GREAT AMERICAN MASTODON.

In the month of August, 1845, whilst excavating marl on the farm of Nathaniel Brewster, Esq., six miles west of the village of Newburgh, Orange county, N. Y., the workmen struck upon the skull of a Mastodon. The work was carefully conducted, and at the close of the second day they had succeeded in exhuming the entire skeleton, with the exception of the toes of one foot, which were probably carried out with the marl. This is the most entire skeleton of this remarkable animal ever found. The bones are in a singularly perfect state of preservation, retaining still a large portion of animal matter even in the spongy portions. The skeleton has since been arranged and set up, and this has been done with great care and the strictest attention to the articulating surfaces of all the bones, which we believe has not been the case with others which have been put together. Such we believe to be the fact from the drawings we have seen of the one arranged by Mr. Peale, and from the description given to us of others which we have had no opportunity of seeing. The amount of cartilage to be supplied between the vertebræ has been misconceived, and thus the back has been made much longer than in the living animal. In the present instance, a perfect gage was furnished by two ribs, which, during the life of the animal, had become united longitudinally. Each one of these ribs articulated with a verteber; and in bringing these articulating surfaces together, the exact amount of intervertebral space was found. This, in connection with the ribs which articulated with two vertebræ, determined the amount to be supplied; and thus the back of this skeleton is said to be from two to three feet shorter than those which have been made according to the fancy of the owners. The intervertebral substance is only half an inch in thickness.

As the discovery of this singularly perfect skeleton of an extinct race of animals has excited a very extensive curiosity, it may be interesting to many to have a particular description of the condition in which it was found. Portions of twelve skeletons of the same animal have been discovered in the same county within the present century; but in no case have bones enough been found to give a full idea of the structure and character of the animal, and in almost all cases the bones have been in an advanced stage of decomposition.

Locality and position. Like all others found in this vicinity, this was buried in a peat-swamp, but, in this case, of very small dimensions. The whole peat formation here is only four hundred feet long and one hundred and twelve wide, lying between two low ridges of slate hills, the whole valley being about two hundred feet wide. The clay which underlies the peat bog, descends gradually from both sides, and once formed the bottom of the small pond which occupied this spot. It slopes down very gradually till within six feet of where the bones were found, in which spot it is but six feet below the surface. At this point, however, it makes a sudden descent, and the bottom cannot be reached by sounding with an iron rod.

Beginning at the bottom, then, the following are the deposites which have gradually formed and filled up the pond :

1. Mud, more than 10 feet
2. Shell marl, 3 feet.
3. A layer of red moss, 1 foot.
4. Peat, 2 feet.

Just below No. 3, in the top of the marl, and barely covered by it, lay the skeleton. The direction of the backbone was north and south. The head was thrown crosswise, so that the tusks pointed nearly to the west. Every bone occupied nearly the position it did when the animal was alive. The back of the skeleton was upward ; each of the vertebræ in place, from the first of the neck to the last of the loins. The ribs were projected downwards on each side. The head was upon the top of the neck, and the lower jaw slipped a few inches to one side. The hindlegs were spread out on each side, each bone in its place to the very feet. The whole position was precisely that of an animal that had become mired, and perished in its ineffectual struggles to extricate itself, and it had doubtless died in the place where its bones were found.

In the midst of the ribs, imbedded in the marl and unmixed with shells or carbonate of lime, was a mass of matter composed principally of the twigs of trees broken into pieces of about two inches in length, and varying in size from very small twigs to half an inch in diameter. There was mixed with these a large quantity of finer vegetable substance like finely divided leaves, the whole amounting to from four to six bushels. From the appearance of this, and its situation, it was supposed to be the contents of the stomach ; and

this opinion was confirmed upon removing the pelvis, underneath which, in the direction of the last of the intestines, was a train of the same material about three feet in length and four inches in diameter. This was composed almost entirely of the twigs, some of them not even crushed, and retaining still the form and structure of the tree from which they were torn.

This is by no means a solitary instance of the discovery of this matter. The same has been found in connection with other skeletons. In Godman's Natural History, under the article Mastodon, is recorded an instance of the same kind, and the species of plant found was detected. He thus quotes from a letter of Dr. Barton : "Very lately, in digging a well near a saltlick in the county of Wythe in Virginia, after penetrating about five feet below the surface of the soil, the workmen struck upon the stomach of one of those huge animals best known in the United States by the name of *Mammoth*. The contents of the viscus were carefully examined, and were found to be in a state of perfect preservation. They consisted of half masticated reeds (a species of *Arundo* or *Arundinaria*, still common in Virginia and other parts of the United States), of twigs of trees, and of grass or leaves."

A good deal of doubt existed at the time and afterwards, as to the character of the substance ; but in the case we have now before us, there can be no doubt. The appearance of the matter, and the peculiar position in which it was found, are unquestionable evidence of its being what it was supposed to be, the food which the animal had eaten.

History of the animal. As far as is known at present, the whole race of mastodons is extinct. There is no evidence of their existence at this day. But the numerous remains of them found in this country, indicate that they have at some period lived in great numbers on this continent. At what time this was, we shall consider hereafter. Their range, however, does not appear to have extended over the whole of North America, but to have been confined mostly to the rich alluvial vallies. Portions of two skeletons only have been found north of Orange county in the State of New-York. East of the Hudson river, portions of two have been discovered. Orange county, however, seems to have been the northern limit of their range, and the Hudson river the eastern boundary. Passing then south through New-Jersey, and thence westward through all the

great western vallies, throughout this whole region the bones are found in greater or less abundance. The saltlicks of Kentucky have furnished the most of these remains; and it has been stated, that from one of these localities alone, portions of more than one hundred skeletons have been removed. This species of mastodon is peculiar to this continent, no remains of it having been found in any other portion of the globe.

The first bones and teeth of this animal were found as early as 1712, at Albany; and were noticed in the Philosophical Transactions, in a letter from Dr. Mather to Dr. Woodward. In 1739, a French officer, by the name of Longueil, discovered some of the bones, teeth and tusks, near the Ohio river; and the next year, large quantities of similar bones were washed up by the current of the same river. After this time the bones were occasionally found, down to the present, but often very much decayed, and never in sufficient quantities to make an entire skeleton. The scientific world is much indebted to the late Mr. Peale, who, with great labor and at much expense, procured, in 1800, sufficient bones to enable him to construct a tolerably complete skeleton, which is now in the Philadelphia Museum.

But though the living animal is unknown to us, the aboriginal inhabitants of this country seem to have been well acquainted with him. Many people are disposed to place very little dependence upon Indian tradition; but however vague such tradition may become in relation to particular facts, by long transmission from generation to generation, yet it must have something real and true for its origin. Such we believe to be the fact in relation to this animal. We shall, therefore, give a few of these traditions as concisely as possible.

In President Jefferson's Notes on Virginia, we find the following tradition of the Indians, in relation to this animal:

"That in ancient times a herd of these tremendous animals came to the Big Bone Lick, and began a universal destruction of the bear, deer, elk, buffaloes, and other animals, which had been created for the use of the Indians.

"And that the Great Man above, looking down, and seeing this, was so enraged, that he seized his lightning, descended on the earth, and seated himself on a neighboring mountain, on a certain mountain rock, where the print of his feet are still remaining, from whence he hurled his bolts among them, till the whole were slaugh-

tered except the big bull, who, presenting his forehead to the shafts, shook them off as they fell, but at length, one of them missing his head, glanced on his side, wounding him sufficiently to make him mad; whereon springing round, he bounded over the Ohio at a leap, then over the Wabash at another, the Illinois at a third, and a fourth leap over the great lakes, where he is living at this day."

A Mr. Stanley, who was taken prisoner by the Indians, and carried beyond the western mountains to where a river runs westward, says that these bones abound there, "and that the natives described to him the animal to which these belonged, as still living in the northern parts of their country."

The following we extract from Dr. Kock's pamphlet on the Missourium*: "One man, in 1816, has asserted that his grandfather told him he saw one of these animals in a mountain pass when he was hunting; and that on hearing its roar, which he compared to thunder, the sight almost left his eyes, and that his heart became as small as an infant's."

Period of their existence. The opinion is a very prevalent one, that these animals were antediluvian, and most persons reject with a sneer the idea that they have lived at a very recent period. But the first opinion has no shadow of ground for belief, and all the evidence seems to show that they have existed not many centuries since.

Mr. Jefferson, in his Notes on Virginia, reasons thus: "It may be asked why I insert the mammoth as if it still existed? I ask, in return, why I should omit it as if it did not exist? The northern and western parts still remain in their aboriginal state, unexplored and undisturbed by us, or by others for us. He may as well exist there now as he did formerly, where we find his bones, &c." The same reasoning which he used, will apply, with a diminished force it is true, to our own times. There are still vast portions of this continent yet unexplored by the white man, and inhabited only by hostile Indian tribes. Vast gorges of the mountains in the west might

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* Doct. Kock discovered, in 1840, the remains of the animal which he has called *Missourium theristocaulodon*, in the Osage country. The grounds upon which he has given it a new name appear to be very questionable, and are by no means sufficient to make it any thing more than the Mastodon, the remains of which are so often found even as far west as Missouri, any more than to make the *Hydrarchos* from the *Zeuglodon* described in our last number.

still contain the living animal, and yet we be utterly ignorant of his existence. But we will not contend for his present existence. We will examine briefly the evidence of his having lived within a very few centuries.

In the first place, the testimony of the Indians, but a few years back. They stated in the early part of this century, that this animal still lived north of the Missouri river. They called it "Pere du bœufs" (father of cattle). But how shall we reply to the question, if the animal has lived in these parts of the country within so short a time, why did not the early white settlers either see them or hear of them from the Indians? To this we answer, that after the discovery of this country, the settlements of it took place very slowly, and then was principally in those parts which have not apparently been in the track of the mastodons. That they did not hear of them from the Indians is not wonderful, for there was nothing to excite enquiry with regard to them. If a bone of one had been found at that period, and thus enquiry started, doubtless something would have been ascertained far more distinctly than has since been learned.

That they were not antediluvian, is settled by the fact of their being found in a deposit of marl and peat, all of which has been formed in modern times, and which is still forming.* Moreover the fact that the bones in this skeleton, from Orange county, are so fresh, containing a large portion of animal matter, and that the contents of the stomach and intestines were found unchanged apparently by time, is strong evidence that this individual has lived at a very recent period, and we may put down five hundred years ago as the most distant time at which he lived; and we are strongly inclined to the opinion, that if extinct now, they have not been extinct one hundred years in the western parts of this country.

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* The rapidity with which this peaty formation is deposited, may be inferred from the following fact. Forty years ago, an excavation for marl was made seven feet deep, within twenty feet of the spot where these bones were found. By the operation of the ordinary natural causes, that pit is now filled to nearly the level of the surrounding surface. The deposit must have been much more rapid, at the time that the peat here was first formed, when every year large quantities of leaves were accumulated in it, besides the rank vegetation which annually grew and decayed there.

It is a curious fact, also, that after these marl pits become filled with water, though unconnected with any stream or pond of water, they in a few years become stocked with eels, catfish and sunfish.

ANATOMY OF THE MASTODON.

The skull. The bones of the skull are wonderfully large, and as well preserved as the other bones. The posterior part is flat and broad, measuring in height one foot eleven inches, and in width two feet nine inches. The *foramen magnum* for the passage of the spinal marrow, is three inches and a half in diameter. In the centre of the occipital bone are two deep cavities for the insertion of the *ligamentum nuchæ*, separated by a thin bony partition. The frontal bone is two feet four inches wide, between the orbits of the eyes. The outer plate of bone is very hard and three quarters of an inch thick, where we find eleven inches and a quarter of cellular bone, extending down to the brain. The cavity of the brain is small, occupying only the lower portion of the skull. In front of the nares (nostrils), between the origin of the tusks, is a cavity as large as that of the brain, and is probably the *antrum highmorianum*.

The insertion of the tusks into the intermaxillary bones, is two feet five inches, extending quite back of the orbits. These tusks were ten and a half feet in length, and two feet and an inch in circumference where they enter the socket. With regard to the direction of the tusks, we are convinced from observation of a number of skulls, that their direction is as accidental as the horns of cattle. Some follow the first curve, downward and outwards, the points in one which we have seen being eleven feet asunder. In the skull of this skeleton before us, they first curved downwards and outwards till they were seven feet apart, when they curved inwards and slightly upwards till they approached at the points within two feet of each other. The socket of the tusks is curved and flattened so that it was impossible for the tusks to have turned in the sockets, during the decay of the soft parts, as is supposed by many to have been the case.

The whole skull, lengthwise, is bounded on all sides by nearly straight lines. The lower jaw is nearly straight from the angle to the front, and measures in that line two feet ten inches. The condyloid process by which it is articulated with the head, is distant from the coronoid process one foot. In the front of the lower jaw, at the commissure, is a small round tooth, eleven inches in length and one inch and a half in diameter, and inserted into a socket seven inches deep. This is on the left side of the commissure. On the

right side is a partial socket, as if another tooth had once been there. It appears that the young animals had these two teeth, but lost them at a later period of life, as the remains of the socket only are found in skeletons of old animals.

The teeth are, in this skeleton, two in each row, making eight in all. The front tooth measures three by four and a half inches; the back tooth, three and a half by seven and a half inches. Like the elephant, this animal probably changed its teeth during its growth; at each change, the back teeth crowding forward, till they eventually crowded out the front ones.

The length of the head, from the occiput to the front of the intermaxillary bones, is four feet and one inch, and weighed, with the tusks, 694 pounds.

There are seven bones of the neck, nineteen of the back and three of the loins. The first seven bones of the back are characterized by very long spinous processes, the longest measuring two feet. From the third they diminish in length very rapidly to the eleventh, when they are almost lost. The bones of the neck are much more upright than in the elephant, giving to the animal the appearance of carrying a high head. Atlas, 3 ft. 8 in. in circumference.

The ribs are forty in number; twenty on each side, and the longest measures four feet and seven inches. The first and second ribs on the right side appear to have been broken by some accident during the animal's life. During the process of healing, the first rib has formed a bony attachment to the sternum or breast-bone, which is a triangular bone of large size and one foot seven inches long. The last two ribs on the right side have also been united logitudinally. The scapula (shoulder-blade) is two feet and ten inches long, and two feet and nine inches wide, having a long and sharp acromion process.

The humerus (shoulder) is three feet and five inches long, three feet and two inches in circumferance at the upper end, and three feet and five inches at the lower. The ulna measures two feet and three inches, from the articulation at the humerus, to where it unites with the foot. The olecranon process is seven inches long, and two feet four inches in circumference at the base. The circumference of the elbow is three feet nine inches. The radius is small and slender, and crosses from the inside of the ankle to the front of the elbow. The articulating surface of the elbow is one foot three and a half inches long, and seven and a half inches wide.

The bones of the fore-foot resemble in form those of the elephant, but project forward instead of being arranged in a perpendicular column, and the toes have evidently possessed great power of flexion.

The pelvis is a broad massive bone, and was taken up entire. It measures, between the illiac extremities, six feet and one inch. The pubic and sacro-illiac symphyses are completely united by ossification. The pubic bone, from the anterior to the posterior edge, measures two feet. The thyroid foramen is nine and a half inches long by five inches wide. The diameter from the sacrum to the pubis is twenty-two inches ; the transverse diameter nineteen.

The femur (thigh-bone) is three feet ten inches long, and seventeen inches in circumference at the middle. The head of this bone is two feet in circumference ; around the trochanter, three feet. The great trochanter is very large, but in place of the lesser trochanter is only a swelling and roughness of the bone.

The tibia is two feet six inches long, and two feet seven inches in circumference at the top. The articulating surface, where it receives the thigh-bone, is one foot transverse diameter. The fibula is two feet two inches in length. The bones of the hind-leg resemble in a wonderful degree the same bones in man ; and it is not to be wondered at, that when these bones have been found, they have sometimes been mistaken for the bones of gigantic men.

The bones of the legs, the tusks and the proboscis in this animal are similar to those of the elephant. The structure of the remainder of the skeleton is entirely different. The head of the elephant is formed of bones more or less rounded throughout. The occiput consists of two large lobes of bone, one on each side, with a deep groove between. The lower jaw is convex on the lower side, and the teeth in that jaw are with the crowns concave from the front backwards, receiving the upper teeth which are convex to fit them. The teeth of the elephant are nearly smooth, while in this animal they are formed of two rows of conical prominences, from which the animal receives its name, the two Greek words of which the name is composed signifying a *nipple* and a *tooth*.

It was formerly the opinion that this animal lived partly upon flesh. There is, however, satisfactory evidence, from its teeth and from the contents of the stomach, that its food was principally the small twigs and branches of trees. It had little, if any, lateral

motion to its lower jaw, and of course could not masticate its food very fine.

All that we know of the habits of the animal is to be inferred from its structure, and tradition. Its form, compared with the elephant, is apparently about the same as the horse compared with the ox. He was probably comparatively a graceful animal in his movements ; and with his elevated head, ornamented with such enormous tusks, appeared terribly majestic. The opinion of some that he was the behemoth of Job, is without any foundation ; yet the description of that animal in some respects may well apply to this.

THE LOST RACES.

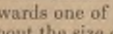
It will not be denied, we presume, that the extinction of entire races of animals is a subject of great interest to man ; that it is a phenomenon well calculated to excite inquiry. It is a circumstance, too, which seems to be of some consequence to us personally : not that any immediate danger, on this score, need be apprehended for our own personal safety and well-being ; but it is of such a nature as to lead us to reflection and inquiry in regard to the mode of operation of those influences which have resulted in such extinction. We do not here refer to the extinction of the lower orders of beings, the mollusca and crustacea ; but to that of the higher orders, those warm-blooded terrestrial animals which rank in the animal scale next to man. Shall we not inquire, then, since the higher animals have perished by families, and entire races have become extinct at a very recent period, May not the same influences which operated in the case of the warm-blooded terrestrial animals, operate also on man as a race, in such a degree as to terminate his career upon the earth ? These lost races, whose remains lie buried in the most recent beds, at the very surface of the ground which is ploughed and sowed by the hand of man, breathed the same atmosphere that we do, basked in the same sunlight, drank of the rains of heaven, and partook like ourselves in many of the commoner pleasures of life ; yet, through the influence of physical agents, entire species have passed away ; and had not their bones been durable, their former existence would never have been suspected.

Can we assign a cause for this catastrophe ? Was it a sudden tempest that swept over the ancient hills, and laid in one common ruin all that then had existence ? Was it an overwhelming flood that poured forth the fury of its waters, and drowned the animals quietly grazing on the plains and hillsides ? Or did an earthquake rock the earth and tear up its foundations ; swallowing a part of the living races, and destroying others by noxious vapors emitted from the suddenly opened caverns ? Or did some slow and subtle poison

diffuse itself through the living frame, begetting a sluggish motion of the blood, destroying the elasticity of the muscles, and gradually enfeebling the external senses, till finally the body became an easy prey to the elements, and the last individual of the race sank down and perished ? Towards the solution of these inquiries, we have no evidence save that of analogy. Life begins at a point ; radiates from that point ; gathers strength and power in its progress, till it reaches its acme ; then begins to faulter, till finally it turns backward, runs a retrograde course, and terminates, as it began, in a point. Species commence their course in a single pair of individuals : they multiply and increase, until the race attains its maximum of development in numbers and physical perfection ; when a stationary period intervenes, and is succeeded by one of decline ; the life-power of the species slowly retires, exhausted of its force by its diffusion through the great flood of beings which it has served to animate, till finally becoming too dilute and feeble to sustain the vital energy, it lingers for a moment like the flickering and dim light of an expiring taper, and then disappears forever. Nations too arise from a few individuals, or from a feeble colony, a score of men perhaps : they press onward and become a strong people ; they extend their power on all sides, and every successive step serves but to increase the national strength and prosperity, until that strength and prosperity reach their highest limit ; when, as it were in the fulfilment of a law of nature, an inevitable decline commences ; the centre of the body politic gradually loses its power over the circumferential members ; its efforts to supply vitality to the extremes exhaust itself, and it falls sooner or later a prey to its own weakness.

We see this principle illustrated, as we think, in the lost races themselves. How often is the geologist able to point to the very origin of a race ; not perhaps to the first progenitor, but to the time when, like a feeble colony, it began its career in a score of individuals only. From such small beginnings, for instance, arose the numerous species which have successively tenanted the ancient waters of our planet : they grew and increased in numbers, till they filled the depths of the sea, and spread themselves on every shore ; but though possessing this wide domain, they were not destined to hold it forever : in numbers, and in perfection of specific development, they reached the limit assigned by nature, and thence began in their turn a downward course, dwindled away to a feeble and imperfect condition, decreased in numbers, and finally perished, never to appear again on this sphere of existence. Recent discoveries corroborate the soundness of these views. We observe, perhaps for the first time, a single mollusk at the base of the New-York system of rocks. As the deposits of this system are piled one upon another, this mollusk increases in numbers with every additional ascending deposit, and, before the middle of the series is reached, has spread so widely, and so countlessly multiplied itself that it nearly fills the mass of the rock. From this point upwards, however, no increase,

but a diminution in the numbers of this same mollusk occurs with each succeeding deposit, till a few solitary individuals only remain. The relation here stated holds true for both the vertical and the horizontal plane, in all the extent of the system of the New-York deposits : go east or west, we find always the same order of increase, decrease, and final extinction of the species.

We have expended many words in attempting to convey a single idea, to exhibit a single fact, which, after all, may be condensed in the three words that serve to define a well-known character employed in musical notation : *crescendo et diminuendo*  . With this harmonical symbol before us, our whole idea is comprised in a diagram ; the complete progress and final close of the march led by each earthborn race is expressed in a formula.

We have been led into the foregoing train of thought, by the discovery of the remains of a species of deer in the freshwater marl beds of Orange and Greene counties in this State. We first obtained the jaw of this extinct species from the marl pit of Mr. Stewart in the latter county, and afterwards one of the horns from a similar pit in Scotchtown in Orange. This deer was about the size of the reindeer of the north, and, like that animal, was provided with a flattened (though more slender) horn ; but it differs specifically from the reindeer, in the possession of two brow antlers instead of one, on a single shaft, and quite near its base. No other bones have yet been found, and hence the height and bulk of the animal have not been accurately determined ; but that in this country the genus Cervus contained a species which is now extinct, is, by this discovery, placed beyond a doubt.

But a still more remarkable species has also perished : we allude to the great Irish elk, whose remains are found in the same beds as those of the deer just spoken of. The horns of this gigantic creature had a spread of ten feet, and hence he must have been one of the most majestic animals of the forests of his time.

Of all the extinct species of quadrupeds, however, the mastodons and elephants are the most remarkable. An animal twelve feet high and proportionately long, provided with tusks curving upwards and outwards to the extent of ten feet, must have been a unique object upon the hills in our vicinity. What their habits were, cannot be well determined now ; but we know that they must have been vegetable feeders, and have browsed upon trees of no mean height and size. A circumstance of some interest in their history is, that they appear to have been confined to the western side of the present valley of the Hudson ; for so far as observations have been made, their remains have not been found either north of the Mohawk valley, or east of the Hudson river. Although the bones belonging to many diffent individuals have been discovered in the counties of Albany and Greene in this State, and in the adjacent counties in New-Jersey, still this part of the continent does not appear to have been their favorite haunt. We must go into the valley of the Mississippi, if we would form a true conception of their former numbers and importance. The Bigbone licks are known the world over, as the cemetery of hundreds of these animals. But here they are not solitary and alone: numerous bones of other animals, known now to be extinct, lie entombed with them in those saline deposits. The horse, the ox, the buffalo, and some others, appear to have been their companions, and to have made these spots a favorite resort. Still farther west, they were equally if not more abundant. The Helderberg hills seem to have been the limits of their wanderings in this direction, the base of the Rocky mountains their extreme west, and the valley of the Mississippi the centre of their range.

The most interesting question in regard to these animals, is that which inquires the cause of their extinction. On this question we are not prepared to sustain an opinion, nor even to offer one that is any thing like satisfactory to ourselves. If we recur to the flood of Noah, we are by no means authorized to believe that we have assigned the true cause ; though, upon a superficial view, that catastrophe seems to offer a plausible solution. The investigations of geologists show that many deluges have occurred, at different times and on different portions of the earth's surface. The subject, however, is one that is still in a course of investigation : time will unfold her secrets ; and we are persuaded that facts bearing directly upon these points will yet be disclosed, which shall reveal to us the whole mystery of the lost races.