VI.—*Recent Discovery of Fossil Bones in Perim Island, in the Cambay Gulph.*

[Read at the meeting of the 1st June.]

The following notice of the interesting discovery of this new deposit of fossil bones has been obligingly communicated to me in a letter from the Baron HUGEL, dated at Bombay the 17th April. Although its publication anticipates the arrival of the specimens themselves, it would be an injustice to science and to Dr. LUSH to delay for a moment so important an announcement. The acknowledgments of the Society are due both to the discoverer and to the Baron HUGEL, for the preference given to our museum for their preservation. I hope the circumstance may lead to fresh exertions in the valley of the *Narbada*, where doubtless much still remains to be explored.—J. P. *Sec.*

" You will receive shortly a few fossil bones from Perim Island, in the Cambay Gulph. Dr. LUSH has the merit to have found them, but without exploring them at all. I had no time to go over from Surat, where Dr. LUSH showed me them. I requested him to send them to you through Mr. WATHEN. One is an imperfect bone of a mastodon or elephant—another the head of a boar unknown, and one belonging, I think, to a '*Rongeur*;' but what induces me particularly to wish them at Calcutta is, that there is a horn in its matrix, which, connected as these fossils must necessarily be with those of the *Narbada*, might belong to that species of Bos mentioned in your Journal: it is decidedly not of a Buffalo. I was so anxious to reach Bombay, that I could not possibly go to Perim myself. I did however manage to send a boat over; and I received yesterday 41 pieces of fossil bones: the greater part belonging to the *mastodon latidens*, of which the teeth, in a perfect state, did not leave any doubt; some of the bones are of an immense size, one fractured piece of the tusk measuring from the centre to the outside of the circle $5\frac{1}{4}$ which gives $10\frac{1}{2}$ inches diameter, or 34 inches in circumference: some of them are in the same hard matrix you will see imbedding the horn; some evidently rolled by the sea. There are some curious teeth among the fragments I possess, and two triangular shaped pieces similar to the horn of a rhinoceros: the teeth are however too large to belong to that animal. I may perhaps send the most curious specimens round to you; but I am at this moment too much pleased with my discovery to part with them. It appears that the island abounds with fossils, and it is a clear proof either that the *Narbada* must have found only lately its way to the Cambay gulph, or that some other revolution must have

separated the little island from *Kattiwár*. Having no opportunity to leave this for either Persia or the Cape, I may still perhaps be able to go to Perim and Gogo, to trace the fossils on the main land of the peninsula."

HUGEL.

Since the above was set in type, and just before striking off the sheet, I have been favored with the subjoined additional information from a new correspondent, Lieut. FULLJAMES, which I hasten to make known through the Journal, while I venture to assure him the thanks of the Society for his projected exertions to enrich its museum. Who will not become an enthusiast amid such discoveries? It is but four years since the existence of strata containing fossil bones was denied in India, or at least supposed to be confined to Assam and Ava. We are proud to think that the Journal has been in some measure the humble means of stimulating the search which has been thus crowned with success in so many quarters.—ED.

"On my arrival in this part of the country in the month of April, I heard a report that some bones, turned into stones, as the natives called them, had been discovered on the Island of Perim in the Gulph of Cambay, and in latitude 21° 39′.

I lost no time in going there to see if the report of fossil remains was correct, and although I do not pretend to be a geologist, or to know much about fossil osteology, still I consider my labours most amply repaid, by my first visit to the island; for I obtained a most perfect specimen of the teeth of the mastodon; one also that I think belongs to the palæotherium; and the femur, vertebræ, and many other bones belonging to mammiferous animals now extinct.

Being well aware from the perusal of your scientific Journal, how highly, and I might say justly, remains of this sort are prized, I shall take the liberty of forwarding to the Society for their acceptance a box containing specimens of these fossil remains.

The formation in which they were discovered is a tertiary conglomerate, composed of nodules of sandstone, indurated clay, and a small proportion of silex, cemented together by a yellow clay; most of the fossil remains have been exposed to view, by the sea having washed off the upper part of the matrix, but still they are firmly attached to the rock, and the only way they were to be obtained, without breaking, was by stone-cutters carefully working all round them; large quantities of petrified wood were lying about in every direction.

The following is a list of the strata as they appeared to me, commencing from the surface, viz.

1st. Loose sand and earth.

2nd. Conglomerate, composed of sandstone, clay and silex.

3rd. Yellow and whitish clay, with nodules of sandstone.
4th. Conglomerate as above.
5th. Siliceous sandstone with a few fossils. (Calcareous.—ED.)
6th. Conglomerate.
7th. Indurated clay more or less compact.
8th. Conglomerate, in which the best, and I may say nearly the whole of the fossil remains have been discovered.

The deepest strata of conglomerate are about 3 feet, but they generally do not run more than 18 inches to 2 feet, and for the most part lie horizontal. On the western side of the island, however, the strata are much disturbed, being fractured, and dipping at an acute angle to the east; on the southern end of the island, sandstone appears below the fossil stratum of conglomerate, dipping to the north at an angle of 25 degrees.

There is a tradition among the inhabitants of Gogah, that the island of Perim was formerly joined to the main land, by means of a stone bridge, which has, in the course of time, been destroyed; remains of some buildings are still to be seen, running into the sea in the shape of piers, &c. It must have been a very stupendous undertaking, for there is a channel now between the land and the island of the depth of 75 fathoms, and nearly 500 yards in width.

On the island there are the remains of a considerable fort, and buildings of Hindu architecture, for I observed in an old temple that had tumbled down, the broken figure of Buddha rudely sculptured in a sitting posture; also the remains of a large tank wall, and *baulí*. Among the other curiosities of the island are two elephants cut out in the rock; they are covered now by the sea except at very low water; one is finished, and I should say, measured about 10 feet long by 8 or 9 feet high. Capital fresh water is procurable on the island, 20 feet below the surface; it is found below the stratum of sandstone.

I will here enumerate the varieties of specimens of fossil remains, which I think have been found. Teeth of mammoth; ditto mastodon, palæotherium, hippopotamus, or rhinoceros, and a number of other smaller animals. The head of some large saurian animal; part of a tortoise; ditto of elephant's tusks. Femora, vertebræ, and other large bones; one shell in siliceous sandstone, and the half of a deer's foot. With this vast variety before me, it requires a person much better qualified than myself in the art to say to what particular animal the different specimens belong, and I therefore forward them with the hopes of hearing the opinion of the scientific in Calcutta.

It has occurred to me, on reading over the Journal for Aug. 1834, that the conglomerate in which the fossil remains in the valley of the

Nerbudda have been discovered, is very nearly similar to that in which the Perim fossil are found; and if my conjectures are correct, we shall be able to trace the formation along the whole line of the Nerbudda valley and the greater part of the Kattíwár coast. Should such be the case, and I have but little doubt in my own mind that it will be so, what a vast field has thus been thrown open, for discovery and research; I still hope to see my conjectures fulfilled with regard to finding coal in the Tajpipla or Kattíwár range of hills before the lapse of many years.

Not wishing to take the credit to myself of having been the first person to discover these remains, I should mention that I believe Dr. Lush was the first; he having, I understand, found a tusk of some animal on the island. During a second visit to the island, I was accompanied by three other gentlemen, who have most kindly given me permission to forward any part of the specimens so obtained, that I think may be acceptable.

Doubtless on further research and on breaking up the stratum, more perfect specimens of bones will be discovered: for I must mention that all those sent were covered at high water, the highest point of the island not being above 60 feet higher than high water mark; the length of the island is about $1\frac{1}{2}$ miles to 2 miles, and in breadth $\frac{1}{2}$ to $\frac{3}{4}$ mile; large sand hills are formed on the south-west side, and it is inhabited by about 12 houses of coolies, who cultivate bájrí there during the monsoon. A light-house has been established there for some years, and kept up by the Government, of which a serang and five lascars have charge: the expenses are defrayed by levying a duty on all boats passing.

Should I be able to make any further discoveries either in fossil remains, or as to the formation of the Kattíwár hill, I shall trouble you with a further communication; that is to say, should you consider the present worthy of occupying any part of the pages of your interesting Journal.

Geo. Fulljames."

VII.—*Table of Sub-Himálayan Fossil Genera, in the Dádúpur Collection.*

By Lieuts. W. E. Baker *and* H. M. Durand, *Engineers.*

The following table is intended to illustrate the proportion in which the respective genera have been found to occur, and is deduced from the specimens in our collection.

The results might have been presented in a more simple form by confining the table to the two last columns; but as information with regard to the number of perfect and imperfect specimens on which

the entries admitted into these columns are based may be deemed interesting, the following headings under which the specimens were counted off are also given.

Craniums, which title includes all specimens showing a considerable portion of the head.

Upper Jaws. Allotted to such palates as possess either one or both lines of molars complete.

Lower Jaws. Under this heading are numbered those lower jaws which are perfect, and also such as, though wanting the symphisis, present the line of molars complete. The shape of the lower jaws of the ruminantia renders them very liable to fracture immediately in front of the molars; accordingly, a great number of half jaws are found, which, being deprived of their symphisis, afford no means of accurately joining together such of them as may have belonged to the same individual. Some pairs may therefore have been overlooked; an error nearly inevitable, and which would account for the apparent excess of lower jaws in proportion to the upper.

Fragments of Upper and of Lower Jaws. Within these columns, as the heading imports, fragments of maxillaries, containing one, two, or more molars, and also those detached molars, the maxillaries of which are not in the collection, have been ranged.

As the table enters into no detail of species, the latest discoveries which it comprises may be cursorily noticed. These are a very perfect cranium and lower jaw of a species of Vulpes; an equally perfect cranium and lower jaw of a species of the genus Gulo; also an addition to the Pachyderma, consisting of the anterior half of a head, of which the posterior half was unfortunately broken off; and owing to the carelessness of the excavators, none of the fragments have hitherto been recovered. The lower jaw is locked within the upper; so that the exterior surface, and the outline of the upper molars can alone be examined; the characteristics of the teeth being thus imperfectly developed, and the occiput wanting altogether, the specimen has been inserted in the table under the general title "Cuvierian Pachyderma:" by which, however, there is no intention of conveying the idea that it has been identified with any of the Pachydermata of the Paris basin; for although it affords some analogies both to the Palæotherium and to the Anoplotherium, its essential peculiarities are sufficiently remarkable to cause it to be separated from either genus.

In the present early state of the search, the accompanying list can only be considered as an approximation to the relative numerical proportions in which the different fossil genera existed. Viewed as such, it tends to prove that species of the genera Elephas, Mastodon, Hippopotamus, Cervus, Antilope, and Bos, were abundant; that the genera

Rhinoceros, Equus, Sus, Canis, and Hyena, were of less frequent occurrence, and that the Camelidæ and the Sivatherium were rare. The habits of these genera may be adduced as reasons for modifying this general summary of the state of a former zoological period.

NOTE.—Having been favored with the perusal of the forthcoming papers on the Hippopotamus, in the Asiatic Society's Transactions, it becomes requisite to remark, that the specimen placed under the genus Anthracotherium is the same which in a note at page 59, is considered by Dr. FALCONER as belonging to a new genus, Chærotherium. In our opinion, it is a new species of Anthracotherium, under which we have accordingly numbered it. Mr. DAWE has brought to our notice a specimen in his possession, which consists of the right half of a lower jaw belonging to the *Hippopotamus Dissimilis* of Dr. FALCONER and Captain CAUTLEY. It is valuable as showing two molars which have suffered but little detrition, and which, instead of the tapering conical collines, with summits close to each other, as in the large Hippopotami, has its colline apices widely separated, the tapering taking place from the point of contact of their bases outwards: the outer side of each colline is nearly perpendicular, and from the manner in which the sloping and the upright surfaces meet, the colline top loses the mammillar aspect, assuming a flattened almost trenchant form. The wear indicated is the same as that describad in the paper above alluded to.

Table of Sub-Himálayan Fossil Genera.

Class.	Order.	Genus.	Craniums.	Upper jaws.	Lower jaws.	Fragment upper jaw.	Fragments lower jaws.	Total upper jaw.	Total lower jaw.	Remarks.
Mammalia,	Feræ,	Ursus ?	0	0	1	0	0	0	1	
		Canis,.	3	0	6	2	1	5	7	
		Hyena, ...	2	0	4	9	15	11	19	
		Felis, ...	2	0	0	0	2	2	2	
		Gulo, ...	1	0	1	0	0	1	1	
	Glires,	Mus, ...	0	1	0	0	4	1	4	
		Hystrix,....	0	1	0	1	1	2	1	
	Pachyderma,	Elephas,....	9	6	22	46	31	61	53	56 doubtful mutilated fragments omitted.
		Mastodon,..	3	6	28	39	31	48	59	
		Hippopotamus, ...	11	14	20	21	43	46	63	
		Sus,.....	3	5	7	4	3	12	10	
		?	0	1	1	0	0	1	1	Cuvierian.
		?	0	0	0	2	0	2	0	
		Anthracotherium, ...	0	0	0	0	1	0	1	
		Rhinoceros,	3	3	7	18	6	24	13	
		Equus, ...	0	0	2	20	14	20	16	
		Sivatherium,	0	0	1	8	8	8	9	
	Ruminantia,	Camelus, ...	1	0	1	1	2	2	3	
		Cervus, ...	3	31	17	25	84	59	101	Many doubtful fragments not counted.
		Antilope,....	8	18	35	8	45	34	80	
		Bos, ...	2	3	12	35	25	40	37	
Reptilia,	Sauria,	Gariala, ...	0	0	0	0	0	0	0	5 fragments.
		Crocodile, ..	0	0	0	0	0	0	0	3 fragments.
	Chelonia,	Emys, ...	0	0	0	0	0	0	0	5 whole—many fragments of both Emys and Trionix
Pisces,			3	0	0	0	0	3	0	

Dádúpur, April 27th, 1836.

VIII.—*Note on the Teeth of the Mastodon à dents etroites of the Siwálik Hills.* *By Captain* P. T. CAUTLEY. *Pl.* XI.

[Read at the meeting of the 1st June.]

Without further preface I refer the reader to the 1st volume of the Osemens fossiles, page 268. Figures 1 and 2, plate 4, under the head of "Divers Mastodons."

These drawings were presented to CUVIER by M. FAUJAS, and the fossil was found near Asti in Upper Italy.

CUVIER merely alludes to this fossil as one of the varieties into which the true Mastodon à dents etroites passes by a greater subdivision and an irregularity of position of the mamillæ; the proportions of length to breadth of the tooth retaining their full and perfect character.

By comparing the accompanying drawings with the figures above alluded to, there can be no demur, I imagine, in identifying the Siwálik variety of Mastodon now under review with the Asti fossil. It remains therefore simply to note the peculiarities in form of the tooth: although it may be a point of consideration hereafter, whether, as the character of the tooth is so marked, and its peculiarities so rigidly adhered to throughout the whole of the remains found in the Siwáliks, it may not be placed under a sub-genus, that of "*angustidens*," with the specific denomination of *M. Sivalensis*.

There is no cortical substance or crusta petrosa; the tooth consisting of enamel and ivory only, the former being very thick and massive, as is normal in the mastodons.

The coronal surface consists of a double line of conical and obtusely pointed mamillæ: those on the external side being in most cases perfect, whilst those on the inner side are divided by a fissure or fissures into two or three irregularly formed obtuse points. These mamillæ are not, as in the true Mastodon angustidens, placed transversely or at right angles with the line of surface, but meet each other from right to left alternately, so that the furrow on one side is interrupted by the mamilla on the other; and the mamillæ on the whole line of tooth lock into each other in the same way that two serrated edges opposed to each other might be supposed to do, were they placed in contact.

The outer surface of the enamel is smooth, and the space or furrow between each mamilla both on the external and internal surface is marked by a small tubercle, the presence of which however does not appear to be constant.

The surface of the tooth of the lower jaw wears obliquely and outwardly on the grinding surface, as in the ruminants, in which respect it differs entirely from the elephants.

The wear of the coronals is marked at the commencement by irregularly lobed figures, which, as the detrition advances, become confus-

ed, and gradually unite, until the mamillæ are worn away entirely, when the tooth is left with merely a surface of ivory surrounded by enamel.

The drawings are intended to represent the tooth at these different stages; from the state of germ, to the old and worn down tooth, shewing the intermediate state of detrition at different ages.

Pl. xi. *Fig.* 1. Fragment of tooth in germ, with the enamel on one of the mamillæ fractured.

Fig. 2. A very perfect molar of a young but adult animal, the front surface being moderately worn, and the rear portion in the state of germ. This is the right molar of the lower jaw. The length of this tooth is 9·2 inches or ·234 metres, and the breadth measured on the base or lower bulge of the mamillæ 2·95 inches or ·074 metres; it consists of six pair of points or mamillæ, with apparently (as the fossil is slightly fractured at this point) a bilobed talon in the rear. The coronal surface is here shewn.

Fig. 3. An internal view of the same tooth.

Fig. 4. An external view of the same, exhibiting the obliquity of wear on the coronal surface.

Fig. 5 and 6. Fragment of a tooth of a greater age than the preceding.

Fig. 7 and 8. Fragment of tooth with jaw attached; this is a portion of the left molar of the lower jaw of an animal of the same age as that represented in *figs.* 5 and 6, distinctly shewing the cup-like cavities formed by the detrition and gradual junction of the mamillæ: the obliquity of wear towards the outer surface is here very distinctly marked.

Fig. 9 and 10. Fragment of a tooth of the same age as the preceding.

The three last specimens have belonged to animals of nearly the same age; the mamillæ are much worn, and we see the gradual obliteration of their independent hollows, reducing the coronal surface to the appearance exhibited in *figs.* 11 and 12.

Fig. 11. Shews the detrition at an intermediate state between *figs.* 9 and 10, and *fig.* 12. The posterior portion of this specimen still retains the encircling lines of enamel on the worn down points, whilst the portion in front has arrived at its last stage of wear.

Fig. 12. May be considered as a representation of the tooth in its final state of detrition, when all marks of the mamillated form of crown is obliterated, and nothing remains but an outer border of enamel encircling a deep internal hollow of ivory.

I wish to draw attention particularly to the alternating position of the mamillæ, which I consider to be the chief specific character, and which is distinctly marked throughout the whole series; and, referring

again to the Asti fossil as figured in CUVIER, I think that a clear identification is established.

As my object in writing this note is simply to point out the distinctive characters of the teeth of the mastodon à dents etroites, which have been found in the Siwálik hills, it is unnecessary to make any further remarks until we can enter upon a general description of the fossil mastodons and elephants of these hills; noting however, that from the half of a lower jaw of this species, with its ramus attached, which is now in my possession, we may look forward to some peculiarities of form, differing very materially not only from the fossil and existing elephant, but also from the other species of mastodons.

Up to this period I am only aware of the discovery of two species of mastodons in the Siwálik hills; namely, the *variety* of *M. angustidens* which is the subject of this note, and the *M. Elephantoides* of Clift. The former is very rare, and the latter in very great abundance.

IX.—*Meteorological Register kept at Bangalore. By Dr.* J. MOUAT, *Medical Surgeon, 13th Dragoons.*

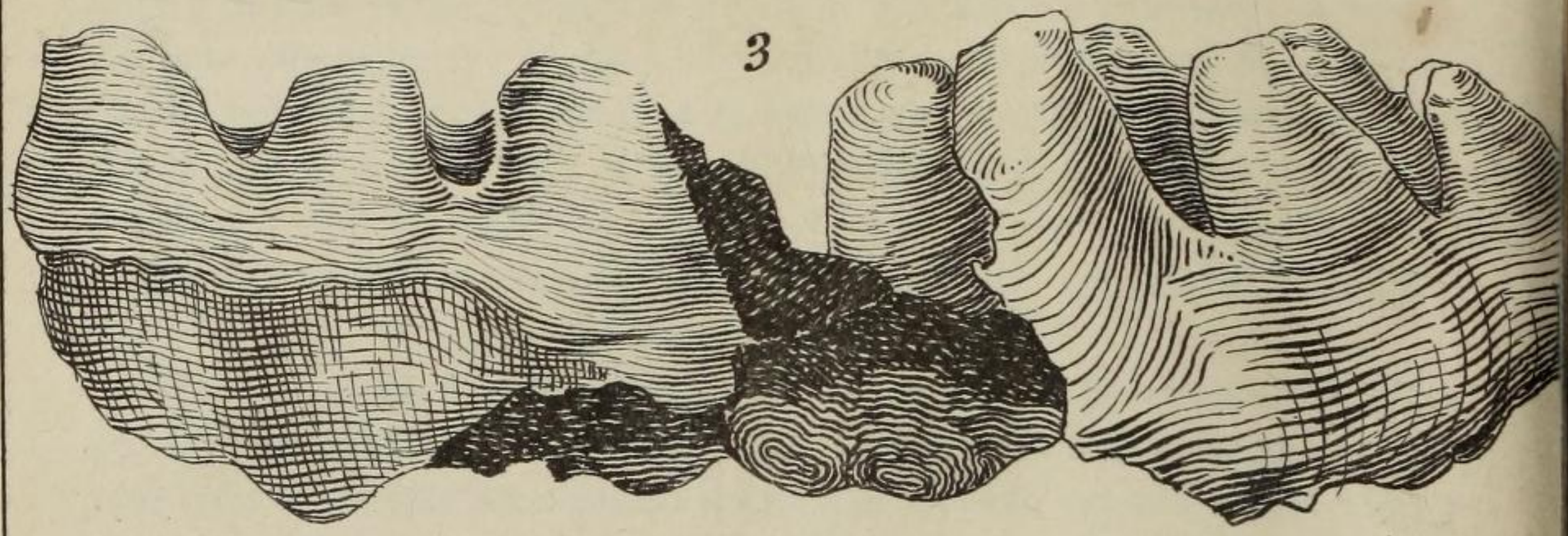
If the accompanying meteorological table, kept at Bangalore, for the year 1835, be of any interest, you are at liberty to make any use of it you please. It has been drawn up for the medical reports, which I am in the habit of transmitting to the heads of my department, and the transcription of which is all the trouble it now gives. The original table, as kept every two hours for the entire of 1834 and 1835, are also at your service; but they are two voluminous and bulky, I should think, for any useful purpose. The column of monthly average was obtained by adding the state of the thermometer, kept every two hours for the entire 24 hours; dividing this by 12, gave the average for each day. These added together for the month, and divided by the number of days in the month, give the monthly average noted in the table.

The wards of the hospital are visited by one of the medical pupils or apprentices every two hours from 10 P. M. to 4 A. M., whose duty it is to give medicine, &c. to the sick, and, at the same time, to mark the thermometer. The corporal of the guard, when relieving the sentries, is responsible, and sees this duty performed; and, in the day time, the hospital serjeant, apothecaries, pupils on duty, &c. mark it, the rest of the 24 hours; so that every source of error is endeavoured to be avoided. The thermometer marked S., or *side*, is fixed on the end of a shelf, some inches from the wall, and by its position, screened from the influence of the glare or reflected heat; the other, marked C. or *centre*, is suspended from the centre of the room, about seven feet from the floor, and the general agreement of the two instruments is a pretty good guarantee for their accuracy. The apartment is the surgery of the

Masto Mastodon Angustidens

2

3



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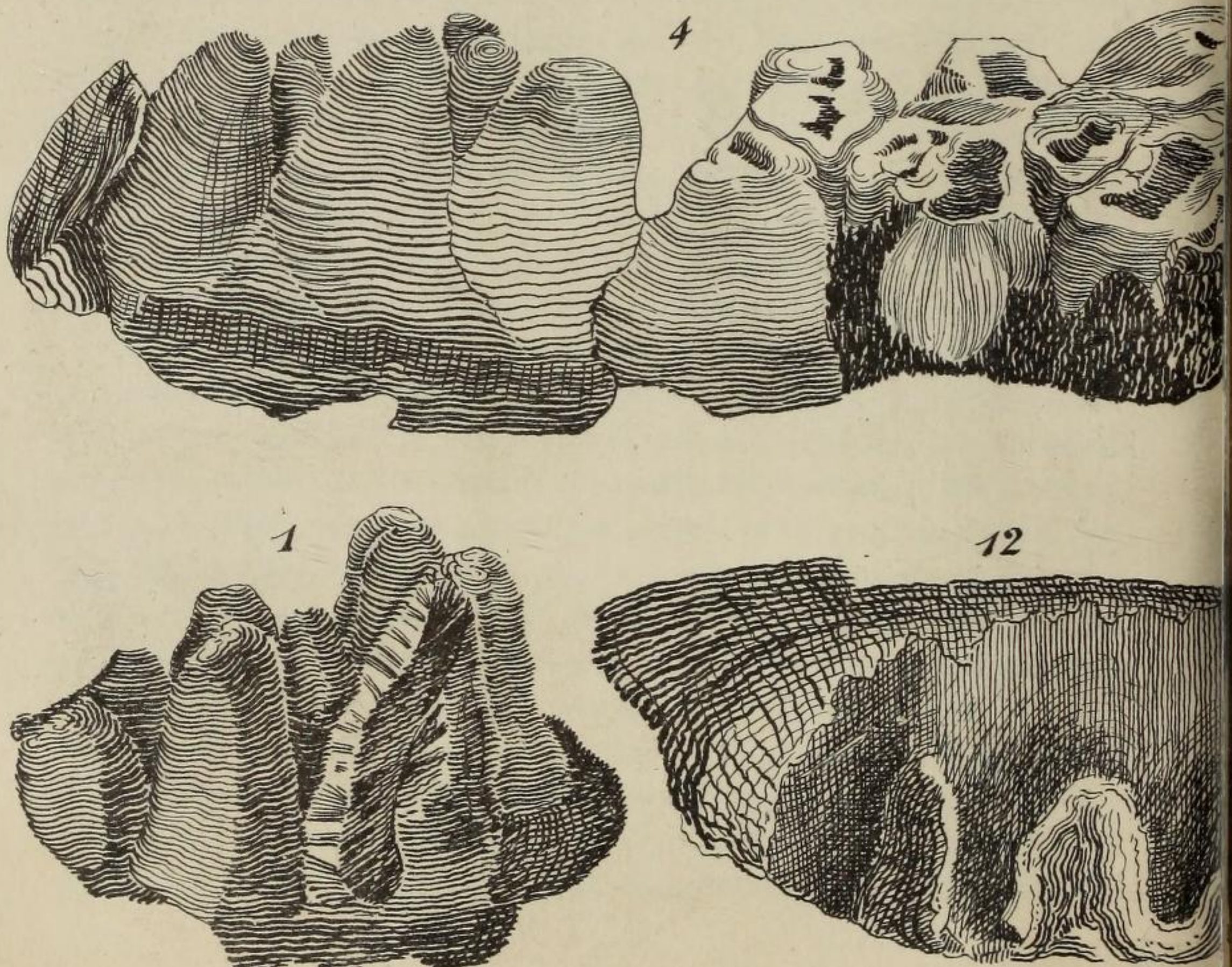

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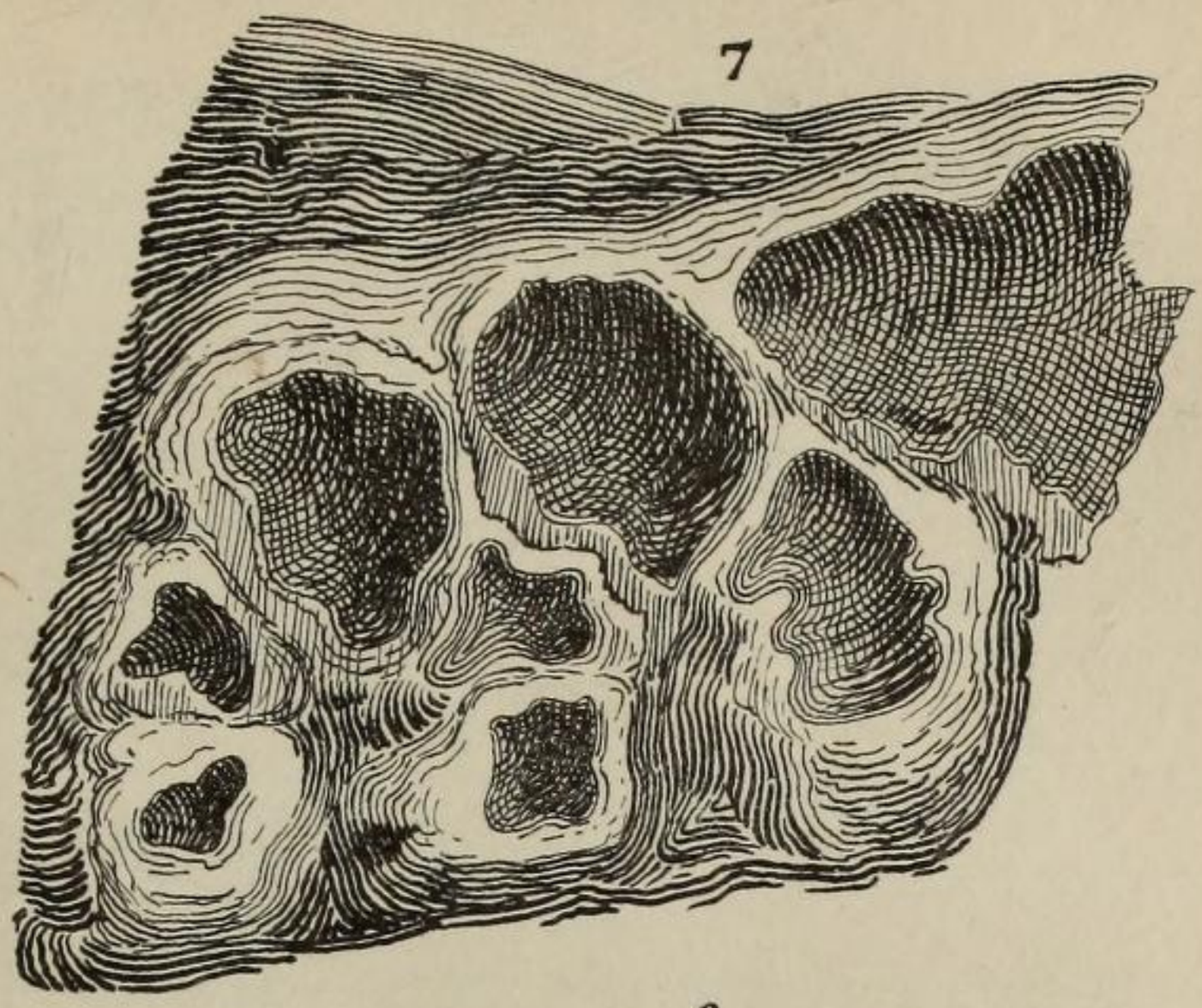
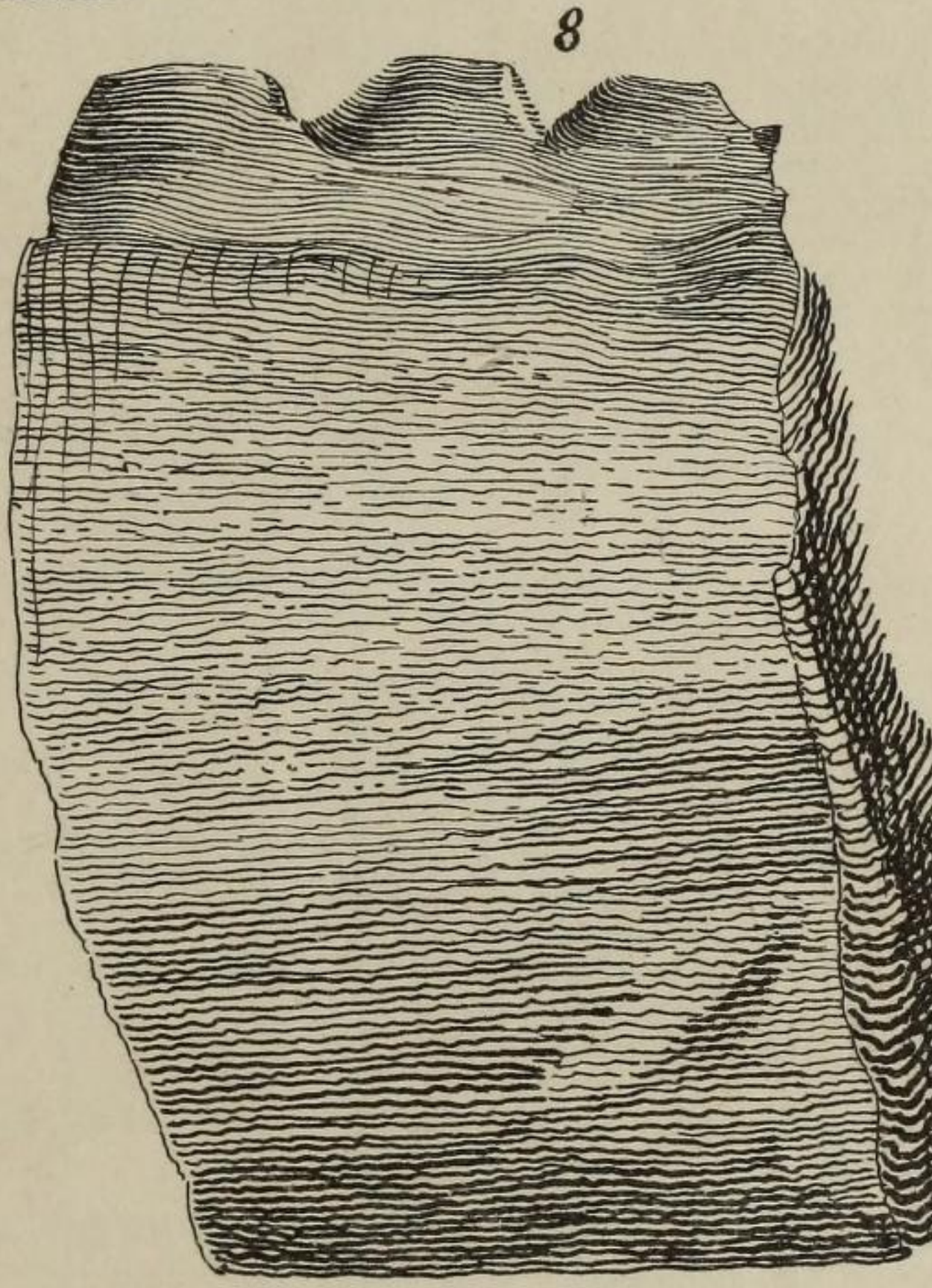
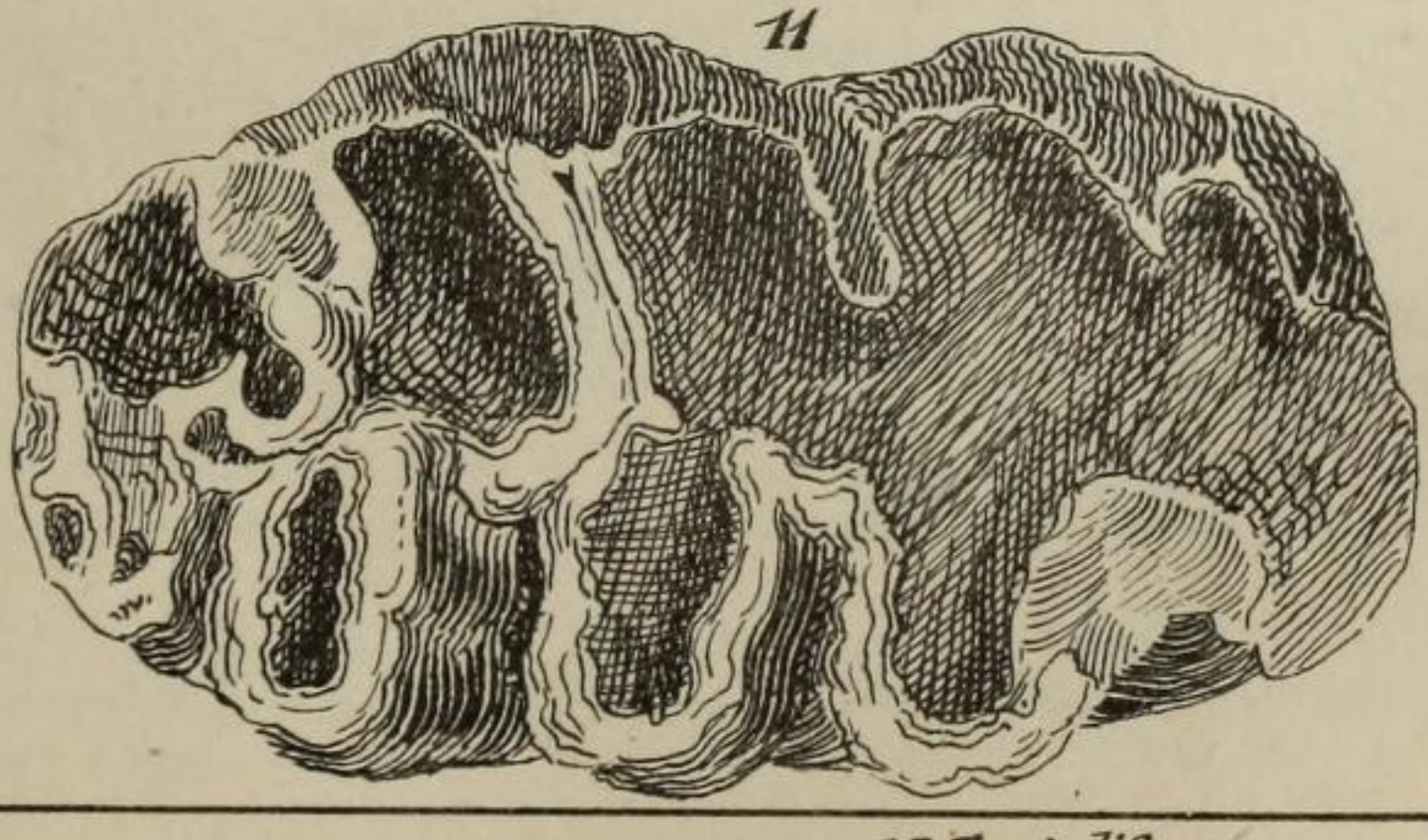
P. T. C. del. 1835.

of the Siwalik hills.







J. B. Tassin lith.