AN

# *HISTORICAL DISQUISITION*

ON THE

# MAMMOTH,

OR,

## Great American Incognitum,

*AN EXTINCT, IMMENSE, CARNIVOROUS ANIMAL,*

WHOSE

## FOSSIL REMAINS

HAVE BEEN FOUND IN

## North America.

Containing some introductory Observations, a Narrative of the Discovery of nearly an entire Skeleton near New York, in the Autumn of 1801, together with a comparative Description, and occasional Remarks: illustrated with Engravings.

*By REMBRANDT PEALE.*

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## To Charles Willson Peale.

In addressing this to one of the best of fathers, it is but just that the world should know how much, and in what manner, it is indebted to you for the antique treasure of which the following pages treat.

When some of the first discovered bones of the Mammoth were, eighteen years ago, brought to you by Dr. Brown, for the purpose of making drawings from them, they were put into one corner of your picture gallery, where they fixed the astonishment of every visitor,

and daily served to confirm your intention of procuring, if possible, an entire skeleton. This your persevering zeal has at length accomplished: but a more extensive benefit was likewise the consequence; and the Museum, of which you are the founder, already rivalling many in Europe, is to be ascribed to the same cause, and dated from the same period. The bones of the MAMMOTH first produced the idea of a Museum, which, after eighteen years of rapid approach to maturity, under the unprecedented exertions of an individual, has in its turn enabled you to place among its treasures nearly a perfect skeleton of the MAMMOTH—the first of American animals, in the first of American

Museums. The world will, therefore, join with me in saying, that the most complete account of the animal you were the means of discovering for them, should be inscribed to you, as a feeble effort to do justice to your meritorious zeal for science, and as an assurance of the gratitude of

Your affectionate Son,

*Rembrandt Peale.*

*London, July* 18, 1803.

# *ADVERTISEMENT.*

*IN the account of the* MAMMOTH, *published in October last, the first crude ideas from an imperfect examination were hastily given: subsequent investigation has discovered many interesting circumstances, which are here detailed; and some passages which were not sufficiently explicit, have been more fully explained. Instead, therefore, of re-publishing it as a second edition, which has been long called for, it was preferred to give it a more methodical, satisfactory, and enlarged form, only adopting such passages as suited the present purpose, (instead of the affectation of giving them a new dress,) and dwelling upon those parts of the subject which were but slightly noticed in the former publication.*

innocent pursuits, it should not rank low in the scale of benefits.

From an examination of the various strata, as discovered in mines or exposed in cliffs, we have been taught that the surface of the earth has at times been violently agitated, and that there have been intervals of rest, in which the growth of animal, vegetable and mineral substances has regularly proceeded: but however rugged the surface of the earth, and broken its strata, very few determinate ideas could be formed, were they not accompanied, as they are, with the remains of organized substances.

The celebrated Cuvier, in his Memoir on Fossil Bones, thus commences his observations: "It is now universally known that the globe which we inhabit, on every side presents irresistible proofs of the greatest revolutions: the varied productions of living nature, which embellish the surface, is but a garment covering the ruins of an antecedent state of nature. Whether we turn up the plains, whether we penetrate the cavernous mountains, or climb their broken sides, the remnants of

organized bodies are every where found, buried in the various strata which form the external crust of this globe. Immense collections of shells lie buried far from any sea, and at heights inaccessible to its waves: fishes are found in veins of slate, and vegetable impressions at heights and depths equally astonishing. But what is most surprising is the disorder which reigns in their relative positions; here, a stratum of shells covers another of vegetables; there, fishes are found over terrestrial animals, which in their turn are placed over plants or shells. Torrents of lava and pumice, produced from subterranean fires, are mixed with the products of the ocean: these fossils are almost always foreign to the soil which hides them; it is in the equator we muſt look for recent shells and fishes analogous to those which are found fossil in the north, and *vice verſa*. In short, although nature has thus embellished the actual residence of living beings, although so much care is shewn in their preservation and happiness, she seems equally pleased with exhibiting the monuments of her power in this disorder and apparent confusion—all evi-

dent proofs of the total overthrow which must have preceded the present order of the universe.

" These traces of desolation have always acted on the human mind; the traditions of deluges, preserved among almost every people, are derived from these marine productions thus scattered over the earth. Those not less universal ideas of giants, are owing to the discovery of larger bones than any produced in those climates, where, from time to time, they have been found." After mentioning the spirit of investigation, which from these effects has sought their solution among wild and inconsistent theories, until a better philosophy has determined to reject them all, and establish nothing but upon the immutable basis of facts—facts which are collecting from every source for mutual elucidation, and already more abundant than could have been expected when the practice first was adopted; he proceeds to state, that what relates to the fossil remains of quadrupeds has been least of all attended to, although unquestionably the most interesting of any, from the fewness of their numbers and the extent and accuracy of

our knowledge of such as are living; whereas, with respect to fossil shells and fishes, who can say which among them is not hid in the bosom of the ocean?

" Notwithstanding these reasons in favour of the preference to be given to the study of the fossil bones of quadrupeds, the celebrated men, whom I have just mentioned*, have been stopped in their reseaches by two kinds of difficulties. On one hand, these bones are more difficult to be collected than any other fossils; rarely are they found in good preservation; the workmen who discover them pay little attention to them, frequently suspecting them to be no other than the bones of ordinary men and quadrupeds: often even the learned have overlooked those delicate variations which distinguish them from the living species. On the other hand, it is not always easy to make the proper comparisons;—comparative anatomy has but just emerged from

* Woodward, Whiston, Leibnitz, Buffon, Sloane, Messerschmidt, Daubenton, Camper, Blumenbach, Hunter, Rosemüller, Faujas.

infancy, and in all Europe there are scarcely more than two or three places where every object may be found necessary to such an exact comparison.

" It is to these two causes we must attribute the little knowledge we possess on this subject, and the errors which reign even in the most esteemed works."

In this interesting memoir of M. Cuvier, whose researches into this subject have been indefatigable and profound, there are mentioned no less than twenty-three different species of animals which are now extinct, but whose existence in former ages is attested by their fossil remains; no recent production of the sort having ever been authenticated. The first on this list is that animal whose tusks afford the fossil ivory so common in Siberia, which was generally supposed to be the same as the elephant of Asia, but which he has proved, in another memoir, not only to have surpassed it in size, but to have differed from it very considerably, although certainly a species

of the same genus: similar remains have been found in various parts of Europe and Asia *.

" The second of these species is that to which the English, and the inhabitants of the United States, have *transferred* the name of MAMMOTH, which properly belongs to the first. It is equally large, but its enormous teeth, armed with conic processes, give to it a peculiar character. Great quantities of these are found on the borders of the Ohio, to the west of the United States, whence almost every cabinet in Europe and America has been supplied."

It appears that about the year 1740, great numbers of bones, of this kind, were found in Kentucky, either washed from the banks of the Ohio, or dug up in its neighbourhood;

* It is not so generally known as it should be, that bones and teeth, similar to such as are found in Siberia, have been discovered in several parts of England. Mr. Wansey, of Salisbury, sent for my inspection some which were dug in Salisbury Plains; others have been found in the Isle of Dogs; some near Bristol, &c. These fossil remains deserve more attention than they have hitherto received; but it is hoped a proper collection of them may be formed, and the subject rightly investigated.

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 thus their re-union rendered next to impossible. 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 DCDLXXXVII. The difference in thickness, which appeared excessive, seemed sufficient to attribute this bone to another animal which must have been larger than the elephant; but as no such animal is known, recourse must be had to the

* Vol. XI. page 169, No. MXXXV. Autre Femur d'Elephant.

pretended MAMMOTH, a fabulous animal, supposed to inhabit the regions of the north, where are frequently found bones, teeth, and tusks resembling those of the elephant."

This paragraph of Mons. de Buffon has given rise, in an extraordinary manner, to several errors. Inasmuch as these bones and teeth, which are found in Siberia, differ from those of the living elephants, they are to be taken as proofs of the former existence of another species no longer known, having the same generic characters, but differing specifically. We are not compelled to adopt M. Buffon's aversion to the idea of any race of animals becoming extinct, but we are forced to submit to concurring facts as the voice of God—the bones exist—the animals do not! The Russian peasants, when they were interrogated as to the bones found in Siberia, attributed them, in a fabulous manner, to the MAMMOTH, "of whom, (says Strahlenburgh) they told and believed the most extraordinary stories:" we must all, therefore, agree with Buffon, that as these Siberian bones were really elephantine, the tales of the MAMMOTH,

*as an animal so called*, are entirely fabulous; the *name* being a corruption from the Behomet, signifying an animal of large size, and therefore applied to bones that were certainly of a large size:—but when bones of equal or superior magnitude were found on the Ohio, in America, they were supposed to be of the same species, and therefore called *Mammoth*, by which name they have been known for sixty years, and called so by thousands who knew not the origin of the word. The Siberian bones turn out to be elephantine; those of America, particularly from the teeth, cannot be: therefore, since the animal was not an elephant, naturalists are now agreed in the propriety of distinguishing it by the name of MAMMOTH; not as a name by which, when living, it was ever called, but as a term well appropriated to express its quality of supereminent magnitude.

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, Buffon 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'Académie 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

necessarily a different position; and as the teeth do resemble, though greatly exceeding in size, those of the hyppopotamus which are in the back of the jaw, and consequently not worn; except that in the latter there are seldom more than three prongs, or blunt-pointed protuberances, on the surface, which is afterwards worn down; whereas in this animal the large teeth have four and five, and the small teeth three and four ridges of high conic processes, very differently arranged from those of the former: besides that, in the hippopotamus, the enamel which commences, as in the sheep, upon the outside, likewise pervades the substance of the tooth, and renders them, when ground *flat (as they always are in adult animals)*, efficacious in reducing the vegetable food; whereas in the MAMMOTH the enamel is *wholly* superficial, and the tooth never wears flat, because it has not the grinding motion.

Mr. Collinson, Member of the Royal Society, in a letter on this subject to M. Buffon*,

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

after describing the situation of the salt lick on the 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;" (and subsequent examination proves them to be as different from those of the hippopotamus.) "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

* The number could only be determined by the quantity of *duplicate* bones—there must have been the remains of several of them; and it is very certain that in the same neighbourhood the number must have been very great indeed, con-

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, in both instances, belonging to 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 an ele-

sidering the quantities taken away at various times, the difficulty of digging, and the small extent of ground which has been examined, by those whose only object is to collect the water for the salt it contains. Stupendous and powerful as this animal was, could he have been gregarious? or may not these be the collected carcases of such as have been bemired in the course of many years? or may they not have been thus collected by the effect of water? Not knowing the form of the country, I pretend to form no judgment. R. P.

phant, 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."

In this state of uncertainty continued the knowledge of these extraordinary remains of the *great American Incognitum*, as it was frequently called, until a recent discovery in the neighbourhood of our cities, afforded us almost a complete idea of the whole skeleton ; and 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 specimen, at my father's museum, in Philadelphia, where it will remain a monument, not only of

stupendous creation, and some wonderful revolution in nature, but of the scientific zeal, and indefatigable perseverance, of a man from whose private exertions a museum has been founded, surpassed by few in Europe, and likely to become a national establishment, on the most liberal plan. The other skeleton, discovered a few miles distant from the former, I have brought with me to Europe.

# NARRATIVE.

IN the spring of 1801, receiving information from a scientific correspondent in the state of New-York, that in the autumn of 1799, many bones of the MAMMOTH had been found in digging a marle-pit in the vicinity of Newburgh, which is situated on the river Hudson, sixty-seven miles from the city of New-York, my father, Charles Wilson Peale, immediately proceeded to the spot, and through the politeness of Dr. Graham, whose residence on the banks of the Wall-kill enabled him to be 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 discovered them, heaped on the floor of his garret or granary, 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. But as the farmer's fields were then in grain, the enterprize of further investigation was postponed for a short time.

The whole of this part of the country abounding with morasses, solid enough for cattle to walk over, containing peat, or turf and shell marle, it is the custom of the farmers to assist each other, in order to obtain a quantity of the marle for manure. Pits are dug generally twelve feet long and five feet wide at the top, lessening to three feet at

* 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 one 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.

the bottom. The peat or turf is thrown on lands not immediately in use; and the marle, after mellowing through the winter, is in the spring scattered over the cultivated fields—the most luxuriant crops are the consequence.—It was in digging one of these, on the farm of John Masten, that one of the men, thrusting his spade deeper than usual, struck what he supposed to be a log of wood, but on cutting it to ascertain the kind, to his astonishment, he found it was a 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: all were eager, at the expence of some exertions, to gratify their curiosity in seeing the ruins of an animal so gigantic, of whose bones very few among them had ever heard, and over which they had so often unconsciously trod. For the two succeeding days upwards of an hun-

dred 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; and, in one or two instances, using oxen and chains to drag them from the clay and marle, the head, hips, and tusks were much broken; some parts being drawn out, and others left behind. So great a quantity of water, from copious springs, bursting from the bottom, rose upon the men, that it required several score of hands to lade it out with all the milk-pails, buckets, and bowls, they could collect in the neighbourhood. All their ingenuity was exerted to conquer difficulties that every hour increased upon their hands: they even made and sunk a large cofferdam, 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

It was a curious circumstance attending the purchase of these bones, that the sum which was paid for them was little more than one-third of what had been offered to the farmer for them by another, and refused not long before. This anecdote may not be uninteresting to the moralist, and I shall explain it. The farmer, of German extraction—and like many others in America, speaking the language of his fathers better than that of his country—was born on his farm; he was brought up to it as a business, and it continued to be his pleasure in old age; not because it was likely to free him from labour, but because profit, and the prospect of profit, cheered him in it, until the end was forgotten in the means.—Intent upon manuring his lands, to increase its production (always laudable) he felt no interest in the fossil shells contained in his morass; and had it not been for the men who dug with him, and those whose casual attention was arrested, or who were drawn by report to the spot, for him the bones might have rotted in the hole which discovered them: this he confeſſed to me would have been his conduct, certain that after the surprise of the moment they were

good for nothing but to rot as manure. But the learned physician, the reverend divine, to whom he had been accustomed to look upwards, gave importance to the objects which excited the vulgar stare of his more inquisitive neighbours: he therefore joined his exertions to theirs, to recover as many of the bones as possible. With him, hope was every thing; with the men, curiosity did much, but rum did more, and some little was owing to certain prospects which they had of sharing in the future possible profit. It is possible he might have encouraged this idea; his fear of it, however, seems to have given him some uneasiness; for when he was offered a small sum for the bones, it appeared too little to divide; and when a larger sum, he fain would have engrossed the whole of it, or persuade himself that the real value might be something greater. Ignorant of what had been offered him, my father's application was in a critical moment, and the farmer accepted his price, on condition that he should receive a new gun for his son, and new gowns for his wife and daughters, with some other articles of the same class. The farmer was glad they were out of his

granary, and that they were in a few days to be two hundred miles distant; and my father was no less pleased with the consciousness, and on which every one complimented him, that they were in the hands of one who would spare no exertions to make the best use of them. The neighbours, who had assisted the farmer in this discovery, envious of his good fortune, sued him for a share in the profit; but they gained nothing more than a dividend of the costs; it appearing that they had been satisfied with the gratification of their curiosity, and the quality and quantity of the rum, and no one to prove that he had given them reason to hope for a share in the price of any thing his land might happen to produce.

Not willing to lose the advantage of an uncommonly dry season, when the springs in the morass 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, pullies, augers, &c.; boards and plank were provided in the neighbourhood,

and timber was in sufficient plenty on the spot.

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 mill-wright 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 a-breast in: a rope round this turned a small spindle, which worked a chain of buckets regulated by a floating cylinder: the water, thus raised, was 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. This machine worked so powerfully, that in the second day the water

was lowered so much as to enable them to dig, and in a few hours they were rewarded with several small bones.

The road which passed through this farm was a highway, and the attention of every traveller was arrested by the coaches, waggons, chaises, and horses, which animated the road, or were collected at the entrance of the field: rich and poor, men, women, and children, all flocked to see the operation; and a swamp always noted as the solitary abode of snakes and frogs, became the active scene of curiosity and bustle: most of the spectators were astonished at the purpose which could prompt such vigorous and expensive exertions, in a manner so unprecedented, and so foreign to the pursuits for which they were noted.—But the amusement was not wholly on their side; and the variety of company not only amused us, but tended to encourage the workmen, each of whom, before so many spectators, was ambitious of signalizing himself by the number of his discoveries.

For several weeks no exertions were spared,

and 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. Each day required some new expedient, and the carpenter was always making additions to the machinery: 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, was, 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 which was 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, the want of which rendered it impossible to form a complete skeleton.

It would not have been a very difficult matter to put these bones together, and they would have presented the general appearance of the skeleton; but the under jaw was broken to pieces in the first attempt to get out the bones, and nothing but the teeth and a few fragments of it were now found; the tail was mostly wanting, and some toe-bones. It was, therefore, a desirable object, not only to procure some knowledge of these deficient parts, but if possible to find some other skeleton in such order as to see the position, and correctly to ascertain the number of the bones. In the course of eighteen years there had been found within twelve miles of this spot, a bone or two in seven different places: concerning these we made particular inquiries, but found that most of the morasses had been since drained, and consequently either the bones had been exposed to a certain decay; or else so deep, that a fortune might have been spent in the fruitless pursuit. But through the polite attention of Dr. Galatian, we were induced to examine a small morass, eleven miles distant from the former, belonging to Capt. J. 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, we began our operations with all the vigour a certainty of success could inspire. Nearly a week was consumed in making a ditch, by which all the water was carried off, except what a hand pump could occasionally empty: the digging, therefore, was less difficult than that at Masten's, though still tedious and unpleasant; particularly as the sun, unclouded as it had been for seven weeks, poured its scorching rays on the morass, so circumscribed with trees, that the western breeze afforded no refreshment: yet nothing could exceed the ardour of the men, particularly of one, a gigantic and athletic negro, who exulted in the most laborious choice, although he seemed melting with the heat. 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 (a sufficient proof of their having been scattered,) our latitude for search was extended to very uncertain limits: therefore, after working about two weeks, and finding 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, found between four and seven feet deep—a reluctant terminating pause ensued.

These bones were kept distinct from those found at Masten's, as it would not be proper to incorporate into one skeleton any other than the bones belonging to it; and nothing more was intended than to collate the corresponding parts. These bones were chiefly valuable as specimens of the individual parts; but no bone was found among them which was deficient in the former collection, and therefore our chief object was defeated. To have failed in so small a morass was rather discouraging to the idea of making another attempt; and yet the smallness of the morass was probably the cause of our failure, as it was extremely probable the bones we could not find were long since decayed, from being situated on the rising slope at no considerable depth, unprotected by the shell marle, which lay only in the lower part of the bason forming the morass. When every exertion was given over, we could not but look at the surrounding unexplored parts

with some concern, uncertain how near we might have been to the discovery of all that we wanted, and regretting the probability that, in consequence of the drain we had made, a few years would wholly destroy the venerable objects of our research.

Almost in despair at our failure in the last place, where so much was expected, it was with very little spirit we mounted our horses on another enquiry. Crossing the Walkill at the falls, we ascended over a double swelling hill into a rudely cultivated country, about twenty miles west from the Hudson, where, in a thinly settled neighbourhood, lived the honest farmer Peter Millspaw, who, three years before, had discovered several bones: from his log hut, he accompanied us to the morass.—It was impossible to resist the solemnity of the approach to this venerable spot, which was surrounded by a fence of safety to the cattle without. Here we fastened our horfes, and followed our guide into the center of the morass, or rather marshy forest, where every step was taken on rotten timber and the spreading roots of tall trees, the luxuri-

ant growth of a few years, half of which were tottering over our heads. Breathless silence had here taken her reign amid unhealthy fogs, and nothing was heard but the fearful crash of ſome mouldering branch or towering beach. 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; yet a last effort might be crowned with success; and, since so many difficulties *had been* conquered, it was reſolved to embrace the only opportunity that now offered for any farther discovery. Machinery was accordingly 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; by which the men were enabled, unmolested, except by the caving in of the banks, to dig on every ſide from the spot where the first discovery of the bones had been made.

Here alternate success and dissapointment

amused and fatigued us for a long while; until with empty pockets, low spirits, and languid workmen, 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, to leave no means untried, 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, though not more than twenty feet from the first bones that were discovered, 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, several toe-bones, 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 unconscious woods echoed with repeated huzzas,

which could not have been more animated if every tree had participated in the joy. "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 with encreasing vigour. 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. One of the ribs had found its way into an obscure farm-house, ten miles distant, to which we fortunately traced it.

Thus terminated this strange and laborious campaign of three months, during which we were wonderfully favoured, although vegetation suffered, by the driest season which had occurred within eight years. Our venerable relics were carefully packed up in distinct cases; and, loading two waggons with them, we bade adieu to the vallies and stupendous mountains of Shawangunk: so called by their former inhabitants, the Indians of the Delaware tribe. The three sets of bones were kept distinct: with 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 inftance, in order to complete the first skeleton, which was found at Masten's, the under jaw was to be modelled from this, which is the only intire one that has yet been discovered, although we

have seen considerable fragments of at leaſt ten different jaws: while on the other hand, in the skeleton just discovered at Barber's, the upper jaw, which was found in the extreme of decay, was to be completed, so far as it goes, from the more solid fragment of the head belonging to the skeleton found at Masten's. Several feet-bones in this skeleton were to be made from that; and a few in that were to be made from this. In this the right humerus being real, the imitation for the left one could be made with the utmoſt certainty; and the radius and ulna of the left leg being real, those on the right side would follow in course, &c. The collection of ribs in both cases was pretty intire; therefore, having discovered from a correspondence between the number of vertebræ and ribs in both animals, that there were nineteen pair of the latter, it was necessary in only four or five instances to supply the counterparts, by correct models from the real bones. 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 skeleton, or from those of the same pro-

portion in the other. Nothing in either skeleton is imaginary; and what we have not unquestionable authority for we leave deficient, which happens in only two instances, the *summit* of the head, and the *end* of the tail.

## COMPARATIVE DESCRIPTION.

THE skeleton of the MAMMOTH, as it is first hastily glanced at, impresses the idea of the elephant, to which, in its general contour it bears some resemblance; yet, on a closer examination, even the general figure is found to vary considerably; and a closer inspection will shew that many of the bones differ in a most extraordinary manner. The supposition which necessarily accompanies this *first impression* is, that the habits and food of the two animals must have been similar. This hasty mode of decision is the parent of prejudice and obstinate error; and nothing better can be said of it, than that it is not unnatural, but such as we should expect from minds little accustomed to investigation, and rather disposed to confide in common-place facts, than to inquire into the possibility of new ones, especially if they are in opposition to their prejudices.

Among all the different genera of quadrupeds with which we are acquainted, a more striking dissimilarity prevails between their heads than any other parts; and the reason is obvious: members that are to answer exactly the same purpose, in different animals, never differ; but an appropriate form of bone always accompanies peculiar modes of action and habits of repose, which by constant use are more and more confirmed: hence, animals wholly different from each other, except in a few instances, are more immediately distinguished by the heads than any other part; not only because their forms are more decidedly peculiar, but because the inexperienced eye can better remark them than such as may exist in other bones which are of more difficult comparison, and more multiform in their parts: for to judge correctly in osteological comparisons requires not so much the knowledge of the anatomist as the eye of the artist:—and I maintain it as a fact, in which every candid anatomist and every artist will join with me, that the mere artist, by a little attention to the variations of form, will sooner, and with more certainty, establish the characters of

skeletons, than the most learned anatomist, whose eye has not been accustomed in an instant to seize on every peculiarity: the slow anatomist may be sure, but unless he *devotes* himself to the abstracted *study* of his subject, he falls short of correct information. It is, therefore, evident, that our hopes of correct knowledge on this subject must rest on those in whom the two characters are combined. For my part, my decisions are pronounced with no other authority than that of an *artist*, pretending to very little more knowledge of anatomy than gives me the names and uses of the bones; but, when *forms* and the right comparison of *lines* and *angles* is the subject of investigation, I feel myself, as every artist must, perfectly confident in the assertion of truth.

## HEAD.

WHAT there remains of the head is of so peculiar a construction that it must be obvious, to the most inexperienced eye. The cranium being deficient, there remains (besides the under jaw) only that portion of it which is

comprised between the condyle of the neck and the sockets for the tusks, the temporal bone, zygomatic process, and the teeth: this, therefore, compared with the corresponding portion of the elephant's head *, taking the level of the teeth in both as a base line from which to measure, will be found comparatively much longer for its height †. In the Mammoth ‡ the sockets of the tusks at A. to the condyle of the neck B. is nearly a horizontal line; in the Elephant, a line between the same parts, forms with the horizon, an angle of nearly 45 degrees. In the Mammoth, a line from the zygomatic process at C. to the condyle of the neck B. *descends* as much as it *rises* in the Elephant, producing a difference comprised within an angle of 45 degrees. In the Mammoth, the condyle of the neck is situated very nearly upon a line with the level of the teeth: in the Elephant it is as much *above* the teeth as it is distant from the frontal bone; consequently the ear of the Mammoth is very little above the horizontal line of the teeth, and in the

* See the plate, figure I.

† This proportion is taken notice of by Camper, in his late folio work on the anatomy of the elephant, page 24.

‡ Figure II.

Elephant there is a vast distance between them. In the Elephant, as in most other quadrupeds, the socket of the eye is, as it were, scooped out of the zygomatic process at C.; in the Mammoth that portion of the bone at C. is sufficiently perfect to shew that there is no such socket: the eye of the Mammoth, therefore, must have been *higher* than the ear; in the Elephant it is *lower* than the ear. One consequence of this uncommon situation of the teeth *below* the condyle of the neck in the Elephant, is, that the arms of the under jaw to the condyloid processes are extremely long, insomuch, that the height of the jaw is equal to the length; whereas in the Mammoth it has the more usual appearance of length, with but short processes, the coronoid being longer and thinner than the condyloid; but in the Elephant the reverse is the case: 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. In the Mammoth, what is called the semi-lunar notch from the condyloid to the coronoid processes, is very strongly marked; but in the Elephant no such notch exists. In the Mammoth the bone from E. to *a.* is extremely thin and rugged; in the Elephant it is smooth, and being semi-cylindrical (as well as circular) is unusually bulky, and well adapted to the peculiar formation of the Elephant's teeth. In the Elephant the under jaw terminates in a grooved point, directed downwards (D.); the corresponding part in the Mammoth has a most extraordinary roughness, composed of foliated or thin irregularly involuted processes, indicating some unusual and immense appendage.—This part, in some degree, resembles the Walrus. And lastly, in the under jaw of the Elephant, the opposite grinders, which in the back of the jaw are very distant from each other, approach towards an open in the front; whereas in the Mammoth they are completely parallel with each other. These variations produce a very different outline in the opening between the teeth, as you look at the jaws in front: in the Mammoth, it is a portion

of a circle; in the Elephant it accords with the figure of a pear. Glancing rapidly from one head to the other, the eye will readily notice other peculiarities, which are not of sufficient importance particularly to mention here.

## TEETH.

From their size, structure, and mechanical action, the teeth are much the most interesting part to the anatomist. From their uncommon size, there are but few of them; (eight being sufficient to fill the jaws;) two large ones in the back, and two small ones in the front of each jaw: the large teeth have *four obliquely transverse conic ridges* or processes; the small ones *three* with the same characters, so disposed as to interlock with each other, in the manner of a crimping-machine, only all at once, with an irresistible power. These conic processes are covered with a thick coat of enamel, *wholly superficial*, reaching down on every side to the alvéolar processes, in the manner of all carnivorous animals. There is a section of one in the British Museum, which

shews that the enamel does not, in the slightest degree, pervade the tooth, as it does in the Elephant. The teeth of the Asiatic Elephant are composed of numerous *perpendicular plates* of enamel, so connected by pairs at the sides, as to form to appearance on the surface, long flattened ovals; and, in fact, they are united at bottom as well as originally at the surface, which is quickly worn off, and which then discloses an ivory of close texture, and different formation from that which separates from each other these flattened ovals of enamel. The teeth of the African differ from those of the Asiatic Elephant in having *fewer* portions of *thicker enamel*, which do not run parallel with each other in plates, but are so disposed that, on the surface of the tooth, or a horizontal section of it, the ivory enclosed within the enamel resembles a *cross*, consequently the teeth are better adapted to coarser vegetables and greater rotatory motion *.

I have seen some teeth of the Mammoth with the summits of their enamel-capped pro-

* See the plate, figure III. and IV.

cesses so worn off as to present, to those *predisposed* to adopt the idea, *some* resemblance, in the superficial *lines*, to the teeth of the African Elephant; but no one could look with *any* degree of *attention* at any tooth of this animal, without discovering that the enamel absolutely covers the whole upper *surface*, except where it is worn off *, and that it never penetrates to the interior of the tooth †.

* The enamel in the Elephant's teeth never wears off, it only wears *down*.

† This incorrect observation, of some teeth of the Mammoth, has induced several anatomists to class this animal as a species of Elephant, more analagous to the African than the Asiatic. Any conclusions from so false an observation would be of no consequence, if they were not given by some of the first characters. Among others, CAMPER, in his elegant work on the anatomy of the Elephant, page 24, when he speaks of the fossil bones from the Ohio, which, on the authority (in this instance incorrect) of the celebrated CUVIER, he classes as a fourth species of Elephant, says thus:—" 4. The American Elephant (so called by Pennant) with bones considerably more bulky than the former (meaning the Siberean bones), with a lengthened and prodigiously heavy head and long tusks: his grinders, more numerous, are composed of three or four plates *(plaques)* first crowned with tubercles, and then marked with a double leaf of clover *(marquées d'une double feuille de trèfle)*. This prolongation

It is evident from the structure and position of these teeth, that they never could have been used in *grinding* vegetables, but in crushing or champing some hard and brittle substances, such as shell-fish, &c. There are three facts to prove that they did not grind the food: 1st. the interlocking of the conic processes: 2dly. their *oblique* direction, so that the ridges or cavities on one side of the jaw do not run parallel with those on the other, which most effectually prevents a lateral motion—this important character has been entirely overlooked—and 3dly. the condyloid processes, which are *transversely oblong*, running perfectly *parallel* with each (as true hinges) and working in a groove, from which they cannot rotate.

of the jaws, influencing the obliquity of the profile, must have given a singular reclination to the facial line, in diminishing the relative height of the vertical axis of the head.—This extinct species, as the first, was more analagous to the African Elephant than the Asiatic."

On this paragraph I shall only remark, that his imaginary *plates* do not exist in the teeth; and that I know not what he means by his "*double feuille de trèfle*," unless it is the *outline* formed by the *worn edges* of the enamel, as observed before; but that his observations with respect to the contour of the head are perfectly correct.

An uniform composition of tooth, as it respects the *intermixture* of enamel and bone, running from the surface to the roots, is observed to prevail in those of the Elephant, Horse, Ox, &c. they principally differ in the *figure* which those veins of enamel assume, and by which alone they may be discriminated from each other. On the other hand, carnivorous teeth, incrusted with enamel as far as the gums, vary in the form and number of their protuberances, so as generally to designate their species: yet among them there is a proper distinction to be observed; which is, that those carnivorous animals, the form of whose teeth, and the attachment of whose jaws, allow them the side or grinding motion, are always of the *mixt* kind. Man, the Monkey, Hog, &c. are carnivorous animals, because their teeth are incrusted with enamel, and because they eat flesh; yet they are adapted for other food, by the rotatory motion of their jaws, and the form of their teeth. And although the Mammoth is deficient in cutting teeth, and has no other canine teeth than his enormous tusks (which deficiencies may have been supplied by a pair

of large and powerful lips, indicated by the uncommon sinuosity on the front of the lower jaw), yet I am decidedly of opinion, since it cannot be contradicted by a single fact, that the Mammoth was exclusively *carnivorous*; by which I mean, that he made use of no vegetable food, but either lived entirely on fish or flesh, and not improbably on shell-fish, if, as there are other reasons to suppose, he partook in any degree of the amphibious nature.

It has been observed that these teeth resemble those of the Hyppopotamus; but very little observation and comparison, between such of them as were but little used and those worn down with age, would have been sufficient to satisfy the weakest judgment that they are of a very different kind; those of the Hippopotamus being always in the adult animal ground down horizontally, so as to present a flat surface to action, and only the hindmost teeth in the young and middle aged Hyppopotamus shewing any appearance of rounded protuberances, which, in fact, are always of an irregular figure and having the enamel, although commencing on the outside as in the

Sheep, Goat, Deer, &c. yet in such manner entering into the body of the tooth as to constitute it, when worn down, a perfectly *granivorous* tooth; for it may be observed, that the Sheep, Goat, Deer, and Hippopotamus, in having the edges of their teeth protected by enamel, differ from those graminivorous animals (as the Horse and Ox) which do not *cut* the bark of trees, or feed upon reeds.

Thus much is as little as can be said on the teeth; not so remarkable even for their size as their peculiar construction, and mechanical action: there being no animal known, whose teeth resemble them.

## TUSKS.

Although it was extremely probable, or rather (as Hunter expressed himself) there was no reason to doubt but that the same animal which owned the carnivorous teeth likewise owned the tusks which were found with them on the Ohio, yet the fact could there not be well ascertained, because the bones of several

animals were intermixed with each other; nor was it satisfactorily proved until the discovery of these skeletons in the state of New-York, in both instances unaccompanied with any extraneous bones.

It was owing to the discovery of tusks, with these bones, that so much has been said about their being elephantine: but they are totally different in their form, substance, and position: the Elephant's tusk is nearly straight, and therefore part of a very large circle; a very long tusk of the Mammoth forms the half of a circle of much smaller diameter, besides having a peculiar twist or spiral form. Transverse sections of the Elephant's tusk constantly yield the *oval* figure; those of the Mammoth are perfectly *round*. The Elephant's tusks are *uniform* ivory; those of the Mammoth are of *two distinct* substances, the internal part having the *texture* of, but a much softer consistence than, ivory; the outer part *not having* the texture of, and actually *harder* than, ivory, forming a very thick shell over the whole tusk. At first I imagined that the internal part had been true ivory, which had

suffered decomposition; but to this idea there presented insuperable difficulties: all the bones found in the same morass, at nearly an equal depth, and equally protected by the shell marle and water, were in an equal degree of preservation; but every bone was *more* decayed than the ivory in the body and roots of the teeth, and these sometimes less perfect than the enamel. How could it happen then that the bones were not wholly decayed, to correspond with the tusk? or why should this be so much decayed, while the ivory of the teeth is in such fine preservation, having been under the same circumstances? These questions cannot be answered but in the belief that the tusks (although they certainly have suffered some injury) never could have been of the same consistence as those of the Elephant.

When the skeleton was first erected, I was much at a loss how to dispose of the tusks; their sockets shewed that they grew out forwards, but did not indicate whether they were curved up or down. I chose, therefore, first to turn them upwards, not because they produced the same effect as in the Elephant; for it is evi-

dent they could not, from the different angles between the sockets for the tusks and the condyles of the neck (as before remarked); the horizontal position of which in the Mammoth, together with the great curve of the tusks, would elevate them too high into the air, directing them backwards, twelve feet from the ground; so that they never could have been brought sufficiently near the ground for any kind of purpose. This position was evidently absurd; and there is infinitely more reason in supposing them to have been placed like those of the *Walrus*, and probably for a similar purpose.

The tusks which were found at Barber's (the point of one I have with me) exactly resemble those in the skeleton, but very much worn at the extremities, and worn in so peculiar a manner as could not have happened in an elevated position; unless on the absurd supposition, that the animal *amused* himself with wearing and rendering them blunt, by rubbing them against high and perpendicular cliffs of rocks. This, in a state of nature, can never be supposed, whatever habits may

be acquired when in a narrow confinement. There can be no doubt, then, of their having been *used* against the ground; and not improbably in rooting up shell-fish, or in climbing the banks of rivers and lakes.

## NECK.

THE bones of the neck do not materially differ from those of the Elephant, except that the spinous processes of the fifth, sixth, and seventh, are not so long as in the Elephant.

## BACK.

THE second, third, and fourth dorsal vertebræ are crowned with immensely long and thick processes, which rise perpendicularly over the shoulders, as in the Hog: from the fourth, the spinous processes decrease rapidly to the twelfth; and from thence to the sacrum, including the lumber vertebræ, they are scarcely to be seen. This conformation differs remarkably from the Elephant, which has a greater

uniformity in the length of these processes; those over the shoulders being not so long, and all the rest of the back and loins much longer; consequently the back is more arched. The vertebræ are, seven cervical, nineteen dorsal, and three lumber—in all twenty-nine.

## HIPS.

EVERY eye is struck with the disproportionate smallness of the opening through the pelvis; although the rest of the bone is sufficiently large. These bones are somewhat broken; but the parts uninjured are sufficient to shew a very different 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 Bisson 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.

## TAIL.

The tail is imperfect, though from the number and size of the bones it was probably a long one; but it is very remarkable that, the lateral processes are extremely long, and the superior ones quite short, so that the tail must have been *broad* and *flat*: whereas the tail of the Elephant *, instead of being broad, is flattened in the direction of the spine, a little bristly hair growing on the *outer edge*, and a greater quantity of it, somewhat longer, growing on the *inner edge*, which gives it something of a fin-like appearance.

## RIBS.

From all the drawings of Elephants, and from such of their real ribs as I have seen, I have observed one universal and unvarying character; they are *flat*, like those of the Ox, *small* towards their head, *broad* towards their junction with the cartilage, and more or less bent sidewise in an undulating form†; whereas

* See the plate, figure V.

† See Camper on the Elephant.

those of the Mammoth are extremely *narrow* at the cartilage, *thick* and *strong* towards their head, and bent perfectly *edgewise*, standing a little obliquely, and without any lateral bend *. The first pair are so remarkable in their form as to appear, especially when seen detached, more like *clavicles*, being (unlike the rest of the ribs) excessively bulky and broad towards the cartilage, and *crossing* the breast-bone at *right angles*, reducing to a very small size and curious figure the entrance into the chest.—The first six pair of ribs are remarkably strong, especially compared with the remainder, which are extremely small and comparatively weak; and the whole of them so *short*, that the body must have been of a very small proportionate magnitude.—The ribs are 19 pair.

## LEGS AND FEET.

As well as can be determined from the drawings and skeletons of Elephants, which are all of a small size in England, and therefore

* See the plate, figure VI.

bad subjects for comparison, I am disposed to pronounce the legs and feet considerably like those of the Elephant, differing in some particulars, but chiefly in the proportionate length and breadth. The scapula of the Elephant * is in proportion much larger than that of the Mammoth, and the upper extremity of it less extended, and more pointed: in the scapula of the Mammoth †, the two processes that proceed from the spine are uncommonly long and rough, especially the one pointing backwards and downwards, extending very nearly across the blade, &c. The humerus, radius, and ulna, are unusually thick for their length, to which the fore-feet correspond, the hind-feet not being near so large; whereas, in the Elephants I have seen, the hind are full as large as the fore-feet, and in some specimens considerably larger: in the Mammoth the bones of the hind-feet are small, but full of those strong protuberances which served for the attachment of muscle. One necessary consequence of this great bulk of the radius and ulna is, that the radius, crossing the ulna

* See the plate, figure VII. † Figure VIII.

from the outside above to the inside below, forms a greater angle than if the bones were slender; in which case the crossing would scarcely be observable:—perhaps it is more remarkable in the Mammoth than any other animal. In the toes of the fore-feet the second plalanges terminate with a little groove, which indicates that the third phalanx, to which the nail was attached, was susceptible of considerable motion; and that the nail probably resembled that of the Hippopotamus rather than the Elephant. Another variation from the Elephant in the legs is, that the difference in length between the thigh-bone and the tibia, or, in other words, the distance from the knee, above and below, is less remarkable in the Elephant than in the Mammoth; the thigh-bone being *longer*, and the tibia *shorter*, than those of the Elephant: hence the knee of the Mammoth must have been more equally placed between the body and the ground, especially as it has already appeared from an examination of the ribs, that the body of the Mammoth must have been much smaller comparatively than that of the Elephant. As we are not in possession of the bones of any large

and full grown Elephants, nor any of the large quadrupeds, we are enabled to make but a very imperfect comparison, by means of the small ones usually to be met with; but, from what we have, there does not appear any other remarkable difference in the legs except in the *femori*; those of the Elephant being *cylindrical*, those of the Mammoth being *flattened*, so that a cross section of the former would shew a *circle*, and of the latter a long *oval*. The comparison which Daubenton made between the thigh-bones of the Asiatic Elephant, the Siberian Elephant or Mammouth, and the American Incognitum (since called Mammoth) shewed three successive degrees of proportionate bulk; that of the modern Elephant being the most slender, and that of the American animal the most bulky in an equal scale of length. He likewise observed that those of the latter were very considerably flattened, and some variation in the direction of the neck and the great trochanter.—The number of bones in the legs and feet agree with the human skeleton.

## DIMENSIONS OF THE SKELETON.

| | Ft. | Inch. |
|---|---|---|
| Height over the shoulders - - | 11 | 0 |
| Ditto over the hips - - - | 9 | 0 |
| Length from the chin to the rump | 15 | 0 |
| From the point of the tusks to the end of the tail, following the curve - | 31 | 0 |
| Length in a straight line - - | 17 | 6 |
| Width of the hips and body - - | 5 | 8 |
| Length of the under jaw - - | 2 | 10 |
| Weight of the same - 63½ pounds | | |
| Width of the head - - - | 3 | 2 |
| Length of the thigh-bone - - | 3 | 7 |
| Smallest circumference of the same | 1 | 6 |
| Length of the tibia - - - - - | 2 | 0 |
| Length of the humerus, or large bone of the fore-leg - - - - - | 2 | 10 |
| Largest circumference of the same | 3 | 2½ |
| Smallest ditto ditto - - - - | 1 | 5 |
| Length of the radius - - - | 2 | 5½ |

| | | |
|---|---|---|
| Circumference round the elbow - | 3 | 8 |
| Length of the scapula, or shoulder-blade | 3 | 1 |
| Length of the longest vertebræ, 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 |
| Circumference of one tooth or grinder | 1 | 6½ |

Weight of the same, 4 pounds 10 ounces.

The whole skeleton weighs about 1000 pounds.

## GENERAL OBSERVATIONS.

MUCH has been said on the subject of the bones found in America by persons who never saw them, or but mutilated fragments of them; resting their faith upon what has been said by certain writers of science and respectability, on the Mammouth of Siberia; and thence falling into the error, that those large bones found in America were of the same species.

Many years ago, when scientific travellers, several of whom were commissioned by the Emperor of Russia, found in the inhospitable regions of Siberia numerous quadruped bones, of gigantic size, they learnt from the peasants to distinguish them by the term Mammouth, an animal which they believed to be still living. These bones, inſtead of another

name, continued to be distinguished by that originally given to them, whenever they became the subject of disquisition. Strahlenburgh, in his Historico-geographical Dictionary, derives this word from the Hebrew *Behemot*, corrupted by the Arabians into Mehemot, and thence into the Russian *Mammout*, or Mammoth. But a short time elapsed, under the encouragement of the Emperor, before a considerable number of these bones, and particularly the heads, were discovered and taken to the imperial cabinet at St. Petersburgh. The tusks and several other bones were, before this, by many suspected to have been elephantine; but the fact is now sufficiently established—and they are, therefore, classed as an extinct species.—They are elephantine, because the head, from which the whole judgment may be taken, is furnished with graminivorous teeth, in some degree resembling those of the Asiatic Elephant; because the eye is hollowed out of a slender zygomatic process; because the cranium swells out into two full conjoining lobes; because the horizontal line of the teeth is situated, so as to form, with the con-

dyle of the neck, an angle of 135 degrees, a line from the condyle of the neck descending in an angle of forty-five degrees to meet the posterior part of the upper teeth; because on this oblique line, *above* the teeth, the inner nostril commences and runs parallel *with* the teeth, terminating in the forehead, between the eyes, where it serves for the origin of the proboscis *; and, because the tusks, which are of perfect ivory, are simply curved, and resembling those of the living Elephant.

And yet with these traits of resemblance, there have been observed in the head and other parts several features, which distinguish it specifically from either the African Elephant, or that of Asia, which it most resembles. I shall only remark, that the teeth appear to be distinguished by having the laminæ of enamel

* This *inner nostril* in the Mammoth, instead of having the direction mentioned above, runs directly upward at right angles from the teeth, and terminates in the broken part of the head posterior to a concave surface, which, if it be the *cerebellum*, is uncommonly low and small. This inner nostril, as far as we can trace it, is very smooth and cylindrical. Could the nostril have terminated as in the whale, and for a similar purpose?

thinner, placed in straiter lines more closely together, and much more numerous, than in the modern Elephant.

As soon as it was known in Europe that bones of a large size were likewise found in America, and either the thigh-bones or drawings of them sent over, they were instantly pronounced the same as those found in Siberia; and, from the circumstance of this opinion having been so hastily expressed, there have been some whose mature judgment has been satisfied with encreasing proofs, who have, nevertheless, been weak enough to be ashamed to confess it. For it is a fact of which almost every man of any observation may have had sufficient proof, that even among men of real science, truth suffers more from the tenacity of opinion once expressed, than from a want of love for it—all men love it, but fear to be thought weathercocks; and, certain that they are not deities, they shrink from the imputation of infallibility! Every anatomist knows that a judgment pronounced from *one* bone is liable to error; and, in fact, there was no more reason to pronounce the *Femori*, found in America, to be elephantine, than there

would have been to decide the *Humeri*, which accompanied them, to have belonged to a gigantic Horse; for the *Humeri* of the Mammoth do not differ so much from those of the Horse, as the *Femori* do from those of the Elephant.

The bones found in America were always accompanied with teeth of a very peculiar structure, unlike those, whether large or small, belonging to any animal known, but most resembling those of the Hog, and the young and unused teeth of the Hippopotamus: they were, therefore, suspected to have been part of an immense Hippopotamus, rather than tolerate the idea that there had ever existed a species of animal no longer in existence. But since it was evident that there had existed a large *unknown* quadruped, of which these were the teeth, how could it appear improbable that the other bones accompanying them should have belonged to the same animal, because they bore some resemblance to the Elephant? Yet it was doubtful: and, while Buffon, Daubenton, Gmellin, and Sloane, were afraid to find the bones otherwise than

elephantine, Hunter was the only naturalist, who, judging impartially, and abiding by the invariable features of nature, was satisfied that they were not, and that the teeth were never used in the mastication of vegetables. The weight of Hunter's authority inclined many to his opinion among the English, but more among the French and Germans confided in the judgment of Daubenton. The discovery of two skeletons, and a third collection of bones, in the state of New-York, has put the subject beyond the reach of question; and we are now satisfied that there formerly existed a stupendous animal in North America, with many peculiar characters. If there were no other instances of the remains of unknown, I may say, extinct animals, it would be difficult to receive this as the first evidence of the kind; but the world teems with them; all Europe abounds with them; and in America already there have been found *four* of a large size, and several of a smaller.

The immense quantity of animal remains found in limestone, and the perfect impressions of vegetables in slate, not only prove a

long period of time to have elapsed since they existed, but that these extraordinary incrustations were effected in some sudden revolutions, and that they must have lived and propagated a period of time before those events. And it is evident that there have been successive revolutions or changes of this kind, by the repetition of similar strata, at various depths, with regular intermediate soils. I shall here introduce a proof, connected with our subject, and otherwise interesting. Besides the skeletons with carnivorous teeth, found in New-York and elsewhere in America, there have been found in Kentucky several very large *graminivorous* teeth, never known to be accompanied with any other parts (unless perhaps the tusks), and always much decayed. They appear to me exactly like those found in Siberia; and I have no hesitation in attributing them to a more *remote* age than that in which the Mammoth lived, unless we suppose the bones of the Mammoth to be of a more dense nature and less liable to decay: that they are astonishingly dense is sufficiently obvious from some few specimens; but I can scarcely imagine the others to have been so

much softer as wholly to have disappeared, except the grinders and some tusks, while such numbers of the former still remain in good preservation.

It is not sufficiently known that there have been large graminivorous teeth found in America; and by those who know it the proper inferences are not generally formed. That there are found in America teeth similar, to those discovered in Siberia, proves either that the same animal has inhabited the two countries, and therefore that there must have been at some period a communication, or that a deluge has deposited some of their carcasses in America; but, from the paucity of their remains, compared with the astonishing numbers discovered in Siberia, whence they have long been taken as an article of commerce, and still continue abundant, it it certain, that if they did inhabit America, it had been but for a short time; or they originally inhabited America, and thence spread into Siberia, and were destroyed in America antecedent to their destruction in Siberia: for it must be again remarked, that while their remains (particu-

larly the tusks and teeth) are frequently in excellent preservation in Siberia, none have ever been found in America but in the extreme of decay: at any rate, that there is this difference in the kind and preservation of these bones must be an interesting fact to naturalists, and lead to some particular conclusions, since it must have been owing to some particular causes; either such as I have imagined, or others equally conclusive.

The Mammouth bones found in Siberia, having given name to the great fossil bones of America, those writers who, from observation, knew the former to be elephantine, concluded the latter to be so likewise, especially if they happened to hear any thing of the great graminivorous teeth above-mentioned: they therefore adopted the idea, that the various leg-bones, &c. found on the Ohio, were part of the same animal which owned these teeth; and that the jaw-bones, with carnivorous or conic-ridged teeth, were the only remains of some other stupendous being, analagous to the Hyppopotamus: but three unquestionable facts now prove the reverse to be the case,

though one would be sufficient, if the whole skeleton was found together almost all united, and without any extraneous bones, as was the case with the skeleton discovered in Ulster County, New-York, and erected in the Philadelphia museum: and we are now satisfied that no other parts of the animal which owned the graminivorous teeth and ivory tusks have been yet discovered, because no other bones have been found, but such as perfectly resemble the skeletons dug up in New-York, and which so materially differ from the Elephant.

Hitherto I have not been able to learn whether even a single tooth of the American Incognitum has ever been discovered in Siberia; and, until we shall have at least one authenticated fact of this kind, we must conclude that this animal was peculiar to America. Nevertheless, I am disposed to think there may yet be found in Siberia these carnivorous teeth, because, as was observed before, teeth similar to the graminivorous ones of Siberia are found in America. Indeed it is by no means improbable that as they were both inhabitants of the same climate, in different lon-

gitudes, a few from either country may have migrated into the other; for the carnivorous teeth, and their appropriate bones, are as abundant in America as the graminivorous or elephantine remains are in Siberia. I am, therefore, of opinion, more from this circumstance than any other, that there must have been a communication between the two continents, since it is now a well established fact, that every country has its peculiar inhabitants. Had the celebrated Buffon attended better to this truth, he would have saved himself some needless observations and theoretic fancies, with respect to the old and new world; but we should likewise have lost the able reply of Jefferson. It is not because the climate and productions of South America are unfavourable to the production of Elephants, that they are not found there; but it is because the Elephant is not an American, nor the Mammoth an African, animal: some violence has destroyed one, while the other still lives; and was even the MEGATHERIUM in existence, it would reflect no discredit on Africa, Asia, or Europe, that neither of them possessed a SLOTH of such stupendous magnitude!

I have frequently been asked, if from appearances it could be determined whether the Mammoth originally inhabited America, or the carcases of them may not have been deposited there? This question is best answered by others: if not originally of America, where alone their bones are found, and in considerable numbers, from what country could a deluge have transported them, that not one trace is left behind? Besides, since they are only found in one country, why should we seek occasion to admit the improbable idea that they belonged to another?

It is an extraordinary circumstance, that in the salt-lick on the Ohio, these bones, large and small, young and old, are intermixed with the bones of Buffaloes and Deer; as if what the Indians say had been really the case, and that these were the collected remains of ages, of those sickly animals which had died during their visit to the salt morass; for it is well known that to this salt morass and others in Kentucky, there are broad roads made by Buffaloes and Deer, which are seen greedily to drink the salt water or lick the salt

earth, whence the name of the *salt licking place*. Yet in the state of New-York, where these skeletons were discovered, only the remains, or part of the remains, of one animal have been found in one place, and those so much together as sufficiently to prove that the whole carcase has been there, whether left by death or a deluge.

Still I think that a deluge has devastated the whole of that part of America, because the country abounds with petrifactions of marine productions, and such as we know now are to be found only in the tropical seas: but these proofs are found every where, and may be antecedent to the existence or destruction of these animals in that part; and their total extinction may have been occasioned by some other extraordinary revolution, for extraordinary it must have been to have produced an effect, the tendency of which the human mind is unable to comprehend: but these great facts speak an universal language, and compel us to believe that a time has been when numbers of animals, and what is more extraordinary, larger animals than now re-

main, existed, had their day, and have perished; and yet the fanciful chain of nature is not broken! or else a new chain has taken the place of the old. Formerly it was as unphilosophical and impious to say that any thing ceased to exist which had been created, as it is now to say the reverse, because innumerable concurring facts prove that the races of many animals have become extinct; since it is not possible that so many, and such large animals, should live unknown, although one or two species might.

In another place I have pointed those circumstances, wherein the head of the Mammoth and that of the Elephant materially differ; my object in this place is to hazard some ideas relative to the habits and the food of the former. When it has been said of the Mammoth that it must have been carnivorous, the word was not intended to convey the idea of his being a *beast of prey*, like the tiger, wolf, &c. but that his food must have been *animal*, because all vegetables (except fruit) require peculiar instruments to file, bruise, or grind them, totally unlike the teeth of the Mam-

moth. But as no other animal whatever has teeth whose mechanical action at all corresponds with those of the Mammoth, we are forbid by the invariable concordance of nature, to suppose that his food could have resembled that of those whose teeth are differently constructed. The teeth of all animals living on grass, bark, branches, roots, nuts, &c. are veined internally with enamel, and they operate by grinding backwards and forwards, like the Elephant, Squirrel, &c.; from side to side, like the Horse, Sheep, &c.; or in a circular manner produced by both motions, Ox, Ass, &c. And in all these animals their teeth seem expressly constructed to accord with such motions; so invariable indeed, that any one may arrange these graminivorous teeth, whether the animals to which they belonged be known or unknown to him, by a very simple rule: When the action of the jaws is backwards and forwards, the enamel runs, more or less, *across* the teeth; when the action is from side to side, the enamel is more or less lengthwise; and when there is the rotatory motion, the figure of the enamel is more irregular and serpentine, resembling a Chinese character.

Another thing worthy of attention is, that in those animals whose teeth are to answer no other purpose than mere mastication, the enamel does not reach the edge of them; but in the teeth of the Sheep, Goat, Deer, &c. which are frequently used in tearing off bark, the enamel, besides pervading the whole tooth, likewise forms a sharp edge to it, so as to answer the purpose of a knife. I take the merit of these observations to myself, because I have never met with any of a similar nature: but cursorily as I have mentioned them, they must appear of some importance, and, I believe, will lead to further and more satisfactory investigation.

This is a short survey of those instruments which are intended to subjugate the vegetable tribes: it must be obvious, that to make as universal an use of the animal world will require a much greater variety; and accordingly the Lion, Tyger, Bear, Wolf, Opossum, Raccoon, Ant-eater, Crocodile, &c. are all variously armed for destruction.

If the Mammoth was intended to live en-

tirely upon shell-fish, no other teeth would be required than such as those of the Walrus, simply operating as two hammers; if his food had been the flesh of quadrupeds, his teeth would have been similar to those of the Tyger or Lyon; but since we actually find them to have the powers of both combined, is it unreasonable to believe that his food might have been shell-fish, turtles, fish, or such other animals as might be found in or near lakes? This is the only kind of food he could conveniently procure, and surely none could be required of a more succulent nature. It is very certain, from the peculiar manner in which the teeth are worn, that the food was hard, and of a small size, because the strongly enamelled protuberances are scarcely ever found equally worn off, but only on one side. This observation can only be made on the teeth of old animals; but it is sufficiently apparent in the skeleton here, and very remarkable in that at Philadelphia. Whatever was the food, after it was taken into the mouth, the tongue has performed its most natural function, and pushed the substance to be crushed against the cheek, so that the pressure of the tongue and

the elasticity of the cheek, counteracting each other, have constantly directed the food in the proper manner, so that the teeth have constantly acted against the inner edge (of the shell for instance) until sufficiently broken, consequently the teeth of the lower jaw are only worn next the cheek; besides, the tusks could not answer a better purpose than that of rooting up such food, or in assisting the animal, in the manner of the Walrus, to ascend the banks: both the jaws resemble those of the Walrus more than the Elephant, and so do the tusks in substance, position and use—but, in speaking of position, I do not so much mean my conjecture of their position downwards, as of the relative situation of their sockets with respect to the condyle of the neck, which evidently requires such an arrangement of tusks, as much as the Elephant, whose sockets are so much lower than his neck, requires his nearly straight tusks to be directed towards the earth: any other position in the Mammoth would render them more cumbersome and inconvenient, without any obvious purpose to be answered.

From an examination of the teeth, it would therefore appear that the Mammoth probably fed in and about lakes, on such animals as could not well escape him, and which would not require much artifice or speed to be caught, nothing more being necessary than his long tusks and some powerful protuberant cartilagenous instrument, for the purpose of taking up his prey, whether, like the Elephant, it was a nose elongated; or like the Walrus, it was a large and powerful lip; or like the Ant-eater, it was a long and powerful tongue.

From the form of the animal otherwise, we should imagine a lake and its neighbourhood to be its proper residence, without any reference to the teeth; but when both lead to the same idea it derives two-fold strength. Besides that the ribs (except those connected with the scapula) are wonderfully deficient in size and strength, and therefore not at all calculated to bear any weight of stomach corresponding in size with such animals as devour vast quantities of vegetables, they are evidently too small to accord even with the

bodies of beasts of prey in general, which, succulent as their food may be, are frequently under the necessity of eating voraciously. In the Mammoth, after observing that the teeth are admirably calculated for mastication, we cannot but be astonished at the smallness of the opening into the chest through the first pair of ribs, the smallness of the body about the loins, and the narrow outlet through the pelvis; all which circumstances, in conjunction with the astonishing strength of the fore-legs, to enable so large an animal to displace a denser medium than air, lead to the idea, that these great animals must have inhabited or frequented the great lakes of America, which we have reason to think were even more numerous and larger than they are at present.

That their remains should always be found in morasses, which evidently have been lakes, or in those situations where lakes must necessarily have been, has appeared to many a sufficient proof of their having inhabited such places: but although I believe they did, it does not appear necessary to induce this inference from a fact that may be otherwise accounted

for; for after the destruction of these animals, whether by water or otherwise, their remains could not have been preserved in any other situation, because in no other situation could they be so well excluded from the air.

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 at 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 grey 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 many 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 undoubtedly 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, unless a confused Indian tradition about the great Buffalo be supposed connected with it.

Among the remains of gigantic and unknown animals, found in America, one of the Ox or BUFFALO kind was lately discovered near the big-bone lick in Kentucky*. The right horn is broken off, and all the fore part of the head; but from the fragment remaining, it is a reasonable conjecture, that the *Buffalo* to which it belonged was about 10 or 11 feet high. The pith of the horn at the base measures 21 inches in circumference, and tapers

* See the Philosophical Magazine for May 1803, p. 325.

very gently towards the extremity where it is broken off; so that the horn itself could not have been less than six feet in length: from the middle suture on the head to the base of the horn the measure is seven inches and a half; consequently the two horns were 15 inches distant, which must have been encreased when they were partly covered with flesh, skin, and hair.

Until the discovery of this bone in America, the tradition of the Indians concerning the GREAT BUFFALO has been considered by many as entitled to very little attention. Some have interpreted it as having entire reference to the animal we now call Mammoth, whose pre-eminent size was so obvious, and whose carnivorous teeth were well calculated to excite terror; but I have now no hesitation in believing that this tradition of the Indians, which, with such little variation, prevails through all North America, mentioning the ancient existence of a *great Buffalo*, is a tradition really handed down to them from their forefathers; but, like all others, clouded with fable: yet it is not improbable, since we find

the remains of the Mammoth and the great Buffalo in the same country, that the distinct ideas of each have been in time confounded, the terrible *power* of the one with the *name* of the other. This idea, however, is very uncertain; but as it has been usual to mention the bones of the Mammoth and the tradition together, it will not be uninteresting if we take notice of it here, especially as it is a specimen of the Indian mode of description, which is always highly poetical, and much in the stile of Ossian.

## 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

* These passages must allude to a *herd* of them.

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 uncontrouled monarch of the wilderness, in despite of even Omnipotence itself."

The language of this Tradition ‡ is certainly English, and perhaps a little too highly dressed; but the ideas are truly Indian: it is

* It is a curious coincidence of circumstances, that in the writings of an ancient Jew rabbi, a Jewish tradition is mentioned, stating *one* of the animals described in Job under the name of Behemoth (from which the term Mammoth by *accident* has been derived) is still living somewhere, and reserved as a feast for the Jews on their restoration.

† The beauty of this passage can only be felt by those who know what an American thunder-storm is, and who know, that while by a stroke of lightning the *oak* is shattered to pieces, the ruinous fir is only inflamed.

‡ Which I first found in Cary's Museum for 1789, and since in Winterbotham's History of America.

given in another form in Jefferson's notes on Virginia. It states "that in ancient times a herd of these animals came to the big-bone lick, and began an universal destruction of the bears, buffaloes, deer, and all the animals created for the use of the Indians: this so displeased the great Spirit, that he descended upon a neighbouring mountain, where there is still to be seen the print of his seat, and of one foot, and hurling his bolts among them, killed them all but the great bull, who, presenting his forehead to the shafts, shook them off as they fell: at length, missing one, it wounded him in the side, and he leaped over the Wabash, the Illenois, and the great lakes, where he still lives."

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: 1*st*, The Mammoth, carnivorous; 2*d*, An animal whose graminivorous teeth, larger than, and different from, those of the elephant, are sometimes found; 3*d*, The great Indian bull; and, 4*th*, 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.

How long since these animals have existed, we shall perhaps ever remain in ignorance, as no judgment can be formed from the quantity of vegetable soil which has accumulated over their bones. Certain we are that they existed in great abundance, from the number of their remains which are found in America. We are likewise sure that they must have been destroyed by some sudden and powerful cause; and nothing appears more probable than one of those deluges, or sudden irruptions of the sea, which have left their traces (such as shells, corals, &c.) in every

part of the globe. It is, therefore, extremely probable that whenever and by whatever means the extirpation of these tremendous animals was effected, the same cause muſt have operated in the destruction of all those inhabitants from whom there might have been transmitted some satisfactory account of these stupendous beings, which at all times must have filled the human mind with surprise and wonder.