

arched; nares long and oblique; very voluminous horns turned laterally with double flexures. I should add myself, the strong and invariable distinction;—males not odorous, as opposed to the males odorous of the genus *Capra*. But, after all, there are no physical distinctions at all equivalent to the moral ones, so finely and truly delineated by *BURTON*, and which, notwithstanding what *H. SMITH* urges in favour of the courage and activity of sheep, will for ever continue to be recognised as the only essential diagnostics of the two genera.

III.—*On the Fossil Bones of the Jamna River.* By *EDMUND DEAN*,  
*Serjeant, Sappers and Miners.*

[Extract from a letter, dated 2nd April, 1834, accompanying the first despatch of specimens, read at the Meeting of the 3rd July, 1834.]

I have taken the liberty of sending for your inspection some specimens from a collection of Jamna fossils, made by me during a period of nearly two years, that I was employed under Captain *E. SMITH*, in removing the impediments to navigation in that river.

I consider myself fortunate in having been able to procure several portions of human bones, in so perfect a state, as to enable an eminent medical gentleman to class the major part of them.

With regard to the specimens before you, No. 8, (an elephant's tooth,) resembles the 2nd and 3rd plates represented in plate x. fig. 10 of *PARKINSON'S* *Outlines of Oryctology*; and No. 9, the 1st and 2nd plates of the same tooth, excepting that the number of the elliptical figures on the crown caused by trituration, is greater in my specimens; and that great difference in the thickness of the plates of this and the common Asiatic elephant, (a specimen of which I observe is in your possession,) which he appears to consider a distinguishing characteristic of the different species, is not so apparent in my specimens as it appears to have been in those of *PARKINSON*. This difference, however, must be confined to the Asiatic specimens, as the length of his fossil tooth was eight inches, and it was composed of 13 plates, which would make two of them average 1.23 in.: this, allowing for the very apparent diminution in thickness of the plates towards the rear, would make my larger specimen, which averages one inch, correspond nearly enough with the plates 2nd and 3rd of fig. 10.

Nos. 10 and 11, (figs. 1 and 2, of Pl. xxxiii.) I have been led to suppose may have belonged to the species of tapir, the crowns of whose teeth are described as being divided into five transverse risings, and if by the enamel standing distinctly above the bony parts, the

term rising be understood, I consider this feature is pretty clearly indicated in the larger specimen ; if they do not belong to this animal, I am utterly at a loss how to class them.

Nos. 14 and 15, I imagine, are portions of the jaws and teeth (broken off at the margins of their alveoli) of some extinct species of the Saurian order, differing in every material point from any species described by PARKINSON ; the transverse section of either shewing no cutting ridges, and the longitudinal section of No. 15, plainly shewing from their curved formation, the impossibility of the teeth being shed, or renewed, as also the existence of a core without any cavity ; whereas a peculiar feature of the whole crocodile tribe is, the teeth are never solid in the centre. Could the larger one have belonged to that scarce monster, the Bhote of the Jamna? a species of crocodile, I believe, that has never yet been described.

Of No. 19, it will be of little use for me to take more notice, than by pointing out what appears to me to have been the outline of the crown of a circular cavity, in the centre of the tooth, which might, when perfect, have contained the nerve. Should this prove to be the case, at least one-third of the tooth must have been broken off, and then the present surface would have been a fracture. The exterior edges all round evidently present a decided fracture ; but the interior surface (so beautifully irregular) has every appearance of the exterior enamel of a perfect tooth. Supposing it to have been arranged in plates (of which however there is not the least trace), the decomposition of the crusta petrosa might have occurred here, as in the elephant ; but the separation (except by force) would have been rendered impossible, by the texture of the enamel that surrounds it on three sides, which is sufficiently strong, even had the crusta petrosa been withdrawn, to have held it together. It might be urged, that the exterior substance is not enamel, but an incrustation ; this indeed might hide the disposition of plates ; but I am inclined to believe, that the qualities of the whole and fractured parts are so intimate, that the position is untenable.

The teeth marked 0-2, 4, 6, and 16, have belonged to animals of the deer and ox tribes, but I have not the means of accurately classing them by comparison or otherwise.

No. 44, (fig. 18, Pl. xxxiii.) has defied the anatomical abilities of every one who has hitherto seen it. I have been able to form no opinion on it ; never to my recollection having seen any vertebra in the least resembling it.

*Specimens of Human Bones, sent Aug. 1834\*.*

No. 1. Supposed to be the remains of the humerus, consisting of the major part of the round head that plays in the cup of the scapula. It was dug out from under a mass of clay at a depth of about 2 ft. 6 inches.

No. 2. May either be a portion of the fibula, or of the ulna, of a child, or woman: this I imagine may easily be decided by any anatomist. It must be of considerable antiquity, as the tube originally occupied by the marrow is completely filled with a hollow concretion or spar, externally solid, and taking the exact mould or form of the concave or inner figure of the walls of the bone. In the interior hollow of this concretion a great number of very fine and sharp-pointed crystals occur, with their points or vertices apparently pointing inwards to a common elongated centre or axis; from which it would appear that the system of this concretion was either by the increase of the crystals in size, or by their gradual projection from the exterior inwards in a radiated manner, to fill up the cavity. This specimen was found, and I have no doubt was petrified, amongst sand and shingle.

No. 3. Portion of the above, supposed to have belonged to a full-grown man.

No. 5. One of the metacarpal bones.

Nos. 46 and 47. Assimilate nearly with the 2nd and 12th dorsal vertebræ; but have belonged to different subjects. (?)

No. 15. Appears to be a molar nearly perfect, and the remains of another broken in its alveolus, with a portion of the jaw covering each, and to have belonged to some of the larger species of deer.

No. 17. Posterior extremity of a rib of a young camel, having the same peculiar concretion as No. 34. (See postscript.)

No. 22. A portion of the jaw of a camel, containing one of the grinders.

No. 34. The remains of the blade bone of the shoulder of a young camel, remarkable for the peculiar cement or concretion filling its cancelli, originally the depositaries of marrow.

No. 18, (fig. 4.) Portion of the jaw of a pig, containing four grinders.

No. 26. Extremity of one of the ribs, and No. 23, portion of the plastron or breastplate of the Cuchwa, or mud tortoise of the Jamna.

No. 62. Portion of a rib of a buffalo, procured at a greater depth

\* We have thought proper to insert this notice, in continuation of the preceding, as the specimens referred to are deposited in the Museum, and have been imagined by more than one person to be human. See the following note.

(about six feet) under the clay than any specimen in the collection. It was not procured in the clay, but imbedded in a layer of sand, which the clay had enclosed in its deposit.

[The remainder of Serjeant DEAN's collection was presented early in the following year, reaching its destination in May last. The following is his description of its contents :]

17 pieces, No. 1. Teeth and fragments of bones of camels.

27 —, No. 2. Ditto and ditto of ditto of bullocks and buffaloes.

11 —, No. 3. Portions of bones of elephants.

10 —, No. 4. Ditto of teeth of ditto and piece of tusk of hippopotamus, (now recognized to be such.)

5 pieces, No. 5. Portion of tufa formation, occupying the place of the marrow in the tusk of an elephant. These pieces are all that remain of a very large tusk taken out of the river at *Adhde*, from beneath a plate of *kankar* : the bony part of the tusk was fossilized, but not petrified, and from its appearance, the sepoy engaged in the work during the absence of the European non-commissioned officer, broke it up to try the experiment of its making pipe-clay or whiting for their belts, and on burning it, succeeded beyond their expectations. It is now too late to regret this great loss, but I imagine it must have been a great curiosity, as it is described to have been at least eight inches in diameter.

4 pieces, No. 6, (fig. 16.) Portions of what I am told is the sting of the sting-ray petrified ; also a perfect sting (fresh) ; and the jaw of a water rat, (fig. 15.)

29 pieces, No. 7. Teeth of deer of various species.

9 —, No. 8. Portions of antlers of ditto and other remains of ditto.

16 pieces, No. 9. Pieces of human bones.

5 —, No. 10. Broken jaws of alligators.

5 —, No. 11. Teeth of garial.

21 —, No. 12. Portions of the shell, &c. of the *kackwa*, or mud tortoise.

3 pieces, No. 13. Pieces of teeth of hippopotamus.

2 —, No. 14. Portion of jaw and teeth of goat or deer.

16 —, No. 15. Petrified wood.

5 —, No. 16. Specimens of pipe *kankar*.

2 —, No. 17. Petrified perfect fish and shells.

I consider this fossil fish to be the greatest curiosity ever found in the Jamna. (See note.)

3 pieces, No. 18. Ribs, unknown.

[On the receipt of the first batch of specimens, a correspondence ensued, to ascertain the precise position of the fossils, and their true geological age; the opinions then upheld by their collector have been since more fully developed in his intelligent memoir published in the *Journal* for May. It will be as well, however, to insert here an extract from Mr. DEAN's previous letter of the 16th August, 1834.]

In answer to your question, whether any specimens (fossil) have been found under the kankar strata of the general Duab alluvium? Without any hesitation, I answer, not one instance has occurred.

It may be questioned, how in the deep bunds of the Jamna, excavated for the purpose of removing the clay banks or shoals, which are so dangerous to the navigation: trees, pieces of boats, and some very few instances of bones have been discovered, at depths of from 2 to 10 feet from the upper surface of the clay, from which perhaps a crust of kankar, from one to four feet thick, has first been removed, in a perfect state of petrification. This circumstance, on a superficial examination, might be deemed conclusive of these specimens having been actually removed from a level lower than the kankar strata of the general Duab alluvium, and from under what would appear to be two regular and natural strata; and that there was every probability of their occurring at the same level under neighbouring and other strata, having no connexion with the river; but, Sir, I feel quite satisfied, that at two feet in or under any natural stratum of kankar placed at any level reached by the Jamna, no specimen of animal or vegetable deposit will be found; but I shall be enabled to prove in my observations on the obstructions of the river, that both these apparently natural strata of clay and kankar, are merely deposits, and which being removed, only leave the river, at this place, at a depth it has before attained; but which, from circumstances I believe peculiar to the Jamna, and which I shall hereafter treat on, may, from the rapidity (comparative) of their formation, give an appearance of the work of ages, to deposits, which have been the work of not more than 10 or 12 years.

I am aware, Sir, that I view this subject in a different light from that in which it has hitherto appeared to you. I feel convinced, however, that the researches of Indian geologists would be amply rewarded in examining the bed of the Jamna; but I should consider the discovery of fossil remains at a level corresponding with the deepest parts of the river in the sandy soil of the Duab as the merest possible accident; and I shall be best understood when I say my firm conviction is, that such specimens of fossil animal or vegetable remains, as

are to be met with in the Jamna, owe their existence to some peculiar quality of the water alone ; and I do not consider the fossils of the Jamna as at all connected with the natural kankar formation, although at any depth that the artificial or deposit kankar formation is found, they may reasonably be looked for.

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IV.—*Note on the preceding.* By JAMES PRINSEP, Secretary, &c.

More than a year has elapsed since Mr. DEAN presented us with a first selection from the fossil bones he had discovered while engaged in blasting the rocks and impediments to navigation in the Jamna, under Major IRVINE, and afterwards Captain SMITH, of the Engineers : a few months prior to that, in November, 1833, we had been made acquainted with the fact of their occurrence by Captain SMITH, to whose valuable sketches on the stratification of the Duáb alluvium and notes on the position of the fossils, published in the Journal for December, 1833, I ventured to add a few remarks, suggesting the probability of their being subjacent to the kankar, and therefore of an age anterior to the deposition of the great bed of alluvium of the Sub-Himálayan plains, when all this part of the present continent was still buried under the expanse of waters.

This opinion has been combated by Serjeant DEAN in the preceding note, as well as in his memoir on the Duáb strata, printed in page 273 of the present volume.

The evidence of an eye-witness must be deemed sufficient, and the theory of original deposit with the alluvium must be given up. Still the hypothesis advanced in its stead by Mr. DEAN, of the fossilizing powers of the Jamna, and the probability of all the present specimens having been mineralized in situ, does not appear adequate to meet the difficulties of the case.

It is so far true, that the bones are found in various stages of transformation ; some in a crumbling state, the interstices filled with the sand and kankar conglomerate of the river ; some lined, in the cells of the bones, with calcareous spar, and chalky earth ; while others are, as it may be termed, wholly fossilized, of a dark shining brown colour, ponderous, brittle, of a conchoidal fracture, and retaining little even of the bone-earth itself in their composition. The substance into which the bones are thus converted, is a hydrated oxide of iron. The animal matter of the bone is probably first replaced by it, and then the softer portions. The hard enamel of the teeth resists decomposition for a long time, and its whiteness, contrasting with the dark brown of the cavities and encasing jaw

gives these fossils the exact appearance of half picked, dried or roasted bones. A fragment of the polished *osseolite* (for it deserves a mineral appellation) yielded on rough analysis,

Phosphate and carbonate of lime, . . . . .	17·5
Water, . . . . .	6·0
Red oxide of iron (with alumina ?), . . . . .	76·5
	100

the specific gravity being 4·5.

Were the fossil ingredient every where carbonate of lime, some support might be gained for the theory of the modern conversion of the bones; but while no cause can be assigned for the ferruginous impregnation, nor less for the siliceous, (of which if instances are less frequent here, they are amply supplied from the analogous fossils of Jabalpur;) we shall be justified in seeking and assigning an extraneous origin for the organic remains of the Jamna. Indeed the very specimens upon which the greatest reliance might be urged by the advocates of local formation, those in which the bone is seen entirely imbedded in the hard kankar, furnish adverse evidence; for the fragments imbedded are broken and rounded, and their substance or composition is entirely heterogeneous to the matrix itself.

When to these arguments is added the strong fact of some of the fossil animals being such as could not have existed in the dry soil of Upper India, the point is in my opinion decided. Mr. DEAN mentions several imbedded specimens, and one whole animal, (the elephant at *Panchkourie*\*) as situated too high in the bank to be reached by the highest modern floods of the river; to these, therefore, he concedes the greatest antiquity, while of another he allows that the parts must have been washed into the situation in which they now lie, imbedded in the tufaceous conglomerate. Of the modern growth of this calcareous tufa there can be no question. The incrustations of roots and twigs (forming the pipe kankar of the specimens), and even of fragments of boats or sunken weapons, lost in wrecks on these dangerous shoals, are convincing proofs of it; but there is an essential difference between this formation and the true kankar of the banks.

There are two animals in Mr. DEAN's list, the camel and the human subject, which have kept up a suspense of judgment as to the nature of his fossil series, from their never having been discovered elsewhere: this difficulty is now removed by the sight of the specimens. Dr. PEARSON, and Dr. EVANS, are decided, that none of the fragments

\* See the description and note in page 271—3.

described as human are such. Two of these are represented in the accompanying plate as figs. 20 and 21. The former, supposed to be the head of a human femur, is more likely to be the core of the horn of some large deer; the other is far too uncertain to be identified. The teeth and remains of the camel have been subsequently disavowed by the discoverer himself (see page 278), and are found to be all of the bovine genus.

We may then conclude, that the fossils now found in the bed of the Jamna, entangled among the rocky shoals, have been washed thither from some locality in which they were originally imbedded and fossilized. From Mr. DEAN's account, it is probable, that they were enclosed in the present bank, and have fallen in on its being cut away by the gradual action of the river. Should this however not prove to be the case, and search for their home be inquiringly extended to a distance; it is not necessary, as I had at first suggested, to travel back all the way to the ample store-house of fossils in the Sewálik range of the Lower Himálaya, whence such fragile materials could hardly be supposed to arrive with any vestige of form; for Lieut. VICARY has presented us with a nearer locality in the banks of the Betwá river\*, and Mr. BENSON, from personal knowledge, confirms the probability of this spot having been the source of the deposit in the rocks of the Jamna. I myself incline to believe that both places have their fossils, and that many more may still be found here and there where natural sections of the alluvium have been formed by rivers, although to expect to fall upon them in the digging of wells would be as chimerical (to use a homely proverb) as searching for a needle in a bundle of hay.

There is in every respect a complete analogy between the fossils of the Jamna and those fortuitously discovered by CRAWFURD under the banks of the Irawadi in Ava. Their preservation is equally owing to their impregnation and conversion into hydrate of iron. The words of Professor BUCKLAND would probably apply as well to the one as to the other:

“At the bottom of the cliff, the strand was dry, and on it were found specimens of petrified wood and bones, that had probably fallen from the cliff in the course of its decay: but no bones were discovered in the cliff itself by Mr. CRAWFURD and Dr. WALLICH: nor were they more fortunate in several places where they dug in search of bones in the adjacent district. This district is composed of sand hills that are very sterile, and is intersected by deep ravines: among the sand are beds of gravel, often cemented to a breccia by iron or carbonate of lime; and scattered over its surface, at distant and irregular intervals, were found many fragments of bone and mineralized wood; in some instances lying entirely loose

\* See Proceedings of the Asiatic Society, 1st April, 1835, page 183.



upon the sand, in others half buried in it, with their upper portions projecting naked, and exposed to the air. They appeared to have been left in this condition, in consequence of the matrix of sand and gravel that once covered them, undergoing daily removal by the agency of winds and rains; and they would speedily have fallen to pieces under this exposure to atmospheric action, had they not been protected by the mineralization they have undergone. On examining many of the ravines that intersect this part of the country, and which were at this time dry, the same silicified wood was found projecting from the sand banks, and ready to drop into the streams; from the bottom of which, the travellers took many fragments, that had so fallen during the gradual wearing of the bank, and lay rolled and exposed to friction by the passing waters. These circumstances shew that the ordinary effect of existing rains and torrents is only to expose and lay bare these organic remains, and wash them out from the matrix to which some other and more powerful agency must have introduced them."

I must now briefly advert to the specimens which I have selected to form the subjects of the annexed plate.—The space is far too limited to embrace Mr. DEAN's collection, much less the extensive additions received from Capt. E. SMITH, at Allahabad, since I engraved my former plate (Vol. II. pl. 25), of Jamna fossils. I have therefore prudently confined myself to *distinguishing specimens*, particularly teeth, which, besides their value as the best types of the animal, are, from their compact size, and hard quality, generally better preserved than ordinary bones.

The teeth, with Dr. PEARSON's assistance I have been able to identify; whereas without a complete Osteological Museum of existing animals (a desideratum we may hope, under his exertions, ere long to possess.)—it would be hazardous and a loss of time to attempt to classify the generality of mere mutilated fragments of bones. The great advantage of such a museum over even the best executed plates, was made most obvious in the course of the present examination: such of the teeth, as could be placed by the side of the actual teeth of Mr. PEARSON's private cabinet, were at once referred to their correct position in the jaw of the animal to which they belonged.

The drawings of all the specimens in the Plate are of half the true lineal dimensions.

Omitting the fragments of elephants' teeth, (Nos. 8 and 9,) as being much the same as those already familiar to us from former plates, I have commenced with the most important and curious of the present series, figs. 1 and 2. The former, which was supposed by Mr. DEAN to belong to the genus Tapir, proved to be the last molar but one on the right side upper jaw of the *fossil hippopotamus*, agreeing precisely with the drawing in pl. i. vol. I. fig. 3, of CUVIER's *ossements fossiles*. This beautiful specimen is, to use the illustrious author's words, "précisément dans l'état de détritition on elle est le plus

facilement reconnoissable par les *trèfles* et les autres linéemens de sa couronne."

No. 2, is a young end tooth of the same animal, of which the points have not yet been submitted to the grinding action.

I cannot forbear inserting here an extract from the Baron's observations on the habitat of the existing hippopotamus, restricted to the central regions of Africa, from the earliest period of antiquity;—and always a stranger to the continent of India.

"Outre le Cap et le Sénégal, on sait par BARBOT et par beaucoup d'autres voyageurs qu'il y en a quantité en Guinée et au Congo. BRUCE assure qu'ils sont très nombreux dans le Nil d'Abyssinie, et dans le lac Izana. Le VAILLANT en a vue dans toutes les parties de la Cafrerie qu'il a parcourues; ainsi l'Afrique méridionale en est peuplée presque partout. Mais n'y en a-t-il que dans cette partie du monde? C'est une ancienne opinion. STRABON, (lib. xv, p. 1012, A., ed. Amsterd. 1707,) sur le témoignage de NEARQUE et d'ÉRATOSTHÈNES, nie déjà qu'il en ait dans l'Indus, quoiqu'il avoue qu'ONESICRITE l'eut affirmé. PAUSANIAS est d'accord avec eux; et bien que PHILOSTRATE et NONNUS aient adopté l'opinion d'ONESICRITE, il est de fait qu'aucun voyageur accrédité n'a rapporté qu'on en trouve sur le continent de l'Inde, même au delà du Gange. BUFFON n'a été nullement touché du témoignage de MICHEL BOYN, qui en place à la Chine; c'est donc à peu près sans autorité que LINNÆUS, dans ses éditions x. et xii. suppose qu'il y en a aux embouchures des fleuves de l'Asie; ainsi M. FAUJAS paraissait bien autorisé à ne point admettre sur ce continent l'existence de l'hippopotame; mais peut être n'aurait il dû étendre sa négation à l'Asie entière: car M. MARSDEN, auteur de considération, place l'hippopotame au nombre des animaux de l'île de Sumatra.

"Cependant il reste à savoir si M. MARSDEN lui même n'a pas été trompé."  
—*Oss. Foss.* i. 279.

The animal, MARSDEN alluded to, was most probably the tapir, for Messrs. DIARD and DUVAUCEL could find no trace of the hippopotamus either in Java or Sumatra.

Fig. 3, is the third molar right upper jaw of a very large ox, or buffalo, though the latter name, a stranger to fossil geology, should rather wait further confirmation\*. The specimen corresponds precisely with the similar tooth of the largest buffalo in the museum.

Fig. 4, I at first took for the *little fossil hippopotamus* of CUVIER, vol. I. p. 334; but on placing it side by side with the upper jaw of a large hog shewn me by Dr. PEARSON, in the Society's museum, it

\* I have just received a note from Lieut. BAKER, correcting, on this head, my notice of the animals in his and Lt. DURAND'S *Dadapur Museum*, in the Proceedings of the Asiatic Society, for July last, (page 409.) The buffalo, he says, has not yet been found in the *Sewalik* hills, although the ox is very common there. I possess a note and sketch, however, from Serjeant DAWK of a supposed buffalo's head, which is now on its way to our museum.

agreed with the latter in every particular, save that it was one-fifth larger.

Fig. 5, is the hindmost molar of the ox, a smaller animal than the last.

Figs. 6 and 8, are two views of the hindmost molar of one of the deer family. It corresponds precisely with a large antelope in the museum, and the Cuvierian characteristics of the teeth of the camel, antelope, goat, and sheep, which contradistinguish them from the other ruminants, namely, "qu'ils ont la face externe de leurs molaires inférieures simplement divisée en autant de piliers demi-cylindriques qu'elles ont chacune de doubles croissans," are particularly marked in it. The antelope is one of the animals not hitherto known in a fossil state, therefore it will be improper to pronounce upon a single tooth; but the goat and sheep are equally so, and the specimen is too large for them, and too small for the camel.

Fig. 7, seems to be the interior spire of the tooth of a ruminant, of which the exterior has been destroyed.

Fig 9, is the second milch tooth, in germ, of the ox or deer; and fig. 10, one of the middle incisors of the latter animal.

Fig. 11, is the second or third molar tooth of the lower jaw of a horse. It somewhat exceeds in size the corresponding tooth of the celebrated racing mare Eclipse, of 15 hands high, whose skull is in Dr. PEARSON'S possession.

Fig. 12, is a fragment of the jaw of a small deer; the teeth are all lost, but one, which is ground down by age, until all the marks are effaced.

Fig. 13, is an incisor of some small ruminant.

Fig. 14, is rightly attributed by Mr. DEAN to the water rat. The delineations on the crown differ slightly from the drawings in CUVIER'S synoptical plate of the "Rongeurs;" but they agree with the existing species.

Fig. 15, are Saurian teeth, probably of the *garial* or *L. Gangetica*. Several fragments of the jaw of the alligator appear in the collection, and many of the vertebræ of a dark-brown shining aspect, well preserved. One of these is represented in fig. 21, (upside down,) to shew the appearance of the processes.

Fig. 16, is correctly described by Mr. DEAN as the fossil sting of a ray fish, coinciding precisely with the recent specimen sent by him for comparison (of which a portion is delineated under the fossil, fig. 17).

Fig. 18. Several pointed calcareous spiracles, without organic structure, but semi-crystallized, appear to resemble the pseudostalactites thus described in Professor BUCKLAND'S memoir on the Ava fossils:—

"There are other calcareous concretions that contain no kind of organic nucleus, but are composed of precisely the same materials as those which are found around the bones, and present many of the irregular shapes of the tuberous roots of vegetables; some of them also have the elongated *conical form of slender stalactites*, or clustered icicles—a form not unfrequently produced in beds of loose calcareous sand, by the constant descent of water along the same small cavity or crevice, to which a root or worm hole may have given the first beginning:" p. 383. Mr. DEAN's collection has many examples of encrusted twigs and roots.

Fig. 19, the specimen which so much puzzled the gentlemen who examined the collection while in Mr. D.'s possession is in fact one of the most curious of the whole, nor is yet certain to what animal it should be assigned. Mr. PEARSON, on seeing it, pointed out its great resemblance to the cervical vertebra of the young *camelopardalis*, which died in Calcutta, a few years since, and of which he preserved the skeleton. Lieut. BAKER has favored me with a drawing of a similar bone, which he states to belong to a fossil elk in Serjeant DAWK's collection. (See Pl. XLIV. and the description in page 507.) There are others of much larger dimensions, he says, in the Dadupur museum, the contents of which will form the subject of a plate in the ensuing number of the Journal.

The specimen set down as a small petrified fish, which it much resembles in outward form, is, on making a longitudinal section, found to be formed of oval concentric concretions, similar to those of the country almond; possibly they are the convolutions of some shell, but certainly not a fish.

VI.—*On the Fossil Elk of the Himalaya.* By Lieut. W. E. BAKER, Engineers.

[In a note to the Editor.]

The fossils represented in the accompanying plate, XLIV., are stated by the natives who collected them to have been found in the Haripur pass of the Sub-Himalayan range. The original specimens are in the possession of Mr. DAWK of the Canal Department.

The fragment of antler (fig. 3,) appears undoubtedly to have belonged to a species of elk, and it is possible, that the two vertebrae (figs. 1 and 2) may have formed a part of the same animal: as they are stated to have been brought from the same locality, and this statement is corroborated by the similarity of colour and general appearance of the fossils. One of the vertebrae (fig. 2) was actually