







A MASTODON'S REMAINS.

RECENT DISCOVERY OF HUGE BONES IN THE PROVINCE OF ONTARIO.

From the Toronto Globe, May 31.

A giant mastodon's remains have just been exhumed from their long resting place in a corn field near Highgate. The skeleton has, piece by piece, been disinterred since last Saturday morning, and for massiveness and grandeur of proportions it equals, if it does not surpass, anything yet known to science. It has been dug out of a piece of farm land which forms part of a swampy plain. Its exact location is given thus: "The southerly part of the east part of Lot 5, Concession 6, of the Township of Oxford, in the county of Oxford, owned by Mr. John Reycraft." It is a little over forty miles westward of St. Thomas, on the Michigan Central line and 160 miles from Toronto.

Four years ago the farmers of the vicinity decided to unite their energies in draining a marshy bog—a place which had been apparently more or less submerged for centuries. To carry off the water that accumulated on the surface they cut an open ditch through several lots until they effected a junction with a larger channel. While the ditch was being opened in Mr. Reycraft's land, the excavator, a relative of the owner, struck his spade against what he first regarded as a log of wood, but on examination found to be the big bone of an animal larger than any he had ever read or heard of. As he continued his digging he came upon some more remains, a large foreleg bone, part of the hind leg, several ribs, vertebrae, and one or two other smaller bones. The entire collection was carefully stowed away in the farmhouse, and few words passed about the discovery. Mr. Reycraft, however, made up his mind to prosecute further search at a more convenient season. The years slipped by, and that convenient season never came. About twelve months ago one of the farm hands was plowing the field by the side of this lonely ditch and the coulter struck another massive bone. In bulk it was like the decaying stump of an ample pine. It proved a stumbling block to the indignant Hodge, and he contemptuously hurled it into the ditch, whence it has not yet been recovered.

The discovery of the skeleton was a matter of small account to the good folks about Highgate, but through the medium of a travelling showman, the story reached the ears of Mr. John Jelly of Shelbourne. He took an active part in the finding of a mammoth on Mr. W. B. Jelly's farm in the township of Amaranth last Summer, and he and his nephew, Mr. W. A. Hillhouse, soon found that the facts were as represented by the showman. Mr. Jelly lost no time in acquiring possession of all the bones found four years ago, and the right to search for whatever further remains there might be in the field. He and his nephew, with a gang of men, set to work on Saturday, and the reward of their first day's toil was 100 pieces of the gigantic skeleton. The enormous jaws, teeth, and tusk proclaimed at once that they belonged to the mastodon, and one of the largest of that branch of the elephant family. On Monday their efforts were attended with almost equal success, and the following day added to the collection, which now weighs several tons and numbers several hundreds.

The area of this earliest of earth's sepulchres is 33 feet by 21. The bones were scattered over it, one joint fitting into the other in a bed of gray marl about six feet below the surface. Over the marl is a thick layer of black loamy soil, resembling in composition and quality the beds that knit a peat moss. It is combustible and will, when fire is applied, shrink to sticks, and the ashes are like the ashes of a peat fire.

352
07
83
I

A C C O U N T
OF THE
SKELETON
OF
The Mammoth,

A NON-DESCRIPT
CARNIVOROUS ANIMAL
OF
IMMENSE SIZE,

Found in America.

BY REMBRANDT PEALE,
THE PROPRIETOR.

LONDON:
PRINTED AND SOLD BY E. LAWRENCE, NO. 378, STRAND;
AND TO BE HAD AT THE
EXHIBITION-ROOM, NO. 118, PALL MALL.

1802.

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 343

LECTURE NOTES

BY

PROFESSOR

PHYSICS 343

LECTURE NOTES

1981

181

TO SIR JOSEPH BANKS, BART.

PRESIDENT OF THE ROYAL SOCIETY, &c.

RECEIVE, Sir, as a small testimony of my high respect for a Character rendered illustrious in the paths of Science, this plain recital of Facts, and first publication, derived from authentic sources, on a subject in which You have declared Yourself to feel the most lively interest; and which must interest every thinking mind, delighting in the investigation of physical causes, or disposed “to look through Nature up to Nature’s God.”

Your much obliged,

And humble Servant,

London,
October, 1802.

REMBRANDT PEALE.

THE UNIVERSITY OF CHICAGO
LIBRARY
1207 EAST 58TH STREET
CHICAGO, ILLINOIS 60637
TEL: 773-936-3300
WWW.CHICAGO.LIBRARY.EDU

UNIVERSITY OF CHICAGO

LIBRARY

CHICAGO, ILL.

A C C O U N T
OF
The Skeleton
OF
THE MAMMOTH.

THE curiosity of the scientific world has for a long time been justly excited by the fossil remains of a non-descript animal, which have been found in North America and Siberia, but generally in so mutilated a condition as to give but very imperfect ideas either of the size or kind of animal to which they must have belonged. The first account of them which we can find, is in the fifth volume of Jones's Philosophical Transactions abridged, part second, page 159, in an extract of a letter from Dr. Mather to Dr. Woodward, dated Boston, Nov. 17, 1712; in which the Doctor gives an account of a large work in manuscript, intitled the *Biblia Americana*. This work Dr. Mather recommends to the patronage of some Mæcenas, to promote the publication of. As a specimen of it he transcribes a passage out of it, being a note on that passage in Genesis, chap. vi. verse 4, relating to giants;

and confirms the opinion of there having been in the antediluvian world men of a very large and prodigious stature, by the bones and teeth of some large animals found lately in Albany in New England, which, for some reasons, he thinks to be human; particularly a tooth brought from the place where it was found to New York in 1705, being a very large grinder, weighing four pounds and three quarters; with a bone supposed to be a thigh-bone, seventeen feet long. He also mentions another tooth, broad and flat like a fore-tooth, four fingers broad; the bones crumble to pieces in the air after they are dug up; they were found near a place called Cluverack, about thirty miles on this side Albany. He then gives the description of one which he resembles to the eye-tooth of a man: He says it has four prongs or roots, flat and something worn on the top; it was six inches high, wanting one-eighth as it stood upright on the root, and almost thirteen inches in circumference; it weighed two pounds four ounces Troy weight. There was another near a pound heavier, found under the bank of Hudson's River, about fifty leagues from the sea, a great way beneath the surface of the earth, where the ground is of a different colour and substance from the other ground, for seventy-five feet long, which they

suppose to be from the rotting of the body, to which these bones and teeth did, as he supposes, once belong. It were to be wished he had given an exact figure of these bones and teeth.

This account is only worth preserving, as it fixes the time at which these extraordinary remains of antiquity were first discovered in America, previous to their being found in Siberia. The supposition that they were the bones of a giant was scarcely less probable than that they should have belonged to a quadruped of which not the smallest vestige could be traced.—Prepossessed, therefore, with the certainty of their being human bones, a calculation was made of the height of the supposed giant, very probably from a broken piece of thigh-bone, and a length of seventeen feet was calculated in proportion to the thickness of that which was subject to their examination; for take either half of these thigh-bones, and nothing can more resemble that of the human leg, until the whole is seen together, when, from its thickness, it is evidently that of a quadruped, the human thigh being very long and slender. The seventy-five feet of black earth, which they calculated to be the length of a man whose thigh-bone was supposed seventeen feet, could have been nothing

but a small morass divested of its water ; and hence the decayed state of the bones.

It appears that about the year 1740, great numbers of bones, of a similar kind, were found in Kentucky on the Ohio ; but they were collected with such eagerness, and forwarded to Europe so hastily, that it shortly became impossible to distinguish one set of bones from another, so as to ascertain their number, proportion, and kind ; parts of the same animal having been scattered over England, France, and Germany, and there compared with similar ones from Siberia. Buffon * speaking of one of these thigh-bones brought from the Ohio by the way of Canada, which he describes as being the tenth of an inch shorter than one from Siberia, and yet an inch thicker, says ; “ This disproportion is so great as hitherto to deceive me with respect to this bone, though it otherwise resembles, both in the external figure and internal structure, the femur of the elephant (he should have said, the femur found in Siberia), mentioned under the number DCCLXXXVII. The difference in thickness, which appeared excessive, seemed sufficient to attribute this bone to

* Vol. XI. Page 169, No. MXXXV. Autre Femur d'Elephante.

another animal which must have been larger than the elephant; but as no such animal is known, recourse must be had to the pretended MAMMOTH, a fabulous animal supposed to inhabit the regions of the north, where are frequently found bones, teeth, and tusks of the elephant." Here again the word elephant is improperly introduced; Messrs. Buffon and Daubenton having conceived an idea that all the Siberian and some of the American bones belonged unquestionably to elephants, render their observations almost unintelligible, from the confident use of the term elephant in cases where it was at least doubtful, especially as it is now evident, that the same animal was native in the north of both countries; with one probable difference, that the bones of the American animal are comparatively thicker than the Siberian; and with this striking difference between them both and the elephant, that the thigh-bones of the latter are round as well as slender, whereas those of the Mammoth are much flattened, so as to stand obliquely in the animal. After reciting the account given by Mr. Fabry, who states the place and manner in which Mr. le Baron de Longueuil, Mr. de Bienville, and Mr. de Lignery (lieutenant in Canada), found some of these bones and teeth on the Ohio in 1740,

he proceeds; “ Mr. du Hamel, of the Royal Academy of Sciences, informs us that Mr. de Longueuil had likewise brought, in 1740, some very large grinders found in Canada, and perhaps with the tusk and femur which I shall mention. These teeth have no characters in common with those of the elephant, but greatly resemble the teeth of the hippopotamus, so that there is reason to believe they may be part of that animal; for it can never be supposed that these teeth could have been taken from the same head with the tusks, or that it could have made part of the same skeleton with the femur above-mentioned: In supposing this, it would be necessary to suppose an UNKNOWN ANIMAL, which had tusks similar to those of the elephant, and grinders resembling those of the hippopotamus. (*Voyez les Memoires de l'Academie Royale des Sciences, Année 1762*).”

Here M. de Buffon, however unwillingly, has drawn a true picture of the Mammoth, with some little variation, inasmuch as the tusks do resemble those of the elephant, except in having a greater curve and spiral twist, and as the teeth do resemble those of the hippopotamus, except that in the latter there are never more than three prongs, or blunt-pointed protuberances, on the

grinding surface; whereas in this animal the large teeth have five and six, and the small teeth three and four prongs, very differently arranged from those of the former.

The elephant, which is a graminivorous animal, is armed with tusks, more properly called by the French *defences*; but to me it appears nothing inconsistent with the nature of a carnivorous animal that it should be furnished with a similar weapon of offence and defence, and indeed from their form somewhat better calculated to answer those objects; therefore the number of instances in which these tusks and those carnivorous teeth were found with bones resembling the bones of the elephant, though larger, should have been taken as the strongest presumption that they were the fragments of one animal, which, from its fossil remains (accompanied with the most terrific and fabulous accounts), has been distinguished, both in Russia and America, by the name of MAMMOTH.

Mr. Collinson, Member of the Royal Society, in a letter on this subject to M. Buffon *, after describing the situation of the salt lick on the

* Buffon, Tome XIII. Notes justificative, Page 224.

Ohio, where an amazing number of bones of the elephant, as he imagined them to be, were found, together with teeth totally unlike those of the elephant, concludes thus: "But the large teeth which I send you, Sir, were found with those tusks or defences; others yet larger than these shew, nay demonstrate, that they did not belong to elephants. How shall we reconcile this paradox? May we not suppose that there existed formerly a large animal with the tusks of the elephant and the grinders of the hippopotamus? For these large grinders are very different from those of the elephant. Mr. Croghan thinks, from the great number of this kind of teeth, that is, the tusks and grinders which he saw in that place, that there had been at least thirty of these animals; yet the elephant never was known in America, and probably could not have been carried there from Asia: the impossibility that they could have lived there, owing to the severity of the winters, and where, notwithstanding such a quantity of their bones is found, is a paradox which we leave to your eminent wisdom to solve." This determination M. Buffon gives us in the following terms, although in direct contradiction to those passages in which he labours to prove that the bones found in Siberia and America were bones of the

elephant: " Thus every thing leads us to believe that this ancient species, which must be regarded as the first and largest of terrestrial animals, has not existed since the earliest times, and is totally unknown to us; for an animal whose species was larger than that of the elephant, could hide itself in no part of the earth so as to remain unknown; besides, it is evident from the form of these teeth alone, from their enamel and the disposition of their roots, that they bear no resemblance to the *cachelots*, or other cetaceous animals, and that they really belonged to a terrestrial animal whose species approached that of the hippopotamus more than any other."

The world is now in possession of two undisputed skeletons of this animal, found in such situations as leave no room for conjecture; each skeleton being dug up in a separate place, without any intermixture of foreign bones, and each bone exactly adapted to its corresponding points of articulation. One of these skeletons is erected as a permanent establishment at the Museum, Philadelphia; the other I have brought with me, with an intention to travel through Europe, beginning with the metropolis of England.

I shall here give a short account of the place and manner of finding these.

In the spring of 1801, having heard that in the fall of 1799 many bones of this animal had been found in the state of New York, in the vicinity of Newburgh, which is situated on the Hudson or North River, about sixty-seven miles from the capital, my father, C. W. Peale, immediately proceeded to the spot, and through the politeness of Dr. Graham, who lived in the neighbourhood, and had been present when most of the bones were dug up, received every information with respect to what had been done, and the most probable means of future success. The bones that had been found were then in the possession of the farmer who owned the land, heaped together on the floor of his garret, where they were occasionally visited by the curious.

These my father was fortunate to make a purchase of, together with the right of digging up the remainder; and immediately packing them up, sent them on to Philadelphia: They consisted of all the neck, most of the vertebræ of the back, and some of the tail; most of the ribs, in greater part broken; both scapulæ;

both humeri, with the radii and ulnæ; one femur; a tibia of one leg, and a fibula of the other; some large fragments of the head; many of the fore and hind feet bones; the pelvis somewhat broken; and a large fragment, five feet long, of the left tusk, about mid way. He therefore was in want of some of the back and tail bones, some of the ribs, the under jaw, one whole tusk and part of the other, the breast-bone, one thigh, and a tibia and fibula, and many of the feet bones. But as the farmer's fields were then in grain, the enterprize of searching for the remainder was postponed for a short time. Two or three weeks were spent in mending such bones as were broken, and arranging the whole; but the deficiencies were such, that very few of them could be put together.

Not willing to lose the advantage of the dry season, when the springs in the morass of course were low, we proceeded on the arduous enterprize. In New York every article was provided which might be necessary in surmounting expected difficulties; such as a pump, ropes, pulleys, augers, &c.; boards and plank were provided in the neighbourhood, and timber was in sufficient plenty on the spot.

The whole of this part of the country abounding with morasses, it is the custom of the farmers to assist each other in turns with personal or specific labour, each man giving a route or frolick on the occasion, in order to obtain a large quantity of their contents for manure. Pits are dug generally twelve feet long and five feet wide. It was in digging one of these, on the farm of Mr. Masten, that one of the men, in thrusting his spade deeper than usual, struck something which he imagined to be a log of wood, but on cutting it to ascertain the kind, it was perceived to be bone: it was quickly cleared from the surrounding earth, and proved to be that of the thigh, three feet nine inches in length, and eighteen inches in circumference in the smallest part. The search was continued, and the same evening several other bones were discovered. The fame of it soon spread through the neighbourhood, and excited a general interest in the pursuit; and all were eager, at the expence of some exertions, to gratify their curiosity, to see the ruins of an animal so gigantic, of which few among them had ever heard. For the two succeeding days upwards of an hundred men were actively engaged, encouraged by several gentlemen, chiefly physicians, of the neighbourhood, and success the most sanguine

attended their labours; but unfortunately the habits of the men requiring the use of spirits, it was afforded them in too great profusion, and they quickly became so impatient and unruly that they had nearly destroyed the skeleton; in one or two instances using oxen and chains to drag them from the clay, the head, hips, and tusk, were much broken; some parts being drawn out and others left behind. So great a quantity of water, from springs in the bottom of the pit, rose upon the men, that it required several score of hands to lade it out with all the buckets they could collect in the neighbourhood. All their ingenuity was exerted to overcome difficulties that every hour increased upon their hands; they even made and sunk a large coffer-dam, and within it found many valuable small bones. The fourth day so much water had risen in the pit, that they had not courage to attack it again. In this state we found it in 1801.

Confident that nothing could be done without having a perfect command of the water, the first idea was to drain it by a ditch; but the necessary distance of perhaps half a mile, presented a length of labour that appeared immense. It was therefore resolved to throw the water

into a natural bason about sixty feet distant, the upper edge of which was about ten feet above the level of the water. An ingenious millwright constructed the machinery; and after a week of close labour, completed a large scaffolding and a wheel twenty feet diameter, wide enough for three or four men to walk abreast in: a rope round this turned a small spindle, which worked a chain of buckets regulated by a floating cylinder; the water emptied into a trough which conveyed it to the bason; a ship's pump assisted, and towards the latter part of the operation, a pair of half barrels in removing the mud. The second day the water was lowered so that they began to dig, and in a few hours were rewarded with several small bones.

Every farmer with his wife and children, for twenty miles round in every direction, with waggons, carriages, and horses, flocked to see the operation; and a swamp always noted for being the solitary and dismal abode of snakes and frogs, became the active scene of curiosity and bustle; the greater part astonished at the whim of an old man in travelling two hundred miles from his home, to dig up as a treasure, at incredible risk, labour, and expence, a pile of bones, which, although all were astonished

to see, many imagined fit for nothing better than to rot and serve for manure.

For several weeks no exertions were spared, and those the most unremitting were required to insure success ; bank after bank fell in ; the increase of water was a constant impediment, the extreme coldness of which benumbed the workmen : Every day bones and pieces of bones were found between six and seven feet deep, but none of the most important ones. But the greatest obstacle to the search was occasioned by the shell marle which formed the lower stratum ; this, rendered thin by the springs at the bottom, and by the weight of the whole morass, always pressed upwards on the workmen to a certain height ; which, without an incalculable expence, it was impossible to prevent. Twenty-five hands, at high wages, were almost constantly employed at work so uncomfortable and severe, that nothing but their anxiety to see the head, and particularly the under jaw, could have kept up their resolution. The patience of employer and workmen was at length exhausted, and the work relinquished without obtaining those interesting parts without which it was impossible to form a skeleton.

Through the polite attention of Dr. Galatian, the next place we directed our attention to was a morass, eleven miles distant from the former, belonging to a Captain Joseph Barber, where, eight years before, four ribs had been found in digging a pit. From the description which was given of their position, and the appearance of the morass, which was a small one, we began our operations with all the vigour a certainty of success could inspire. Almost an entire set of ribs were found, lying pretty much together, and very entire; but as none of the back-bones were found near them, sufficient proof of their having been scattered, our latitude for search was extended without limits; therefore, after working about two weeks, we found nothing belonging to the head but two rotten tusks (part of one of them is with the skeleton here), three or four small grinders, a few vertebræ of the back and tail, a broken scapula, some toe-bones and the ribs; these were found between four and seven feet deep.

Our next place of search (about twenty miles west from the Hudson) was a most dismal morass; the most awful silence reigned throughout it, and not the smallest breath of air was felt; every step was taken on rotten timber and the

spreading roots of tall trees, the luxuriant growth of a few years, half of which were tottering over our heads. It was almost a dead level, and the holes dug for the purpose of manure, out of which a few bones had been taken six or seven years before, were full of water, and connected with others containing a vast quantity; so that to empty one was to empty them all. Machinery was erected, pumps and buckets were employed, and a long course of troughs conducted the water, among the distant roots, to a fall of a few inches.

Here alternate success and disappointment amused and fatigued us for a long while; until our pockets emptied, our spirits low, our workmen languid, we were about to quit the morass with but a small collection, though in good preservation, of ribs, toe and leg bones, &c. In the meanwhile the ground was searched in various directions with long-pointed rods and cross handles: after some practice we were able to distinguish by the feel whatever substances we touched harder than the soil; and by this means, in a very unexpected direction, struck upon a large collection of bones, which were dug to and taken up with every possible care. They proved to be a humerus, or large bone of the right leg,

with the radius and ulna of the left, the right scapula, the atlas, and, the great object of our pursuit, a complete under jaw!

After such a variety of labour and length of fruitless expectation, this success was extremely grateful to all parties, and the woods echoed with repeated huzzas. “Gracious God, what a jaw! how many animals have been crushed between it!” was the exclamation of all; a fresh supply of grog went round, and the hearty fellows, covered with mud, continued the search. The upper part of the head was found twelve feet distant, but so extremely rotten that we could only preserve the teeth and a few fragments. In its form it exactly resembled the head found at Masten’s, but as that was much injured by rough usage, this from its small depth beneath the surface, had the cranium so rotted away as only to shew the form around the teeth and thence extending to the condyles of the neck; the rotten bone formed a black and greasy mould above that part which was still entire, yet so tender as to break to pieces on lifting it from its bed.

This collection was rendered still more complete by the addition of those formerly taken up,

and presented to us by Drs. Graham and Post. They were a rib, the sternum, a femur, tibia and fibula, and a patella or knee-pan.

Some of the neighbours, with an eye to the certain prospect of profit, began to think of finding a similar treasure in their morasses; and one actually began his operations, but was quickly deterred by the rising difficulties, although he had some reason to hope for success, eighteen years before, several bones having been discovered in the same spot, and by a German physician forwarded to England. We examined the place, and were of opinion, as the morass had been since drained, that the remaining bones must necessarily have decayed in consequence of their exposure to the air, alternately wet and dry.

We visited every spot in the neighbourhood where any bones had ever been found, and we knew of seven within ten miles square; but there appeared no prospect of success adequate to the expence and difficulty: So that, after a laborious campaign of three months, we carefully packed up, in distinct cases, our venerable relics, and loading two waggons with them, bade adieu to the vallies and mountains of Shawangunk.

After the laborious task of mending the ribs and other bones, and putting together the fragments of the head (of which no other idea could be formed than appears in the skeleton), it remained to determine the number and situation of each kind. The three sets were kept distinct; out of the two collections which were most numerous it was intended to form two skeletons, by still keeping them separate, and filling up the deficiencies in each by artificial imitations from the other, and from counterparts in themselves. For instance, in the first skeleton the under jaw was formed from this, which is the only intire one we have ever heard of, although we have seen considerable fragments of at least ten different jaws; while on the other hand, the upper jaw of this animal, which was found in the extreme of decay, was completed, so far as it goes, from the more solid fragment in the former skeleton. Several feet-bones in this skeleton were made from that; and a few in that were made from this. In this the right humerus being real, the imitation for the left one was made with the utmost certainty; and the radius and ulna of the left leg being real, those on the right side followed in course. The collection of ribs in both cases was pretty intire; therefore, having discovered from a correspon-

dence between the number of vertebræ and ribs in both animals, that there were nineteen pair of the latter, it was only necessary in four or five instances where there was not a complete pair, either to make an artificial counterpart, or to take the same formed rib from the collection found at Captain Barber's. In this manner the two skeletons were formed, and are in both instances composed of the appropriate bones of the animal, or exact imitations from the real bones in the same animal, or from those of the same proportion in the other: Nothing is imaginary, and what we do not unquestionably know, we leave deficient; which happens in only two instances, the summit of the head and the end of the tail.

The tusk which belongs to the skeleton at Philadelphia, I have brought with me: in taking it from the ground it was broken into three pieces, but they were carefully put together, and give the intire form, composed of a strong arch and a spiral twist resembling an ox's horn, ten feet six inches in length and twenty-one inches in circumference. In the Leverian Museum there is a fossil elephant's tusk found in England, about seven feet in length: On making a comparison between these it will be observed, that

in the Leverian tusk there is not the smallest twist, and but a gentle curve; whereas in this animal they are much more crooked in every respect; the consequence of which is, that as the cavities for the reception of the tusks lie more horizontal (from a similar direction between the teeth and the condyle of the neck), the tusks are much more elevated, and the ends pointing backwards. It is the opinion of many, that these tusks might have been reversed in the living animal, with their points downwards; but as we know not the kind of enemy it had to fear, we judged only by analogy in giving them the direction of the elephant, especially as we know of no other carnivorous animal with only eight grinders and two tusks: Neither the tusk itself, nor the cavities for the reception of them, could assist in the determination, as they were both very straight, and would equally answer one way as the other.

There is one bone less in the neck of this animal than in the elephant; and we are confident of having the whole, for two reasons; 1st, The neck-bones were found with the first skeleton all together, in their natural positions, and the first bone of the back, with which the sixth vertebræ of the neck articulated as exactly as it did with

the fifth; and, from the configuration of these bones, every anatomist knows this could not be the case was there a bone wanting: This is strong presumption, had we not the completely satisfactory proof of finding them all together. And, *2dly*, Among the collections of bones which we have seen, we have never met with a single bone resembling a seventh vertebra of the neck.

It was a more difficult task to determine the number of dorsal and lumber vertebræ, as those we dug up ourselves were not only found much scattered, but several which had been dug up by the farmer were in the possession of some of the workmen in the neighbourhood, to the distance of seven miles round: these we collected with all possible care, and had the satisfaction to find they agreed in number with those of the elephant; still further corroborated by a perfect agreement between them and the nineteen pair of ribs, leaving three vertebræ for the loins.

But in the head the great distinguishing characters are to be found. I believe it has been well enough ascertained that the teeth of this animal are perfectly carnivorous, as they have every quality of form and substance that is required: the roots are not in such a massy body

as the elephant's, and the teeth are composed of a bony substance projecting into strong obtuse points to form the grinding surface, and all this surface encrusted with a strong coat of enamel; whereas all graminivorous animals have teeth whose grinding surface is flat, and composed of an intermixture of bone and enamel; the enamel running in laminæ or veins from the surface to the roots. In carnivorous animals the surface of the enamel is constantly changing, and is finally worn off and the teeth rendered useless; but in graminivorous animals the veins of enamel always present the same figure, only that in youth they are regularly protuberant, and in age regularly worn down by a side-motion of the under jaw, which all of them have. The jaw of the Mammoth was incapable of this motion, as is very evident from the condyloid process, which is finished with an oblong head inserted into a transverse groove; and from the teeth, which are worn, not horizontally, but the lower front ones on the inside, the upper front ones on the outside; the lower back ones on the outside in part, and the upper back ones on the inside in part; in such a manner that they fit into each other like the teeth of two saws, and when shut are immoveable; and hence were certainly incapable of masticating, like graminivorous ani-

mals, either grass or leaves. These teeth were supposed by some writers, Buffon, Croghan and Collinson among others, to have been the teeth of the hippopotamus, deposited in these places, together with the remains of elephants, in the general deluge ; but they are very different from those of the hippopotamus, the largest of which have only three obtuse points composing the surface, arranged triangularly ; whereas the smallest teeth in this animal have three rows of double points arranged parallel to each other, and the largest ones four and five in the same manner.

Although a simple comparison between the teeth of this animal and the elephant be sufficient to prove that the former is as certainly of a carnivorous as the latter of a graminivorous nature, yet the anatomist in examining further, will find complete satisfaction, from the internal structure of the jaw, as well as the position and growth of the teeth. I shall only observe here, that in the jaw of this animal, like those of all others of a carnivorous nature, the roots or fangs are inserted into the mass of bone, which not only surrounds the roots, but divides one tooth from the other ; whereas in the elephant the grinders occupy one large and uni-

form cavity, from which they are gradually protruded as they are required for the purpose of grinding. To those who wish to study this subject more profoundly, it will be well to read, in the Philosophical Transactions for 1799, two learned papers by Mr. Corse and Mr. Home.

Between the temporal bone of this animal and that of the elephant there is a considerable difference in every part; I shall only observe, that where the socket of the eye in the elephant appears scooped out of the anterior projection of the temporal bone, in this animal there is not the least appearance of such an orbit, but instead thereof, a great mass of bone.

To those who have not seen the originals, words are inadequate to convey a correct idea of the difference in form between the jaw of this animal and that of the elephant. The under jaw of the elephant terminates in a point, which in its direction corresponds with the tusks; the same part in this animal is composed of a large projection of a foliated appearance like the leaf of the mallard. And although the lip of the elephant is large and powerful, in this there appears the origin of one infinitely more so; perhaps a long and powerful assistant to the pro-

boscis which it probably had. There is no positive proof that it had a proboscis, but from the shortness of the neck and magnitude of the tusks, it is reasonable to suppose that it was furnished with some such contrivance; that part in which it must have originated is deficient in both skeletons; and although I have met with several accounts of the distance between the orbits of the eyes in fragments of heads, they were never accompanied with any mention of such place of insertion for a proboscis.

The general form of the under jaw of this animal is made up of three distinct angles; one horizontal, on which the jaw rests (when placed on a table), from the front to the back, where a small corner appears cut off, whence it rises perpendicularly to the condyle. The same view of the elephant's jaw exhibits very nearly a regular portion of a circle without any angles. The arms of this animal's jaw (composed of the condyloid and coronoid processes and their bases), are short as well as flat, adapted to the peculiar form of the upper jaw, which I shall proceed to describe; whereas those of the elephant are comparatively thick, and generally as long as, and frequently longer than, the body of the jaw itself: This length is adapted to the great eleva-

tion of the cavity for the condyloid process, taking the level of the teeth as a base from which to measure. The angle from the teeth to the condyles of the neck in the elephant is at least forty-five degrees, and sometimes more; but in the Mammoth the same angle does not exceed ten or fifteen degrees; hence the comparative disproportion of their jaws with respect to length and height.

In the back of the elephant's head there is a very deep cavity for the reception of muscles from the spines of the back to support the head; which cavity commences immediately from the condyle of the neck: The back of this animal's head presents a very different outline, for there is scarcely any appearance of a cavity; and the whole of the back part of the head is angular, in contradistinction to that of the elephant, which is composed of two lobes receding forwards from the condyle of the neck. I have been here particular, as in this respect the two animals are vastly different, and it may lead to curious speculations concerning the structure of the unknown parts and the habits of the animal.

The hips were somewhat broken, but the parts uninjured were sufficient to shew a very differ-

ent form from those of the elephant, which are high in comparison with their breadth; and consequently the rump of this animal was even more depressed than the elephant's, in the manner of the American bison or buffaloe. In the elephant the angles from the *ossæ tabulæ* to the lateral processes of the ilium, are very great; whereas in the Mammoth they are almost on a straight line.

From all the drawings of elephants, and from such of their real ribs as I have seen, I have observed one universal character; towards their junction with the cartilage they are broad and more or less bent sidewise in an undulating form; whereas those of the Mammoth are very small in the same place, and in form without any lateral bend.

In the Mammoth the spinus processes are much longer and thicker, in proportion with the rest of the animal, than they are in the elephant, whose head is drawn up close to them by the ligaments attached to the deep cavity in the back of the head before-mentioned; in the Mammoth this cavity being situated higher from the condyle of the neck and attached to much longer spines, must act with an advantage pro-

portioned to the magnitude of the head and the weight of the tusks or defenses. Besides, these spines are so long, and the form of the ribs such, that unless we suppose them covered with a superfluous quantity of flesh, the back of the animal could not have been *round* like that of the elephant, but sharp like that of a hog.

As the inhabitant of a cold climate, it is probable the Mammoth was clothed with hair or wool, which in most situations was quickly liable to decay. The only instance of hair being found with the remains of this animal, occurred in a morass belonging to Mr. A. Colden, in the neighbourhood where this skeleton was found. The hair was coarse, long and brown, a large mass of it together, and so rotten that, after a few days exposure to the air, it fell into a powder.

The skeleton of the Mammoth*, merely as a skeleton, is certainly entitled to some attention; as the skeleton of a very large and non-

* Strahlenberg, in his *Historico-Geographical Description*, observes, that the Russian name is *Mammoth*, which is a corruption from *Memoth*, a word derived from the Arabic *Mehemot*, signifying the same as the *Behemot* of Job. This word is applied to any animal of extraordinary size.

descript animal it becomes more interesting, to those in particular who are disposed to think on the subject; whether its extirpation be attributed to the power of man, the prevalence of famine, or the violent and sudden irruption of water. There are many facts to support this latter opinion, which I confess myself disposed to adopt.

Orange and Ulster counties in the state of New York, are situated westward of the Hudson and northward of West Point; from the Shawangunk mountain, which is a long ridge east of the blue mountains, they appear as an immense plain, bounded on every side by stupendous mountains, the situation of which certainly tend to confirm the authenticity of an Indian tradition, which states them formerly to have been the boundaries of a great lake; and it would now be a lake if the high mountains on each side of the Hudson near West Point were united, as probably they may have been. It is a fact, that all over the country, the stones, which in a curious manner are strewed over the ground, from the largest to the smallest, have been worn round by long-continued friction, as if by the agitation of water; more particularly in the lowest and flat situations, where the stones

are larger, and gradually becoming smaller in the higher situations. The surface of the country, though by no means so level as it appears from the mountains, is formed of single hills, prominences, or swelling knolls, which have the appearance of having been caused by the agitation of water. Many of the cavities between these knolls are dry, others are in the state of ponds, but an infinite number contain morasses, which must originally have been ponds, supplied by springs which still flow at their bottoms, and filled, in the course of ages, with a succession of shellfish and the decay of vegetables; so that at present they are covered with timber, and have been so within the memory of man. An old man, upwards of sixty, informed us, that all the difference he could remark between these morasses now and what they were fifty years ago, was, that then they were generally covered with firs, and now with beach. This was verified by the branches and logs of fir which we found in digging; many pieces of which had been cut by beavers, the former inhabitants of these places when in the state of ponds. Scarcely a fir is now to be found in the country.

On digging into these morasses you generally have to remove from one to two feet of peat or

turf; you then enter on a stratum, from one to two feet thick, of what the farmers call the yellow marle, composed of vegetable earth intermixed with long yellow roots; next the grey marle, which resembles wet ashes, to the further depth of two feet; and finally a bed of decayed shells, which they call shell-marle, the upper surface of which forms a horizontal line across the morass, consequently it is thicker in the center than at the edges; under this, forming the bottom of the pond or morass, is found gravel and slate covering a thick stratum of clay. It was in the white and yellow marle the bones were generally found; those in the white in the highest preservation, less so in the grey; and where an end happened to rise into the yellow stratum it was proportionally decayed: One cause of this must have been the accession of air when the springs in dry seasons were low.

The grey marle, in which most of the bones lay, by analysis was found to contain seventy-three parts in the hundred of lime: when dried in the sun it cracks into thin horizontal laminæ, and becomes extremely light, as hard as baked clay, and brittle; in this state it burns with a bright flame for a long while, and instead of

leaving ashes, it remains a strong black coal, apparently well adapted to the purposes of the arts.

These various strata are the production of a long succession of ages, and, in my opinion, have been formed over the bones. In two of the morasses there was not depth sufficient to have bemired an animal of such magnitude and strength; and in the third the bones were lying near the sloping edge, from which some of them had already been washed farther in: The animals have either died or been destroyed generally over the country, and only in these situations have been preserved; or they have sought these cool places to die in; or perhaps both.

No calculation can be made of the length of time necessary to have formed these morasses, although we are certain that, as in fifty years past scarcely any change appears, it must have been proportionally slower in the commencement; and a period has elapsed in which all accounts of this animal have dwindled into oblivion, except a confused Indian tradition.

In the neighbourhood of these morasses are found an infinite number of petrifications, a few

specimens of which I have brought with me : they are in strange and unknown figures, and appear to be generally marine productions, as various species of coral and sea-urchins were likewise found among them. Two revolutions in nature must have contributed to this effect ; one in which the petrifications were formed by a copious incrustation of calcareous matter, in a semifluid state ; and a subsequent one, in which the stones have been broken to pieces, worn into a round shape, and finally deposited, an hundred miles from the sea, and many hundreds from those seas where corals are produced.

Here a question of some importance arises ; could this animal have been destroyed in a deluge, which must have been sudden and powerful enough to produce those great effects ? And was the entire race of them thereby rendered extinct ? Certain it is that they are no where to be found, nor their footsteps traced. Among the Indians of North America, from nation to nation, the tradition has spread and prevails, which relates their former existence and their sudden extirpation. I shall here give a tradition, said to be in the very terms of a Shawanee Indian, as published in Winterbotham's History of America, which appears in an embellished

dress from an English pen, but founded on a real tradition. I have questioned, through their interpreters, various and distant nations of Indians, and have known of many others, and all their accounts agree in the main story, though they vary in some of the subordinate parts.

INDIAN TRADITION.

“ Ten thousand moons ago, when nought but gloomy forests covered this land of the sleeping sun; long before the pale men, with thunder and fire at their command, rushed on the wings of the wind to ruin this garden of nature; when nought but the untamed wanderers of the woods, and men as unrestrained as they, were the lords of the soil; a race of animals existed, *huge as the frowning precipice*, cruel as the bloody panther, swift as the descending eagle, and terrible as the angel of night. The pines *crashed* beneath their feet, and the lake *shrunk* when they slaked their thirst; the forceful javelin in vain was hurled, and the barbed arrow fell harmless from their side. Forests were laid waste at a meal; the groans of expiring animals were every where heard; and whole villages, inhabited by men,

were destroyed in a moment. The cry of universal distress extended even to the region of peace in the west; and the good Spirit interposed to save the unhappy. The forked lightning gleamed around, and loudest thunder rocked the globe! The bolts of heaven were hurled upon the cruel destroyers alone, and the mountains echoed with the bellowings of death. All were killed except one male, the fiercest of the race, and him even the artillery of the skies assailed in vain. He ascended the bluest summit which shades the source of the Monangahela, and, roaring aloud, bid defiance to every vengeance. The red lightning scorched the lofty firs, and rived the knotty oaks, but only glanced upon the enraged monster. At length, maddened with fury, he leaped over the waves of the west at a bound, and this moment reigns the uncontroled monarch of the wilderness, in despite of even Omnipotence itself."

The idea of a carnivorous animal, which the Indians appear to have had of it, corresponds with the teeth of this; and the name Bull, which they give to it, might have been derived from the hornlike appearance of the tusks; but it is perhaps still more probable, that in the

course of time the ideas of two distinct animals are confounded ; for I have brought with me a plaster cast from a bone presented last June to the Philosophical Society of Philadelphia, by Major Brown, of Kentucky : it is unquestionably a fragment of an animal of the ox kind, but of a most stupendous magnitude. It consists of a large portion of one side of the back part of the head, and part of the other ; and the internal substance or pith, which was covered by the horn, twenty-one inches in circumference, and with the horn on it, must have been at least twenty-four or twenty-five. This bone was found, in a creek which empties into the Ohio, some years ago, and by the proprietors supposed to have been part of the Mammoth. It is impregnated with ferruginous earth, and in high preservation ; and must have been broken with violence, but no one knows of any other portion of it.

Various bones, generally pieces of the head of the oxen kind, have been found in all parts of Europe and in Asia, having the same character which distinguishes the one from which this cast was made, in the form and direction of the horn ; it descends backwards, and then rising,

points forwards. There are several specimens of these in the British Museum, but none so large as this.

A few years since some large bones, of an uncommon kind, were found in a cave in Virginia, highly preserved by lying in earth abounding with nitre. They were sent to the Philosophical Society, and an account of them published in the fourth volume of their Transactions: By permission of the Society, I have made accurate casts of them.

Hence it appears that four animals of enormous magnitude have formerly existed in America, perhaps at the same time, and of natures very opposite: *1st*, The Mammoth, carnivorous; *2d*, An animal whose graminivorous teeth, larger than, and different from, those of the elephant, are sometimes found; *3d*, The great Indian bull; and, *4th*, An animal probably of the sloth kind, as appears on comparison with the bones found in Virginia, and a skeleton found in South America, and preserved in the Museum at Madrid.

Mr. Jefferson, on the Mammoth bones, says, "To whatever animal we ascribe these remains,

it is certain such a one has existed in America, and that it has been the largest of all terrestrial beings. It should have sufficed to have rescued the earth it inhabited and the atmosphere it breathed, from the imputation of impotence in the conception and nourishment of animal life on a large scale ; to have stifled in its birth, the opinion of a writer *, the most learned too of all others in the science of animal history, that, in the new world, ‘ *La nature vivante est beaucoup moins agissante, beaucoup moins forte.*’ That nature is less active, less energetic on one side of the globe than she is on the other.”

It was my intention to have closed this account with Dr. Dunter’s essay, whose accuracy in the examination, and knowledge in the discrimination of those few bones which were within his reach, had already given to his opinion the weight of unquestionable authority ; but as his paper was somewhat long, and as the facts since he wrote are more numerous, and subject in the skeleton which we have, to the examination of every one ; I shall only introduce his concluding sentence, that, “ If this animal was indeed carnivorous, which I believe cannot be doubted,

* Buffon.

though we may as philosophers regret it, as men we cannot but thank Heaven that its whole generation is probably extinct."

—

DIMENSIONS OF THE SKELETON.

	Ft.	Inch.
1) Height over the shoulders - - -	11	0
1) Ditto over the hips - - -	9	0
1) Length from the chin to the rump	15	0
1) From the point of the tusks to the end of the tail, following the curve -	31	0
1) Length in a straight line - - -	20	0
2) Width of the hips and body - - -	5	8
1) Length of the under jaw - - -	2	10
4) Weight of the same - 63½ pounds		
2) Width of the head - - - -	3	2
1) Length of the thigh-bone - - -	3	7
3) Smallest circumference of the same -	1	6
1) Length of the tibia - - - -	2	0
1) Length of the humerus, or large bone of the fore-leg - - - -	2	10
3) Largest circumference of the same	3	2½
3) Smallest ditto ditto - - - -	1	5
1) Length of the radius - - - -	2	5½
3) Circumference round the elbow -	3	8

	Ft.	Inch.
/ Length of the scapula, or shoulder-blade	3	1
/ Length of the longest vertebra, or back-bone	2	3
/ Longest rib, without cartilage	4	7
/ Length of the first rib	2	0
/ Ditto of the breast-bone	4	0
/ Length of the tusks, defences, or horns	10	7
3 Circumference of one tooth or grinder	1	6 $\frac{1}{2}$
4 Weight of the same, 4 pounds	10	ounces
5 The whole skeleton weighs about	1000	pounds.

FINIS.

Lawrence, Printer,
No. 378, Strand.

Prof. Angelo Heilprin of the Academy of Natural Sciences of Philadelphia writes to the *Public Ledger* that a mastodon of ponderous proportions has, during the present week, been discovered in the immediate vicinity of Philadelphia. The find is due to the enthusiasm of two young students. The unusually high water of the stream had evidently only quite recently exposed so much of the skeleton as was attainable at the time of the visit—a portion of the upper jaw and the head of one of the thigh bones—and it was clear from the manner in which a number of bones were found inter-associated that the true resting-place of the animal had been found.

The bones, which are mainly in a good state of preservation, were firmly embedded, and not until after having partially diverted the course of the stream was it possible to remove them from the enclosing matrix. The head was found resting on its top surface, with a portion of one of the molars of the upper jaw exposed above the water. Both tusks had been removed from their sockets, and likewise one of the anterior molars; fortunately, however, the former were recovered by the two young men above mentioned in the bed of the stream, a short distance below, and, although no longer perfect, were still sufficient in themselves to indicate a ponderous dental armature. By closely feeling and grubbing along the bottom of the stream, other parts of the skeleton, such as the leg and arm-bones, ribs, etc., were successively uncovered, and, doubtless, further excavations will reveal the greater part, if not the whole, of the skeleton. Through the generosity of the first finders, Messrs. Saltar and McConnell, the parts have been donated to the Academy of Natural Sciences, whither they are now being removed, and where they will be shortly placed on exhibition. No exact measurements of the bones have as yet been made, but they indicate an animal apparently equalling if not surpassing a full-grown elephant in size. The species is probably *Mastodon giganteus*.

The remains of mastodons, writes Prof. Heilprin, have been found at various times in the State of New Jersey, but it appears that none either so well preserved or so perfect have been determined since 1845, when, as reported by Sir Charles Lyell, six skeletons were exhumed from a drained pond in Warren County, in the north-western part of the State. Five of these immediately crumbled, but the sixth one is stated to have been preserved entire (even to the retention of the food contained in its stomach!). The whereabouts of this skeleton, if it at all exists, Prof. Heilprin has been unable to discover. A nearly perfect skeleton is reported to have been excavated in the line of the Morris Canal, near Schooley's Mountain, in 1827, and a similar one, which subsequently became the property of the New York Lyceum of Natural History, three years before, in a swamp at Poplar, Monmouth County. Fragments of teeth and bone have been noted from several other localities and counties, and it appears that the animal was an inhabitant of the greater portion of the State. The latest important find in this direction is the mastodon of Freehold, Monmouth County, which was discovered on June 7, 1882, and fully described by Mr. Samuel Lockwood, at the Montreal meeting of the American Association for the Advancement of Science, in August of the same year. It is interesting to note, as bearing upon the present discovery at Pemberton, that near the same locality, some twenty years ago, a mastodon cranium, unknown to be such, for several years served as a stepping-stone in a swamp.

REMAINS OF THE GIGANTIC MAMMAL FOUND
ON A FARM NEAR NEWBURG—DETAILS OF
THE DISCOVERY—MEASUREMENT OF THE
BONES—ENORMOUS SIZE OF THE ANIMAL
INDICATED.

NEWBURG, N. Y., July 7, 1879.

Mr. Hugh Kelley is an Irishman and a farmer, owning and working a farm of 103 acres. The farm is situated in the town of New Windsor, adjoining this city and about one mile south of the Little Britain Presbyterian Church, on a cross road leading to Bethlehem, in the same town. Mr. Kelley is an industrious man and is surrounded by a family of three or four children, the boys of which are grown up and able to assist in the work of farming, which he is now busily engaged in. Mr. Kelley has owned his farm for the past fifteen years, but until Saturday never dreamed that he was the successor in possession of a mastodon, the petrified bones of which were beneath its surface. Just east of the house, which is an old-fashioned two story frame structure, is a marshy swale. Fifty years ago there was a pond here which probably covered three acres of land. On the west is a rising slope of ground where cattle graze, which is surrounded by cherry trees now loaded with fruit. The swale runs north and south, and extends for several miles each way. The outlet, what there is, goes to the eastward, and empties into the Otter Kill, which flows to the Hudson River. The pond was drained, Mr. Kelly says, about fifty years ago, and since the black muck ground has been used for raising garden truck.

THE DISCOVERY.

It is now planted with potatoes, and in order to help this crop along Mr. Kelley set his sons, Willie and James, young men of about sixteen and eighteen years of age, digging a drain on the western edge of the patch. Several bones were observed lying around loose upon the surface of the bog meadowy land and nothing was thought of their appearance. But when Willie discovered on digging down about two feet beneath the surface the second joint of the foreleg, which measures two feet ten inches in length, he was thunderstruck. At first he thought it was a log. He had never heard nor read about the mastodon of ancient times, and when he made the family acquainted with his discovery they, too, were dumfounded. Mr. Kelley concluded to quit the digging of the trench then and there and inform some of the neighbors. This was done, and on Sunday R. Wallace Genung, William J. Morrison, neighbors, Willie, the son, and Mr. Robert Glover, of New York, a visitor at Mr. Morrison's, went to work at digging again and their labor was rewarded by finding nearly all the bones. A large trench, about thirty feet long and ten feet wide and four and a half feet deep has been dug so far and the men are yet at it, endeavoring to recover what is needed to make up the whole frame or skeleton. Operations were resumed early this morning on a larger scale, and several sections of the spine, two more ribs and other pieces of minor importance have been recovered to-day. The muck taken from the trench, which is now assuming large proportions, is thrown over on the potato patch. A spring of cool water has been struck and the diggers are troubled bailing it out. The black vein of muck is said to be about twenty feet deep and is very fertile. As stated, it at one time formed the bed of a good sized pond, and it is conjectured, as in the cases of other mastodons found, that the animal waded in beyond his depth, got fast and there perished.





