. 23.

13. The Os calcis presents some analogy in general contour to that of the *Badypus tridactylus*, but is proportionably much shorter, as will be seen by referring to the table of dimensions; it presents three articulating surfaces for attachment to the astragalus; superior, inferior, and exterior. Vid. pl. 14. fig. 24. The inferior border is concave; the superior, probably, an oblique plain; (this portion being fractured.) The posterior and inferior extremity is inclined inwards. Vid. pl. 14. fig. 25.

14. The inferior maxilla of a Bear, found in "White Cave," is introduced here, as it displays appearances of an antiquity nearly equal to that of the bones of the *Megalonyx*. It appears to have belonged to the common black Bear, (*Ursus Americanus*,) pl. 14. fig. 26.

Our animal with the teeth constructed after the manner of the Sloth, presents in the remaining portions of the skeleton, a singular admixture of characters peculiar to the Ant-eater, the Armadillo, and the *Orycteropus*.

In size, the adult of the present species surpasses the *Megalonyx* of Jefferson, being about one third less than the *Megatherium*. It possesses peculiarities of organic structure, which certainly entitle it to rank as a distinct species; indeed a minute examination of the tooth and knee joint, render it not improbable, supposing the last named character to be peculiar to it, that if the whole frame should

hereafter be discovered, it may even claim a generic distinction; in which case, either *Aulaxodon*, or *PLEURODON*, would not be an inappropriate name; referring to the ribbed or fluted form of the mesial aspect of the tooth, *M. Desmarest's* most prominent character of this genus, viz. "Molars cylindrical," will not apply to this animal. In every instance, when it could be accomplished with any degree of certainty, an attempt has been made to restore the fractured portions of bone, by introducing dotted lines.

The fossil humerus disinterred at Big-bone-lick, and which appears to have belonged to an adult individual of the present species, is nineteen inches in length; the same bone of the *Megatherium* is twenty-six inches and four tenths; the height of the whole skeleton of the latter, according to *CUVIER*, being seven feet four inches and five tenths; which would give to the new animal, a height of about five feet, supposing the existence of similar proportions. The radius of the new animal, (being part of the young skeleton found in "White Cave") is about one sixth less than that of the *M. Jeffersonii*; and the individual to which it belonged, may have been about the size of the common ox, although it was not more than three fourths grown, if we are permitted to judge from comparisons made on the size of the os humeri, and metacarpal bone of the fossil animal found at Big-bone-lick, with those from White Cave.

Continued between Tracts 182.