

IX. *On the Fossil Mammals of Australia.*—Part VI. Genus *Phascalomys*, GEOFFR.
By Professor OWEN, F.R.S. &c.

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§ 1. *Introduction.*—In a paper “On the Osteology of the Marsupialia”* I noted the expansion of the base of the nasal bones in the genus *Phascalomys*, and the agreement of the Wombat in this character with the Koala, Phalangiers, Petaurists, Myrmecobians, Dasyures, and Opossums; thus indicating, as far as observation then warranted, a general marsupial character of form in those bones.

In a second paper I entered upon a comparison of the nasal bones in *Phascalomys vombatus*, Geoff., and *Phasc. latifrons*, Owen, and showed that, in the latter species, “the nasal bones were relatively broader, forming the whole upper surface of the anterior third of the skull”†.

In the ‘Descriptive Catalogue of the Osteological Series in the Museum of the Royal College of Surgeons of England,’ another character was pointed out in “the superior breadth of the part of the maxillary ascending in front of the malar and lacrymal bones to join the nasals” in *Phascalomys latifrons*. “The greater relative breadth of the nasal bones, as compared with those of *Phascalomys vombatus*,” was also noted among the characters differentiating a third species of existing Wombat defined in that work‡ as *Phascalomys platyrhinus*.

§ 2. *Nasal bones in Phascalomys vombatus, Pér.*—I now proceed to consider, as far as materials permit, the amount of variety to which the same species of Wombat may be subject in the nasal bones,—a requisite preliminary to determining the value of these bones in differentiating recent and fossil species of *Phascalomys*.

In an old male Tasmanian Wombat (*Phasc. vombatus*) the basal breadth equals two thirds of the length of the pair of nasal bones§. The outer angles of the nasals, at their base (15), are divided from the lacrymal tubercle (73) by a strip of maxillary (21) 4 lines in breadth, joining to that extent the frontal (11). The sides of the pair of nasals converge forward at the hinder third, then run parallel, gently curving inward, and finally gaining the margin of the nostril, with a slight curve outward. Thus the course of each lateral border of the nasals is undulate. Their tips (15) extend forward

* Transactions of the Zoological Society, vol. ii. (1838) p. 387.

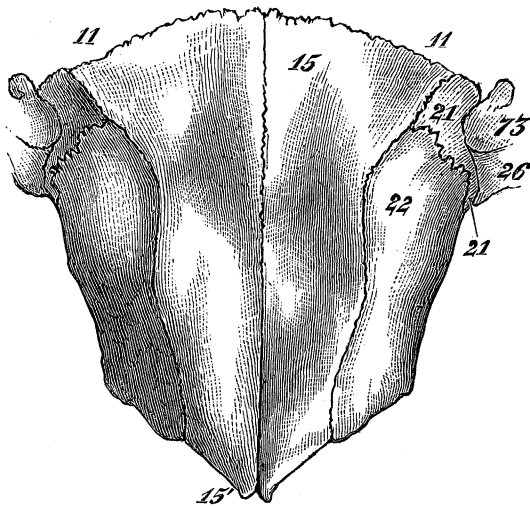
† Ib. vol. iii. (1845) p. 304, pl. xxxvii. figs. 1 & 4.

‡ 4to (1853), p. 334.

§ This proportion is expressed as follows by Dr. MURIE in describing his specimen of *Phascalomys vombatus* :—“The proportional breadth of the two nasal bones at their hinder ends is to their length as 68 to 100.” (Proc. Zool. Soc. 1867, p. 802.)

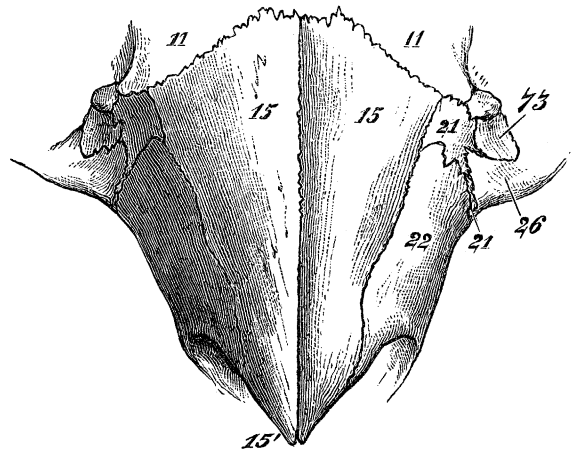
about three lines in advance of the naso-premaxillary suture, and are bevelled off to an obtuse point from without obliquely inward and forward. Together these bones form the middle third of the upper border of the external bony nostril. The frontals (11) make a slight projection into the middle of the fronto-nasal suture, which from this shallow indent runs outward and a little forward to the nasal process of the maxillary (21)*. The naso-maxillary suture forms the hind fifth part of the lateral border of the nasals; the naso-premaxillary suture runs along the rest of the extent of the nasal bones; *i. e.* to the beginning of their free ends, which are short and subobtuse.

Fig. 1.



Nasal bones and their connexions,
var. 2, *Phascolomyx vombatus*, Geoffr.

Fig. 2.



Nasal bones and their connexions,
var. 3, *Phascolomyx vombatus*, Geoffr.

In a second Tasmanian Wombat the nasals (fig. 1, 15) differ from those above described in their basal breadth, this being equal to rather more than three fourths of their length, or as 77 to 100, also in the absence of any mesial indent of the fronto-nasal suture, and in the sharper convergence forward of the hinder fourth part of the lateral margins. These margins describe a similar wavy course, convex outwards along the middle third, or a little in advance of it. The apices overhanging the nostril are less sharp and prominent than in the last or type specimen.

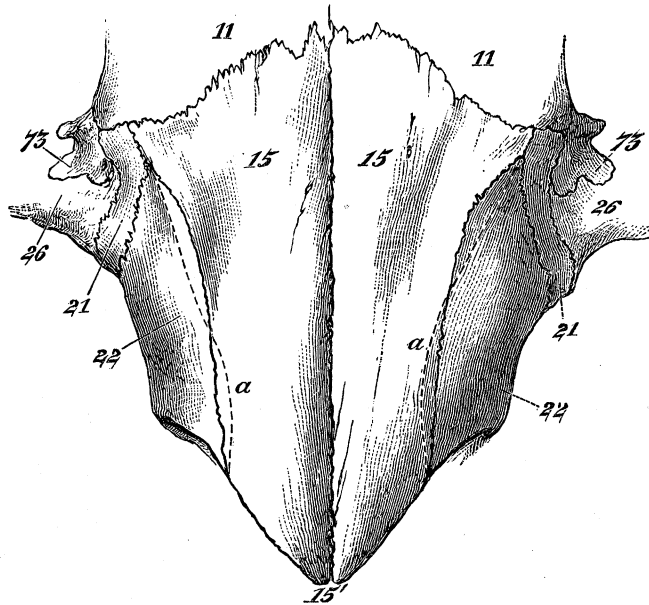
In a third younger *Phascolomyx vombatus* (fig. 2) the lateral margins converge more gradually and in an almost straight line from the base to the anterior fourth of the nasals, where the margins extend nearly straight to the nostril. The middle sixth part of the fronto-nasal suture is slightly concave; the rest extends outward and more obliquely forward than in the two preceding specimens. The apices of the nasals projecting beyond the premaxillo-nasal sutures are sharp, and form one fifth the length

* This specimen, figured in my first paper (*loc. cit.*), shows the usual characters and is not here figured: the references to the numerical symbols of the bones, in aid of the description, are seen in the subjects of the two Woodcuts showing the varieties.

of the whole lateral margin of the bone. The basal breadth bears almost the same proportion to the length of the nasals as in the first cited skull.

§ 3. *Nasal bones in Phascalomys platyrhinus, Ow.*—The Platyrrhine Wombat, in the absence of postorbital processes, the shortness of the naso-maxillary suture, and the deep emargination of the fore part of the nasal process of the premaxillary, is more nearly allied to *Phasc. vombatus* than either of these species are to *Phasc. latifrons**; but the nasal bones (fig. 3, 15) are relatively broader in the Platyrrhine than the Tasmanian

Fig. 3.



Nasal bones and their connexions, *Phascalomys platyrhinus*, Ow.

Wombat, the outer basal angles approaching as near to the lacrymal tubercles (ib. 73) with a greater relative breadth of the skull at that part. In one skull the lateral borders of the nasals have the same undulatory course, but more feebly marked than in the second variety of *Phasc. vombatus* (fig. 1). In a second the suture between the nasals (15) and premaxillaries (22) runs as in fig. 3. There is a narrow and irregular intrusion of the frontal at the middle of the fronto-nasal suture, sometimes at the expense of the right (as in fig. 3), sometimes of the left nasal bone. The breadth of the base of both bones equals five sevenths of the length of the nasals in two specimens, and four fifths in a third. The apices (15), projecting anterior to the naso-premaxillary suture (22), are blunter than in the first variety of *Phascalomys vombatus*. The width or breadth of the nasals, at their base or fronto-nasal suture, begins to diminish at once, as they advance, by the converging course of the naso-maxillary (15-21) and naso-pre-

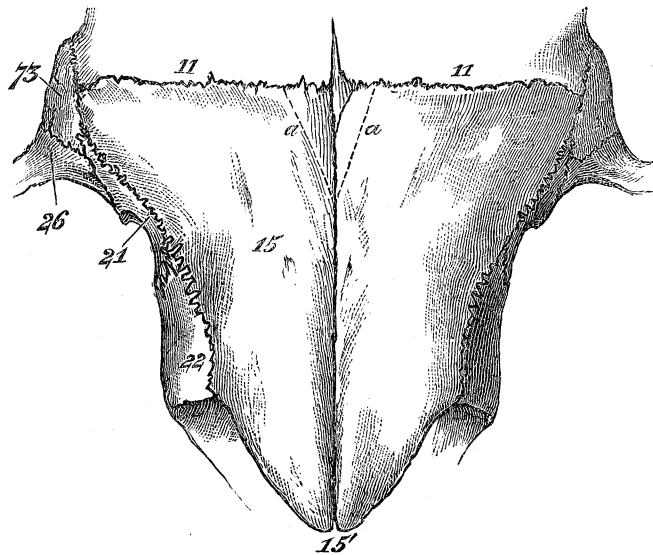
* This relation is pointed out by Dr. MURIE, who remarks:—“*Phascalomys latifrons* shears off from the common form of Wombat and reverts to the true marsupial type in several particulars” (*loc. cit.* p. 800). These, however, he does not cite; and I may have to note some points in which it seems rather to diverge from the common character.

maxillary (15–22) sutures. In not any of the three specimens before me is “the width of the nasals continued forward beyond their middles”*. In one variety the course of the naso-premaxillary suture was such as is shown by the dotted line *a a* in figure 3. A broader strip of the maxillary (21) divides the malar (26) from the premaxillary (22) in the present species than in *Phascalomys vombatus*. This is a good and constant character in a comparison of the two species.

§ 4. *Nasal bones in Phascalomys latifrons, Ow.*—The breadth of the fore part of the frontals in the Latifront or Hairy-nosed Wombat is made to contrast with the narrowness of the rest of the bones by the outward extension of the postorbital processes †; the nasals (fig. 4, 15) present a more regular triangular form, through the prevailing transverse course of the fronto-nasal suture (11–15) and the more regular convergence of the lateral margins of the nasals to the fore ends of the naso-premaxillary sutures (15–22). Beyond these the lateral margins of the nasals converge more rapidly to their apices (15'), which extend freely further forward than in the two preceding species. The breadth of the nasals at the base of their free extremities is greater than in the bare-nosed Wombats, and the upper surface of the entire bones is flatter.

In one of the two skulls before me of *Phascalomys latifrons* the left frontal breaks the transverse course of the fronto-nasal suture by a sharp-pointed process or wedge between the two nasals (indicated by the upper line in fig. 4); in the second skull

Fig. 4.



Nasal bones and their connexions, *Phascalomys latifrons*, Ow.

the right frontal sends forward in the same way a more obtuse triangular process; in my type skull (Zool. Trans. vol. iii. pl. xxxvii. fig. 4) both frontals contribute equal shares to the wedge, which is longer (as shown by the lower dotted lines, *a, a*, in fig. 4).

* MURIE, *loc. cit.* p. 803.

† Plate xxxvii. fig. 4, *o, o*, Zool. Trans. vol. iii. (1845) (nat. size); also MURIE, Proceedings of the Zool. Soc. 1865, p. 844, fig. 1 (half nat. size).

Outside this, in all Latifront Wombats, the fronto-nasal suture runs straight outward to the lacrymal (73), from which bone it is not separated, as in *Phascolomys platyrhinus* and *Phasc. vombatus*, by the maxillary (21). The extent of the naso-maxillary suture (15-21) equals that of the naso-premaxillary suture (15-22).

These differences in the connexions of the nasals are more significant of specific distinction than the shape of the bones. The naso-maxillo-premaxillary suture (15-21-22) is very slightly concave outwardly in the Latifront Wombat; and the free border of the nasals beyond the suture affects a convex bend toward the apices.

§ 5. *Nasal bones in Phascolomys Mitchelli, Ow.*—There would be no doubt in determining *Phascolomys latifrons* by the naso-maxillo-premaxillary part of the skull, at least as being distinct from the other two known recent species, if even the still more characteristic part of the frontal bones was wanting. There might be more difficulty in pronouncing as to whether a fore part of the skull belonged to *Phascolomys platyrhinus* or to *Phasc. vombatus*.

I now proceed to compare such a fragment of a fossil skull of a Wombat on the basis of the characters which comparisons of different individuals of the three well-determined recent species of *Phascolomys* affords.

The fragment in question (Plate XVII. figs. 1, 3, 4, 5) includes the nasals (15) with parts of the frontals (11), lacrymals (73), malars (26), maxillaries (21), premaxillaries (22), and palatines (20). The nasals (15) are of the type of those in *Phascolomys vombatus* and *Phascolomys platyrhinus*; in the proportion of basal breadth to length and the speedy narrowing as they advance they resemble the modification shown in Woodcut, fig. 1, p. 174, in *Phasc. vombatus*. But small as is the extent of the naso-maxillary suture (15-21) in *Phasc. vombatus* (figs. 1 & 2) and *Phasc. platyrhinus* (fig. 3), it is still less in the fossil, the apex only of the basal expanse of each nasal (15) touching the maxillary (21) (Plate XVII. fig. 1) on each side of the skull. The naso-premaxillary suture (ib. 15-22, 22') runs along the side borders to within half an inch of the extremities (15'), which are obtusely pointed, as in *Phascolomys platyrhinus*. The suture or lateral border of the nasals describes but two curves, concave at the basal half, convex at the apical one; slight in both, in *Phascolomys Mitchelli*. The angle formed by the fronto-nasal suture (11-15) is as in *Phasc. platyrhinus* (fig. 3); and an obtuse process, 3 lines broad, of the frontal is wedged into the beginning of the internasal suture.

Seeing the variations in regard to such frontal wedge, as in the sinuous course of the lateral borders of the nasal, these bones could not differentiate by their form the fossil from the existing continental Wombat (*Phasc. platyrhinus*). The superiority of size is but small in the fossil; but the difference of connexion, shown in the almost exclusion of the maxillary from junction with the nasal, is a satisfactory distinctive characteristic of this part of the skull of the fossil Wombat under consideration, which I refer to the *Phascolomys Mitchelli, Ow.**

* First defined in Appendix to MITCHELL'S 'Three Expeditions into the Interior of Eastern Australia,' vol. ii. 8vo, 1838, pl. 48. figs. 4-7, p. 368 (2nd ed.).

The present representative of that species is from the same bone-cave as the type fossils* ; it has been flattened or crushed from above vertically downwards. The facial parts of the premaxillaries (22, 22') are on the same horizontal plane as the nasals (15), which they suturally join. The frontals (11, 11) have been pressed away from the nasals along the major part of the suture, and all the bones are more or less fractured. To this condition the skull had been reduced before the drip of the cavern had hardened the red mud about it. The process of clearing away such matrix was long and tedious.

Did the skull show the violence of a carnivorous troglodyte destroyer, or the effect of some cosmical force operating on the breccia-bed of the cave? If the former, the blunted laniaries of our old *Thylacoleo* are the only animal dynamic in Australia capable of so smashing the Wombat's head that I am as yet cognizant of.

§ 6. *Nasal bones in Phascolomys Kreffti*, Ow.—This species is founded on a fore part of a skull (Plate XVII. figs. 2, 6) discovered by GERARD KREFFT, Esq., in the same bone-cave as the last-described fossil. It is as closely allied to the broad-fronted or hairy-nosed Wombat as *Phascolomys Mitchelli* is to the bare-nosed continental species; and the value of the nasal characters comes well out in the comparisons determining the present fossil.

It includes the major part of the nasals (15), with the connected parts of the premaxillaries (22) and maxillaries (21). The nasals are broad and flat; their lateral margins are suturally joined with a smaller proportion of the premaxillaries than in *Phascolomys latifrons* (Woodcut, fig. 4, 22).

The free anterior extremities of the nasals (15') show nearly the same form and proportions as in that Woodcut; their basal breadth, where the naso-premaxillary suture ends anteriorly, is 1 inch 3 lines; the length of the outer margin is 1 inch in a straight line, but is rather more following the curve. The lateral suture, as it extends along the maxillary (21), shows a slight uniform curve, concave outward. A portion of the left fronto-nasal suture (11-15) indicates an oblique course from within outward and forward in about the same degree as in *Phascolomys platyrrhinus*, fig. 3. I have not seen such course, as a variety, of that suture in any specimen or figure of the skull of the recent *Phascolomys latifrons*. Other instances of combination in the smaller fossil Wombats, such as are now under review, of characters which respectively specialize the Platyrrhine and Latifront Wombats will be adduced in the present memoir.

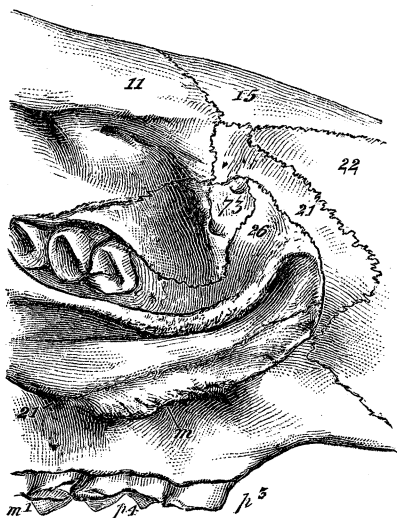
The length of the left nasal, as far as it is indicated by the preserved extent of its suture with the frontal, is 2 inches 10 lines; the extreme basal breadth cannot be given, on account of the side-fractures.

The internasal suture seems to be partially obliterated; and there is a narrow elliptical vacuity with rounded margins, situated ten lines from the tips of the nasals, six lines in length and two lines in extreme breadth, which seems to be natural, though probably an individual variety. I shall return again to this fossil in relation to other characters.

* MITCHELL'S 'Three Expeditions into the Interior of Eastern Australia,' vol. ii. 8vo, 1838, pl. 48. figs. 4-7.

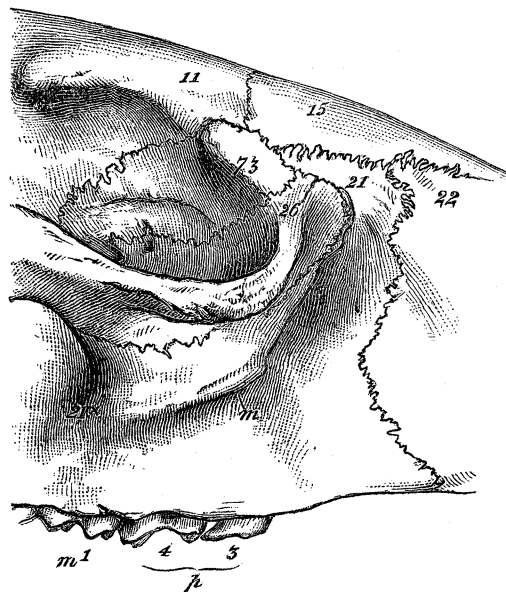
§ 7. *Lacrymal, maxillary, and palatal characters of Phascolomys Mitchelli, Ow.*—So much of the lacrymal (73) is fortunately preserved on the right side of the subject of Plate XVII. fig. 3, *t*, as to indicate the affinity of the fossil to certain existing Wombats. This bone, both in *Phascolomys vombatus** and *Phasc. platyrhinus* (Woodcut, fig. 5), develops a prominent tubercle above 73 at its upper border, below the fronto-maxillary suture (11–21). In *Phascolomys latifrons* (fig. 6) a feeble swelling of the lacrymal (73), where it

Fig. 5.



Lacrymal &c. characters, *Phascolomys platyrhinus*.

Fig. 6.



Lacrymal &c. characters, *Phascolomys latifrons*.

joins the frontal (11), answers to the tubercle. The indications of a lacrymal canal are minute in all Wombats. The lacrymal of *Phasc. Mitchelli* (Plate XVII. fig. 3, 73) shows the well-developed tubercle (*t*) in the same relative position to the fronto-maxillary suture as in *Phascolomys vombatus* and *Phasc. platyrhinus*: the bone anterior to the tubercle is flatter, less excavated in *Phasc. Mitchelli* than in those existing Wombats, and herein more resembles the lacrymal in *Phascolomys latifrons*.

The alveoli of the five upper molars of each side (Plate XVII. fig. 5, *p* 3, 4, *m* 1, 2, 3) with the intervening part of the bony palate (ib. 20, 21) are preserved in the present fossil. The form of the latter adheres to the type of that of *Phascolomys vombatus*† and *Phasc. platyrhinus* (Woodcut, fig. 7); in *Phasc. latifrons* (Woodcut, fig. 8) the palate (20, 21) is less contracted anteriorly. The fore part of the postpalatal apertures (Plate XVII. fig. 5, *b*) does not reach that of the hindmost socket (*m* 3) in the fossil, which also in this respect agrees with *Phascolomys vombatus*‡ and *Phasc. platyrhinus* (Woodcut, fig. 7, *b*); whilst it

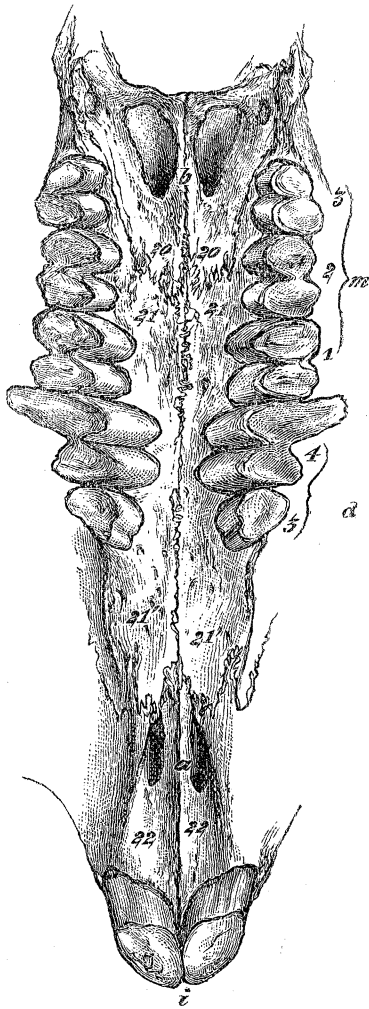
* Trans. Zool. Soc. vol. iii. pl. xxxvii. figs. 1 & 2. It is also represented in figs. 2 & 3 of Dr. MURIE's memoir *loc. cit.* p. 814, but the suture dividing the tubercular lacrymal from the frontal is not marked.

† Trans. Zool. Soc. vol. ii. plate lxxi. fig. 1.

‡ Ibid.

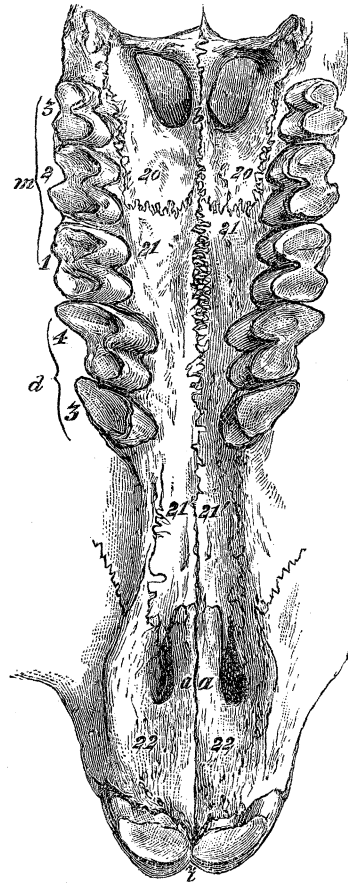
differs from *Phascolomys latifrons* (Woodcut, fig. 8, *b*), in which the postpalatal apertures extend forward beyond, or at least as far as, the interval between the last and penultimate sockets*. In the more advanced portion of the roof of the mouth I noticed (in 1845) a character† in *Phascolomys latifrons* by which it differed from *Phasc. vombatus*, and as I now know it also differs from *Phasc. platyrhinus*. The portion of bony palate

Fig. 7.



Palatal surface of upper jaw and teeth,
Phascolomys platyrhinus: nat. size.

Fig. 8.



Palatal surface of upper jaw and teeth,
Phascolomys latifrons: nat. size.

between the molar series and the incisors is more concave transversely, or deeper, in *Phascolomys latifrons* (Woodcut, fig. 8, 21, 21', 22, 22'), and the channel is bounded by well-defined or sharp borders: this character is much better marked in the fossil (Plate XVII. fig. 5, 21', 21', 22, 22') than in the skulls of *Phascolomys vombatus* or *Phasc. platyrhinus*.

Another character in which the fossil resembles *Phascolomys latifrons* more than it

* In the latter variety (fig. 8) the apertures should extend more forward than is represented.

† Trans. Zool. Soc. vol. ii. plate lxxi. fig. 1. "The palatal surface of the intermaxillaries is deeper" (p. 304).

does the other two recent species is the greater vertical extent of the maxillary (Plate XVII. figs. 3 & 4, ^{21*}) beneath the origin of the malar or zygomatic process (^{21*}) of that bone (compare with Cuts 5 & 6, ^{21*}). I shall recur to this character in the description of another fossil of the present genus.

§ 8. *Upper molars of Phascolomys Mitchelli, Ow.*—The differential characters of these teeth, as compared with their homologues in *Phascolomys vombatus*, have been elsewhere pointed out†. As to the two larger existing species, in the molar dentition of the upper jaw *Phascolomys Mitchelli* more resembles the platyrrhine than the broad-fronted Wombat. In the latter the right and left upper molar series (Woodcut, fig. 8, d_3-m_3) run more parallel to each other, are less convergent anteriorly, with absolute greater breadth of the bony palate there. The first molar (d_3) in *Phascolomys latifrons* is, relatively to the second, larger in both upper and under jaws‡. I therefore limit the comparison of the upper molars in the present fossil to those of *Phascolomys platyrrhinus* (fig. 7, d_3-m_3). The extent of the five alveoli, lengthwise, taken at their outlets, is the same in both; or at least the fossil (Plate XVII. fig. 5, d_3-m_3) exceeds only by about a line, giving 2 inches $2\frac{1}{2}$ lines instead of 2 inches 1 line as in *Phascolomys platyrrhinus*. I have seen no example of *Phascolomys latifrons* in which the molar series extended beyond 2 inches; it is commonly less, as in Woodcut, fig. 8.

The alveolus of the first molar (d_3) of the fossil indicates a tooth not larger than in the Platyrrhine Wombat. The other four molars, of which the first three are preserved on the left side and the last two on the right side, closely repeat the characters of these teeth in the Platyrrhine Wombat§. This gives more weight to the differential characters of greater length and less breadth of the nasals, the greater concavity and sharper definition of the diastemal part of the bony palate, and the greater depth of the maxillary below the anterior pier of the zygomatic arch in *Phascolomys Mitchelli*.

§ 9. *Palatine foramina in Phascolomys.*—I next proceed to notice Phascolomydian fossils from the freshwater deposits of Queensland, in the interpretation of which some observations must be premised on the palatal foramina in existing species of Wombat.

In my first paper on the Osteology of the *Marsupialia* I state that *Phascolomys* resembles *Phascolarctos* and *Hypsiprymnus* in having “the posterior palatal openings large and situated entirely in the palatal bones; and that posterior and external to these are two small perforations”||. In the other two species (*Phascolomys latifrons* and *Phascolomys platyrrhinus*) determined by cranial characters since the date of that remark (1838), the generic characters of the postpalatal openings are repeated. These additional materials serve to test the statement that in Marsupials “the perforations of the bony palate

† MITCHELL'S ‘Three Expeditions into the Interior of Eastern Australia,’ vol. ii. p. 368, pl. 48. See also WATERHOUSE, ‘Natural History of the Mammalia,’ 8vo, 1845, p. 244.

‡ *Loc. cit.* p. 304.

§ The second molar is abnormally worn, through slight displacement of the opposing tooth, as happens in other partially enamelled teeth of perpetual growth.

|| “On the Osteology of the Marsupialia,” Trans. Zool. Soc. vol. ii. p. 389.

deserve particular attention; they are generally specific, and of consequence in the determination of recent and fossil species"†.

In the skull of the Wombat from Tasmania (*Phasc. vombatus*), figured in the same Paper‡ to illustrate the palatal and other characters afforded by a basal view of the cranium, the foramina are oval, the base which is behind being rounded; but the small anterior end of the oval is so nearly pointed as to suggest the term "triangular." In two skulls since compared these foramina present the same shape and proportions; in two smaller and younger skulls of *Phasc. vombatus* they are relatively smaller, and rather elliptical than oval. In two skulls of *Phascolomys platyrhinus* in the Collection of the British Museum I note that the postpalatal foramina are longitudinally elliptical or oblong in one, and are triangular in the other; the larger continental bare-nosed species showing the same variety as the smaller Tasmanian Wombat. This, therefore, is an exception to the general rule of the specific value of the postpalatal character§. The larger, especially the longer postpalatal varieties, encroach more forward and come nearer to the transverse parallel of the anterior wall of the hindmost socket. Allowance must be made for this variation.

In two skulls of *Phascolomys latifrons* the postpalatine foramina are relatively larger, especially longer, than in either the Tasmanian or Platyrrhine Wombats, and they are rounded anteriorly, but less broad there than behind.

Dr. MURIE|| notes the larger size of the postpalatine foramina in *Phasc. latifrons* as compared with *Phasc. platyrhinus*, and I therefore attach the more value to the character, as probably being more constant in the latifrons species. It must, however, be considered in connexion with the more constant cranial characters. The following fragmentary fossil from the "breccia-cave" of Wellington Valley exemplifies the need of keeping this relation in view. The fossil consists of a left maxillary and palatine, with the molar alveoli, fractured at both ends (Plate XVII. figs. 7, 8); the anterior fracture exposes the socket of the first molar, *d s.* By the anterior contraction of the palate and by the size and proportions of the alveoli the fossil resembles *Phascolomys platyrhinus*; by the parallelism transversely of the fore part of the postpalatal aperture and the same part of the posterior alveolus, and by the height of the maxillary below the malar process of that bone (fig. 7, 21*), it resembles *Phascolomys latifrons*. By the combination of both characters it proves its relationship to *Phascolomys Mitchelli*; as in that species the prezygomatic ridge is less prominent or definite, and is higher placed than in existing Wombats.

§ 10. *Palate and upper molars, Phascolomys Mitchelli, from freshwater deposits,*

† "On the Osteology of the Marsupialia," Trans. Zool. Soc. vol. ii. p. 388.

‡ *Ib.* plate lxxi. fig. 6.

§ The skull of the Wombat, from New South Wales, with "two large triangular holes in the end of the palate," was probably the only one in the British Museum Collection at the date of Dr. GRAY's comparison of it with the smaller Tasmanian species, which he believed to be differentiated by the "two moderate-sized oblong holes in the hinder part of the palate." ("Some Observations on the skull of *Phascolomys vombatus*," by J. E. GRAY, F.R.S., Proc. Zool. Soc. 1847, p. 41.)

|| *Loc. cit.* p. 844.

Queensland.—In a heavy petrified fragment of skull (Plate XVIII. figs. 1–4)†, including the molar series, upper jaw, and their alveoli, with the bony palate from its hind border or bar (*a*) to 4 lines in advance of the molars ($21, 21$), the palate, as compared with that of the last-described fossil (Plate XVII. fig. 5), is more concave transversely, and its concavity is divided by a sharp ridge, extending from the interpalatine ($20, 20$) along the intermaxillary‡ palatal suture, as far forward as the second molar (d_4).

The upper molars have a somewhat zigzag arrangement: the second (Plate XVIII. fig. 1, d_4) extends more mesiad than the first (d_3) or the third (m_1), the hind lobe of the third more so than the fore lobe of the fourth (m_2), and the hind lobe of the fourth more so than the fore lobe of the last molar (m_3). This arrangement is also shown in the palatal view of the fossil of *Phascolomys Mitchellii* (Plate XVII. fig. 5), and by the alveoli in the more fragmentary fossil of the same species (fig. 8) of the same Plate. The same character is seen in a minor degree in the outer contour of the grinding-surfaces. The antero-external angle of one tooth projects more outwardly than the postero-external angle of the tooth in advance. This arrangement, a tendency to which has been noted in *Diprotodon* and *Nototherium*, is more marked in the Tasmanian and Platyrhine Wombats, as in MITCHELL'S fossil, than in *Phascolomys latifrons*.

The intermolar bony palate in the present fossil (Plate XVIII. fig. 1), though exceeding in length by the antero-posterior diameter of the last molar tooth that of *Phascolomys latifrons* (Woodcut, fig. 8), is narrower anteriorly than in that species, without being so broad posteriorly. It further differs from both this, the Platyrhine (Woodcut, fig. 7) and the Tasmanian existing Wombats, in the smaller size of the post-palatal foramina (ib. *b, b*); they are absolutely smaller than in *Phascolomys wombatus*, although the fossil indicates an animal as large as the largest *Phascolomys platyrhinus*. These foramina are, unfortunately, not preserved in the two previously described fossils; but the anterior boundaries in the subject of fig. 5, Plate XVII. indicate a size or breadth of the foramina equal to those in either the Latifront or Platyrhine existing species.

The antero-posterior extent of the molar alveoli, upper jaw, of the present fossil is 2 inches $2\frac{1}{2}$ lines, which is exactly that in the cave-fossil (Plate XVII. fig. 5) and in the largest Platyrhine Wombat. But the palate is narrower in the fossil by 1 line posteriorly, besides being deeper or more concave across, and divided by a mid ridge.

The differential character noticed in the preceding fossils is here repeated, viz. the greater depth of the outer alveolar plate of the maxillary (Plate XVIII. fig. 2, 21) below the zygomatic process (ib. 21^*); it is $10\frac{1}{2}$ lines in the present fossil, and the premaxillary ridge or tuberosity (ib. *m*), less defined or prominent than in existing Wombats, is correspondingly raised above the alveolar outlets.

The worn surfaces of the molar teeth are rather broader transversely than in *Phasco*

† This fossil was presented to the British Museum, in 1861, by GEORGE BENNETT, Esq., F.L.S. It is from a freshwater deposit, Darling Downs.

‡ I use the term to signify the suture between the maxillary bones, in a sense different from that in which it is sometimes applied, viz. to the "premaxillary bone."

lomys platyrhinus, and the inner ends of the two lobes are more sharply, or less obtusely, angular than is usual in that species. The difference both in this character and the breadth of the molars is also notable between the present and the first-described fossil; but seeing the influence direction and degree of attrition have upon the size and shape of the grinding-surface of the molars, the differences noted may be within the limits of that influence. In the subject of Woodcut, fig. 7, *d*₄ had been abnormally abraded.

The characteristic downbending of the hind part of the palatines, which forms a transverse bar (Plate XVIII. fig. 1, *a*) behind the postpalatal apertures (ib. *b*, *b*), perforated at each end from behind forwards by a smaller aperture in the recent Wombats, is repeated in this present instructive fossil (ib. fig. 4, *d*, *d*).

This evidence of *Phascolomys Mitchelli* (Plate XVIII. figs. 1-4), from freshwater deposits, resembles *Phasc. platyrhinus* in the depth and position of the antero-internal longitudinal groove of *d*₃, which tooth is wanting in the cave fossil, although the socket (ib. fig. 5, *d*₃) indicates the same position of the groove. In *Phascolomys latifrons* the fore part of *d*₃ (Woodcut, fig. 8) is less produced than in *Phasc. platyrhinus* and *Phasc. Mitchelli*.

A difference in the grinding-surface of the upper molars and in the intervening bony palate between the subjects of fig. 5, Plate XVII., and fig. 1, Plate XVIII. is appreciable; but, as above remarked, the one may be due to a phase of attrition; and, moreover, the outer side of the surface is slightly mutilated in fig. 5, Plate XVIII.; whilst the variety in regard to a rising along the mid palatal suture in the Platyrrhine Wombats warns against founding a specific distinction thereon.

These characters are of the less consequence, since, where they are not preserved in a fossil, there may be others which allow of no such hesitation in regard to the specific distinction of the Wombats; as, *e. g.*, in the case of that to which the fragment of skull about to be described belongs (Plate XVIII. figs. 5, 6, 7). It is a portion of the left maxillary with the bony palate intervening between the left and right molar series, the left series being in place (ib. fig. 7), the right represented by the second molar and the alveoli of the two following teeth: the extent of the left molar series at their issue from the alveoli is 2 inches 2 lines.

The chief value of the present specimen is the character of the malar process of the maxillary (ib. fig. 5, *a*₁), which is preserved with the beginning of the attached part of the malar (ib. *a*₂) on the left side, showing the malo-maxillary suture. To this help in the determination of fossils of the marsupial genus under consideration I was led by the following comparisons.

In the largest of three skulls of *Phascolomys vombatus* available for the purpose, the left upper molar series, taken as in the fossil, does not equal 2 inches; it falls short by nearly a line. In the specimen figured in my "Osteology of the Marsupialia"*, it is 1 inch 8 lines; in the next in size it is 1 inch 10 lines; in an evidently younger Wombat, with all the molars in place and use, the series is 1 inch 7 lines.

* Trans. Zool. Soc. vol. ii. (1838) plate lxxi. fig. 6.

These five ever-growing teeth gain in fore-and-aft as in transverse diameter, until the full size of the individual is attained; they grow with the growth of the skull, though in a minor ratio; and I have no evidence of their exceeding in size the teeth requiring the extent of alveoli noted in the largest of the cranial specimens of *Phasc. vombatus* before me.

Now in this, as in the second-sized skull, the lower border of the malar process of the maxillary bone is 6 lines above the margin of the outer wall of the alveolar opening of m_2 ; in the younger and smaller skull it is 5 lines. In all the specimens the maxillary contributes to the inner and lower part of the beginning, or anterior pier, of the zygoma, speedily narrowing to a point as it passes backward on the outer side of the arch, where it ends about 7 lines from the back part of the origin of the process; the depth or vertical diameter of the outer side of the base of the zygomatic process of the maxillary is about 2 lines.

In the skull of a *Phascolomys latifrons* with an upper molar series, taken at the alveolar outlets, of 1 inch 10 lines in extent, the malar process of the maxillary rises $7\frac{1}{2}$ lines above the issue of the second molar, there contributes $3\frac{1}{2}$ lines in depth to the under and fore part of the beginning of the zygoma, and narrows to a point 7 lines behind its origin. In another skull of *Phascolomys latifrons* with a molar series of 1 inch 1 line in extent, the maxillary process rises 8 lines above the outlet of the second molar, and contributes a similar small proportion to the under and fore part of the zygoma.

In the skull of a *Phascolomys platyrhinus* with a molar series 2 inches 1 line in extent, the malar process of the maxillary (Woodcut, fig. 5, $_{21}$ *) rises 6 lines above the outlet of the second molar, and contributes $3\frac{1}{2}$ lines to the vertical extent of the beginning of the zygoma ($_{26}$), which here has a total depth of 1 inch 4 lines; the process ($_{21}$ *) decreases to a point at 9 lines from its origin.

In the fossil (Plate XVIII. fig. 5) with a molar series of the same extent as in the last skull, the malar process of the maxillary ($_{21}$) rises 9 lines above the outlet of the molar, and contributes 7 lines to the vertical extent of the fore part of the zygoma ($_{26}$). The different relation of the malo-maxillary suture to the premasseteric ridge (m) is strongly marked between the fossil and any of the recent species of Wombat, the interspace between the front pier of the zygomatic arch and the alveolar outlets being much greater in the fossil.

In the extent, especially hinder breadth and feeble concavity, of the bony palate, *Phascolomys platyrhinus* most resembles the present (ib. fig. 7) as it does the preceding fossil; but the zygomatic character only stands out the more strongly in connexion with this resemblance and the general size.

In *Phascolomys vombatus* the form of the palate resembles that in *Phascolomys platyrhinus*. It is rather more concave in some individuals than in others in both species; and in the Platyrhine Wombat I have noticed a slight mesial ridge along the bony palate.

In *Phascolomys latifrons* the palate is not only more concave, but is wider anteriorly, less triangular; and at the hind part formed by the proper palatine bones, their median

suture rises as a longitudinal ridge dividing the bony palate there into two concavities or longitudinal channels, leading backward to the postpalatal apertures.

§ 11. *Mandibular characters of existing Wombats.*—In differentiating by cranial characters the species of Wombat called *Phascolomys latifrons*, I noted, in comparing it with *Phascolomys vombatus*, that “the curve of the lower border of the lower jaw is much deeper, the inner angle of the condyle is less produced, the coronoid process is higher and narrower, and the postsymphysial depression is almost obsolete in the Lati-front Wombat”*. With the exception of the latter particular, which is variable in both species, subsequently acquired skulls have confirmed the constancy of the above characters. They likewise serve to differentiate the mandible of *Phasc. latifrons* from that of *Phascolomys platyrhinus*, except that the coronoid process rises higher in the platyrhine species (Plate XXII. fig. 2, *c*) than in the Tasmanian Wombat (ib. fig. 1, *c*); but the broader proportion of the process as compared with that in the Hairy-nosed Wombat (ib. fig. 3, *c*) is retained. The deeper curve described by the lower contour of the jaw from the neck of the condyle to the incisive alveoli, as shown in fig. 5, Plate xxxvii. of the undercited volume†, is a constant and well-marked character of *Phascolomys latifrons*; so, likewise, is the less produced inner angle of the condyle, shown in fig. 7, *c d*, of the same Plate. In both the Tasmanian and Platyrhine Wombats this angle is more produced and deflected.

The diastemal part (Plates XIX., XX. & XXI. *l, s'*) of the long symphysis (ib. *s, s'*) is subject to some variety in existing Wombats. In two mandibles of *Phascolomys platyrhinus*, in which the length of the series of molar alveoli is 2 inches 3 lines, that of the interval between the first alveolus and the foremost angle of the symphysis is, in one skull, 1 inch $7\frac{1}{2}$ lines (Plate XXI. fig. 2), in the other 1 inch $6\frac{1}{2}$ lines; the breadth of the diastema, midway, is the same in both, viz. 10 lines.

In a mandible of *Phascolomys latifrons* with the molar series of alveoli 2 inches in extent (Plate XX. fig. 1), the diastema (*l, s'*), taken as above to the foremost point at the interspace of the incisors, is 1 inch 6 lines; in a second mandible with the molar alveoli 1 inch $10\frac{1}{2}$ lines in extent, that of the diastema is also 1 inch 6 lines: the breadth of the diastema, midway, is in the first mandible 8 lines, in the second 7 lines.

In the two mandibles of the Platyrhine Wombat compared, the diastema is slightly convex both lengthwise and across; it is traversed by a pair of shallow longitudinal grooves, and is not sharply defined from the sides of the symphysis. In a third mandible of the same species (Plate XIX. fig. 2, *l, l*) the defining ridges are better marked, the transverse convexity is less so; and this part of the symphysis is rather longer and narrower than in the other two mandibles. In these respects the third mandible approaches nearer to *Phascolomys latifrons*; but it differs, as do the other mandibles of the same species as well as those of *Phasc. vombatus*, in the larger, especially broader, incisive alveoli, and in the oblique course of their upper margins from the mid line of the sym-

* “On the Osteology of the Marsupialia” (Part II.) (1845), in Transactions of the Zoological Society, vol. iii. p. 304, plate xxxvii. figs. 2 & 5.

† Trans. Zool. Soc. vol. iii.

physis outward and backward. The fore end of the symphysis of *Phasc. latifrons* is at once recognizable by the narrower outlets of the incisive alveoli, and the more transverse course of their upper border (Plate XX. fig. 1, *s'*). The lateral borders of the outlets are also more nearly vertical, and do not slope backward as they descend, like those of the incisive alveolar outlets in *Phasc. platyrhinus* and *Phasc. vombatus**.

With the narrower alveoli associated with the more compressed form of the incisors of *Phasc. latifrons*, one may predicate of a generally narrower diastemal part of the symphysis, the upper surface of which, with a mesial canal towards the end and the two parallel longitudinal grooves obsolete or nearly so, is better defined from the sides of this part of the symphysis. In one jaw of *Phasc. latifrons* the defining ridges are sharp, and the intervening upper surface is concave transversely to near the incisive outlets, where the defining ridges subside. I may note that the anterior outlet (*v*) of the dental canal in three mandibles of *Phasc. platyrhinus* is 1 inch 4 lines, or 1 inch 5 lines behind the foremost point of the symphysis (Plate XXII. fig. 2, *v*): in one mandible of *Phasc. latifrons* (ib. fig. 3) it is 1 inch behind the fore end of the symphysis, in another mandible it is 10 lines from the same part. The foramen is more anteriorly situated in the broad-fronted or hairy-nosed species: it opens nearer to the molar series in *Phasc. vombatus* (ib. fig. 1, *v*)†. I may further note that in the mandibles of two individuals examined since describing that of the type skull of *Phasc. latifrons*, the intercommunicating foramen from the entry of the dental canal to the outer surface of the base of the coronoid is smaller in one, as in the type mandible, than in the Platyrhine and Tasmanian Wombats, while in the other it does not exist. It is interesting to find this variety, because, in the great *Diprotodon* and *Notothere*, with some affinities to *Phasc. latifrons*, the absence of the perforation of the base of the coronoid process is the rule, as in the Marsupialia generally.

The first lower molar (*d*₃) in *Phasc. latifrons* (Plate XX. fig. 1) has a subquadrate transverse section; in *Phasc. platyrhinus* (Plate XIX. fig. 2) and *Phasc. vombatus* (ib. fig. 1, *d*₃) it has an elliptic or ellipsoid transverse section. The outer depression (Plate XXII., *f*) of the ramus ascendens, or "ectocrotaphyte cavity," is less deep in *Phasc. latifrons* (ib. fig. 3), and shallows more gradually forward, than in the bare-nosed recent species (ib. figs. 1 & 2); the inflected angle (*a*), viewed from below as in Plate XXIII., has a broader base in proportion to its length, and is not produced so far or directly backward in *Phasc. latifrons* (fig. 3) as in *Phasc. platyrhinus* (fig. 1).

§ 12. *Mandibular characters of extinct Wombats similar in size to the recent species.*—I now proceed to apply the above characters and comparisons of the mandibles of the known existing kinds of Wombat in the attempt to elucidate the fossil mandibular

* This latter character differentiating *Phasc. vombatus* from *Phasc. latifrons* is shown in figs. 3 *c* & 7 *c* of plate xxxvii. *tom. cit.*

† This character is shown in the figures of the mandible of the Tasmanian and Broad-fronted Wombats in plate xxxvii. of my second memoir (*tom. cit.*); but I could not then, as now, depend upon the constancy of such character.

evidences of similar-sized Wombats, of which I have received or worked out twelve specimens from the breccia-masses transmitted to the British Museum by the Trustees of the Australian Museum, Sydney, New South Wales, in conformity with the desire of the Colonial Legislature, and in connexion with their liberal vote in aid of further explorations of the bone-caves discovered by Sir THOMAS MITCHELL, C.B., Wellington Valley. Four other and more complete specimens are from the freshwater deposits of Queensland. The first of the cave specimens which I shall describe consists of the almost entire symphysis (Plate XX. fig. 2 & Plate XXIII. fig. 4), and it is the only specimen from the breccia which shows this instructive part of the lower jaw. With the bone are included the implanted bases of the incisors (*i*), the three anterior molars of the right side (d_3, d_4, m_1), and parts of the first and second molars of the left side. The upper surface of the diastemal part of the symphysis (*l, s*) is concave transversely, divided by sharp margins from the sides, and has a mesial longitudinal channel at the anterior third, without the pair of such channels. Lengthwise the upper contour of the diastema is slightly concave (Plate XXII. fig. 7, *l, s'*). From the fore part of the anterior molar alveolus to the broken end of the symphysis is 1 inch 6 lines; the breadth of the symphysis midway is 9 lines. So far the fossil shows a closer affinity to *Phascolomys latifrons* (Plate XX. fig. 1) than to the other two existing species, and more especially to the variety, fig. 3, Plate XXII.

This affinity is more decisively shown by the form of the incisors in transverse section (Plate XX. fig. 2, *i, i*) and of the anterior molars (ib. d_3). The enamel covers and defines the lower broad flattened side of the incisor, bending up a little way upon both outer and inner sides, which converge toward the upper, narrower surface, but unequally; the outer surface descending therefrom, at first more vertically, toward the base, while the inner surface slopes to the mid line of the symphysis as it descends.

Thus there is a greater interval between the upper than the lower sides of the two incisors; the vertical exceeds the transverse diameter of the transverse section of the tooth. In these characters the lower incisors of the fossil agree with those of *Phascolomys latifrons*.

In the Platyrrhine and Tasmanian Wombats the transverse prevails over the vertical diameter of the exposed end of the incisors, and the enamel bends up from the lower along the outer surface nearly to the upper one, describing a uniform convexity, transversely.

The fossil adheres also to the latifront type in the shape of the first molar, d_3 (fig. 2, Plate XX.), and resembles the Hairy-nosed Wombat in the size of its molars, which is less than in *Phascolomys platyrrhinus* (Plate XIX. fig. 2, d_3, d_4, m_1). But the following differences present themselves in the comparison of the present fossil with the corresponding part of the mandible of *Phascolomys latifrons*. In that species the upper transversely concave intermolar part or surface of the symphysis does not extend backward beyond the alveolus of the second molar; at the third molar the inner wall of the jaw soon changes its concavity for a convexity bending down to the back part of the symphysis. In *Phascolomys platyrrhinus* the concave upper surface of the symphysis extends further back, and this character is exaggerated in the fossil; for the inner wall

of the socket of the third molar (Plate XX. fig. 2, m_1) arches inward as it descends, continuing the diastemal transverse concavity to that part of the molar series where the hinder fracture of the present fossil has occurred, exposing the long curved implanted part of the third molar (m_1 , fig. 3).

Another difference is seen at the under part of the symphysis of the fossil (Plate XXIII. fig. 4) as compared with that in the latifront species (ib. fig. 3). In this the longitudinal contour is convex, concurrently with the greater general convexity of the curve of the lower border of the mandible (Plate XXII. fig. 3); in the fossil (ib. fig. 7) the lower surface of the symphysis runs straight, or very nearly so, from the hind fracture to the outlets of the incisive alveoli (s'), along a preserved symphyseal extent of 2 inches 8 lines. It is interesting to see that here, again, the fossil resembles the Platyrrhine species (Plate XXII. fig. 2), the older spelæan form combining to a certain extent characters kept apart in still existing species of Wombat. Nevertheless the more essential resemblances are to the *Phascalomys latifrons*. The pair of subsymphysial foramina (Plate XXIII. fig. 4, r) characteristic of the Wombats are wider apart (4 lines) than in the Platyrrhine (ib. fig. 1, r) and Tasmanian (ib. fig. 2, r) species, and show rather the latifront character; they have the usual relative position to the fore and hind ends of the symphysis.

The specific distinction between the broad-fronted (Plate XXII. fig. 3) and other existing Wombats (ib. figs. 1 & 2) afforded by the ascending ramus of the mandible induced attention to all the cave fragments of that part of the lower jaw, and led to careful removal of the matrix from both the outer and inner depressions. This brought to light the modification of the lower part of the ectocrotaphyte depression (f) shown by the subject of fig. 6, Plate XXII. In the minor depth of the base or lower part of that depression the fossil mandibular fragment agrees with *Phascalomys latifrons* (ib. fig. 3, f), and more especially with the variety above noted with the absence of the transverse perforation (Plate XXII. fig. 3). The part of the base, or below the base, of the coronoid in the fossil where the canal opens externally in the normal mandibles of *Phasc. latifrons** is entire; it is also less depressed there than in the perforate variety. From this and the normal mandible of the latifront species the fossil (Plate XXII. fig. 6) differs in the relative position of the anterior beginning of the "ectocrotaphyte ridge" (h) or that bounding below the ectocrotaphyte depression (f). In the three recent species (ib. figs. 1, 2, 3) this ridge (h) begins near the lower border of the ramus; in the fossil (ib. fig. 6, h) it begins midway between the lower and upper borders, and on a vertical parallel with the third or antepenultimate molar (m_1)—consequently more in advance than in the recent Wombats, in which both the ridge and the base of the coronoid (q) begin below the fore part of the penultimate molar (m_2). Both penultimate and last molars are in place and are worn in the fossil, so the differences above noted cannot relate to nonage. The beginning of the ectocrotaphyte ridge is $10\frac{1}{2}$ lines below the outlet of the first division of the alveolus of m_2 in *Phasc. latifrons* (ib. fig. 3, h), and is 1 inch below the same part in *Phasc. platyrrhinus* (ib. fig. 2, h); in the fossil it is 6 lines below the hind

* Trans. Zool. Soc. vol. iii. plate xxxvii. fig. 5.

division of the alveolus of m_1 . The anterior origin of the coronoid appears to be proportionally advanced in the fossil. The outer surface of the ramus below the beginning of the ectocrotaphyte ridge slopes more gradually inward and lower down before passing into the broad under surface of the jaw in the fossil (Plate XXII. fig. 6). In the recent Wombats the same surface curves, with a stronger and shorter convexity, into the lower border, yet less abruptly in *Phasc. latifrons* (ib. fig. 3, k) than in *Phasc. platyrhinus* (ib. fig. 2, k).

The ectalveolar groove is longer, deeper, and narrower in the fossil (Plate XIX. fig. 3, u), owing to the more advanced origin of the coronoid (g) and its greater proximity to the last two alveoli (m_2, m_3); this differential character is still more marked as compared with the Platyrrhine species (ib. fig. 2, u). From so much of the entocrotaphyte ridge, or anterior beginning of the inflected angle, as is preserved, the degree of inflection appears to have been less in this fossil (Plate XXIII. fig. 5, a) than in the recent species (ib. figs. 1, 2, 3, a). The surface broadening as it recedes, between the ecto- and entocrotaphyte ridges, is not only flattened but becomes rather concave in the fossil toward the inner border.

The two hindmost molars in place (Plate XIX. fig. 3, m_2, m_3) are narrower than those in *Phasc. latifrons* (Plate XX. fig. 1, m_2, m_3), as are the anterior molars in the fossil previously described (ib. fig. 2, d_3, d_4). To the species represented by the last-cited fossil, I am disposed, from the resemblance of the symphysis to that in the imperforate variety of *Phasc. latifrons*, to refer the present fossil. They might be parts of the same mandible, as well as of the same species; but more complete specimens must confirm or confute this supposition. It is certain that both fossils show the nearest resemblance to the mandibular imperforate variety of *Phascolomys latifrons* above named, yet with marked differences, in value equalling those interpreted and accepted as specific. The part of the dental canal which courses along the inner side of the molar alveoli and the bottoms of the last two alveoli are exposed by fracture of the thin film of bone originally covering them.

In reference to the characters of the two portions of fossil mandible above defined, as they plainly justify the inference that they belonged to a species of *Phascolomys* as distinct from the three accepted recent species as these differ from one another, each might be indicated by a specific name; and it may ultimately prove that they do belong to distinct species.

The same remark applies to both or either in relation to the maxillary fossil from the same cavern (Plate XVII. figs. 2 & 6) which I have referred to a *Phascolomys Krefftii*.

Considering, however, that the two portions of mandibles combine, like that maxillary one, characters of affinity to *Phascolomys latifrons* with differential ones forbidding a reference to that species, it may be, and may be probable even, that they all belong to the same extinct species. I prefer, therefore, to indicate them as parts of a *Phascolomys Krefftii*, and leave to those who may be so fortunate as to obtain evidence to the con-

trary, to impose their own specific denominations on the so demonstrated distinct kind of Wombat.

§ 13. *Mandibular fossils of Phascalomys latifrons*.—Of six other mandibular fragments showing the fore part of the ectocrotaphyte depression, two mutilated right rami (Plate XXII. figs. 4 & 5), by the gradual beginning and degree of deepening of that depression (*f*), agree with the perforate or normal mandible of *Phascalomys latifrons*. The outer orifice of the transverse canal or perforation (ib. *p*) holds the same position in these fossils: one of them (ib. fig. 4) includes the four anterior molars and the socket of the fifth; the other (fig. 5) includes the four posterior molars. The fore-and-aft extent of the series of five sockets, in each specimen, is 2 inches, the depth of the mandible at the back part of the symphysis is (in fig. 5) $6\frac{1}{2}$ lines; in fig. 4 it is 1 inch 5 lines. The ectalveolar groove (Plate XIX. fig. 4, *u*) is narrow. The inner wall of the ramus, forming that of the second (*d*₃) and third (*d*₄) sockets, descends more vertically than in the first described fragment (Plate XX. fig. 2), or in the Tasmanian (Plate XIX. fig. 1) and Platyrrhine (ib. fig. 2) Wombats. The hind end of the symphysis is on the vertical parallel of the interval between *d*₄ and *m*₁, or not further back than the middle of *m*₂ (Plate XIX. fig. 4, *s'*). In both these characters the present fossils come nearer to the latifront species (Plate XX. fig. 1, *s*) than to the Platyrrhine and Tasmanian Wombats. The first molar (*d*₃) repeats the formal characters of that tooth in the *Phasc. latifrons*.

I conclude, therefore, that the mandibular fossils under description belonged to a "hairy-nosed" Wombat, and one nearer to the existing species than the preceding fossil (Plate XX. fig. 2), in which the symphysis appears to have extended as far back as it does in *Phascalomys platyrrhinus* (Plate XIX. fig. 2).

§ 14. *Mandibular fossils of Phascalomys Mitchelli*.—I now come to mandibular fossils which, in the depth of the base of the ectocrotaphyte depression (Plate XXI. fig. 5, *f*), resemble the Tasmanian and Platyrrhine Wombats. Four of these have the entire molar series in place. In one (Plate XIX. fig. 5) the extent of the series is 2 inches 2 lines; the first molar, however (*d*₃), agrees in shape and size with that in *Phasc. latifrons* (Plate XX. fig. 1, *d*₃).

The transverse concavity of the inner wall, continued from the first and second molar sockets and upon the symphysis half an inch in advance, more resembles that in the imperforate variety of the Latifront Wombat than in any other mandible of recent species. The symphysis (Plate XXI. fig. 6, *s*) does not extend so far back as in the Tasmanian (ib. fig. 1, *s*) and Platyrrhine (ib. fig. 2, *s*) Wombats. From the fore part of the first molar socket to the back part of the upper division (ib. fig. 6, *s**) of the symphyseal surface, in the fossil, measures 1 inch; and this part of the symphysis is on the vertical parallel of the hind lobe of the second molar. The lower division (*s*) terminates, as in fig. 4, below the interval between *d*₄ & *m*₁.

The fore part of the root of the coronoid, in the fossil (ib. fig. 5, *g*), stands out from the alveolar wall of the penultimate molar, as in *Phasc. latifrons*; not from that of the last molar, as is the rule in the Tasmanian (Plate XXII. fig. 1, *q*) and Platyrrhine (ib. fig.

2, *q*) Wombats. The extent of the molar series and the sizes of the individual teeth accord, save in the narrower character of the lower molars, with the teeth of the upper jaw in the subject of figure 5, Plate XVII. If these fossils are maxillary and mandibular specimens of the same species of Wombat, the lower molars are relatively narrower transversely, compared to the upper ones, than in any of the existing species.

In the mandibular specimen under consideration we see combinations of characters confined severally to distinct species in existing Wombats. I am disposed therefore, and for reasons above assigned, to refer this mandibular fossil, with the maxillary one above cited, to *Phascolomys Mitchelli*.

A second similar specimen of left ramus, including part of the symphysis and of the ascending ramus, has a molar series 2 inches in extent, and, as in fig. 5, Plate XIX., the teeth have the general characters of those in *Phascolomys latifrons*; they are transversely narrower than in *Phascolomys vombatus* or *Phasc. platyrhinus*. The ectocrotaphyte depression is deeper than in the perforate mandible of that species; the perforation (*p*) here shows a similar position and size. The depth of this fossil jaw at the back part of the symphysis is 1 inch 5 lines. The symphysis terminates below the interval, between the second (*d*₄) and third (*m*₁) molars. The ectalveolar groove is wider than in the subject of fig. 3, Plate XIX., but is deeper than in the Platyrhine and Tasmanian Wombats. The symphysis is not bilobed behind, as in fig. 6, Plate XXI.; but this and the before-mentioned differences from that subject probably exemplify the range and seat of variety in the mandibular characters of one and the same species.

The characters noted in the subjects of figs. 4 & 5, Plate XXIII., of fig. 4, Plate XXI., and of figs. 2 & 3, Plate XX., are of specific value; but, as in the maxillary fossils (Plate XVII. figs. 1 & 2), I do not feel grounds for indicating, after comparison of the mandibular fossils from the Wellington-Valley breccia-caves, more than two species of a size not exceeding the known existing Wombats, and not referable thereto.

§ 15. *Mandibular characters of Phascolomys Thomsoni, Ow.*—From the freshwater deposits of Queensland I have received mandibular fossils of the genus *Phascolomys*, which, with decrease of size, show characters not in accordance with those of any of the cave fossils.

The subject of figs. 8 & 9, Plate XVIII., and fig. 7, Plate XXI., is a right mandibular ramus, with slight mutilation at both ends. In the lower contour of the jaw, the depth of the ectocrotaphyte depression (*f*), the breadth of the ectalveolar groove (*w*), the position and size of the intercommunicating foramen (*p*), the shape of the anterior molar (*d*₃), and the shape and proportions of the incisor (*i*), so far as these are indicated, the present fossil agrees with *Phascolomys platyrhinus*, and differs from *Phascolomys latifrons* and *Phasc. Mitchelli*. It agrees, however, with these, and differs from both the bare-nosed Wombats, in the relative position of the back part of the symphysis (Plate XXI. fig. 7, *s*), which does not extend beyond the vertical line dropped from the front lobe of *m*₁.

The grinding-surface of *d*₃ (Plate XVIII. fig. 9) is an ellipse with the long axis nearly parallel with that of the mandible. The outer side of the incisor is transversely convex,

and curves uninterruptedly to the underside, as in *Phasc. platyrhinus* and *Phasc. vom-batus*. In size this fossil does not exceed the Tasmanian species. The antero-posterior extent of the working-surfaces of the five molars is the same, viz. 1 inch 11 lines; but the teeth are rather narrower transversely, and the last molar, especially its hinder lobe, shows a greater decrease, as in the Hairy-nosed Wombat.

I indicate this modification of *Phascalomys*, from which the present fossil has been derived, by the name of the late estimable Professor of Geology in the Sydney University, New South Wales, ALEX. M. THOMSON, D.Sc. The specimen is from a lacustrine deposit at Gowrie, Darling Downs, Queensland, and was presented to the British Museum by Sir WILLIAM M^cARTHUR, Bart.

§ 16. *Mandibular fossil of Phascalomys platyrhinus, Ow.*—The subject of figs. 3 & 4, Plate XX., well exemplifies the differences by which *Phascalomys platyrhinus* differs from *Phascalomys Thomsoni*. The symphysis has the same backward extent and relative position to the molar series as in the recent specimen (Plate XIX. fig. 2); the character of the upper surface of the diastemal tract (*l*) is repeated; the formal characters of *d*₃ and of *i* in the fossil are precisely those in the recent continental bare-nosed Wombat: in size the fossil equals the largest living specimen of that species. The antero-posterior extent of the molar series is 2 inches 2½ lines. The shape and proportions of the molars characteristic of *Phascalomys platyrhinus* are closely preserved in the fossil. It was obtained from the bed of a tributary of the Condamine River, Queensland, by EDWARD S. HILL, Esq., and shows that the characters of the actual Platyrhine species were established at a period coeval with the existence of *Diprotodon* and *Thylacoleo*.

§ 17. *Mandibular and lower molar characters of Phascalomys parvus, Ow.*—With present evidence of the constancy of size of the molar series of teeth in existing and extinct species of Wombat, such series fully in place and well worn, having a longitudinal extent of 1 inch 5 lines, cannot be referred to a species with a longitudinal extent of molars never less than 1 inch 9 lines, and usually more: as, *e. g.*, in the Tasmanian Wombat, which is the smallest of the known existing species. The series of molars in Plate XIX. fig. 6, contrasted with those in fig. 1, is implanted in a mandible of similar small size (Plate XX. figs. 6 & 7). In the lower contour, the depth of the ectocrotaphyte fossa (*f*), the breadth of the ectalveolar groove, the shape and size of the incisor, and the shape of the grinding-surface of the anterior molar (*d*₃) this fossil agrees with *Phascalomys platyrhinus*. But the symphysis (Plate XX. fig. 7, 3) does not extend so far back; it ends there below the interspace between the second (*d*₄) and third (*m*₁) molars. The hind contour of the symphysis is subbilobed (*ib. s, s**); it is long, but less deep relatively than in *Phascalomys Mitchelli* (Plate XXI. fig. 6).

The grinding-surface of the anterior molar (Plate XIX. fig. 6, *d*₃) is subelliptic, with the long axis nearly parallel with that of the jaw, 2 lines and 1 line in the two diameters, showing the usual disposition of the incomplete coat of enamel. The succeeding molars have the normal bilobed or biprismatic shape; their grinding-surfaces do not exceed severally 3½ lines, the fore lobe of the first (*d*₄) and the hind lobe of the last (*m*₃) being

the smallest. The hinder half of the diastemal tract, above, is bounded by a ridge (*l*) on each side, and is there transversely concave. The outlet of the dental canal (Plate XX. fig. 6, *v*) is more advanced in position than in *Phascolomys vombatus* (Plate XXII. fig. 1, *v*). The outer enamelled surface of the incisor is transversely or vertically convex, curving uninterruptedly to the lower border of the tooth, as in the bare-nosed Wombats, but with less relative breadth of the tooth than in those existing species. Sufficient of the angle of the jaw is preserved to show the partial division of the large cavity formed by its inward extension into the inner (*d*) and outer (*e*) angular depressions (Plate XXIII. fig. 7). The base of the coronoid process (Plate XX. figs. 6 & 7, *c*) is 6 lines in fore-and-aft extent; in *Phascolomys vombatus* it is 11 lines.

The well-marked characters of this small extinct species are satisfactorily repeated in a second mandibular specimen, also of the left ramus, but more mutilated behind. It retains, however, the anterior end entire; and the incisor shows its worn surface (Plate XIX. figs. 6 & 7, *v*). The vertical diameter of the incisor equals the long diameter of the working-surface of the second molar tooth, *d*.

A third illustration of this diminutive species is likewise afforded by a portion of the left mandibular ramus; it is a small portion, but includes the last two molars and the hind half of the antepenultimate molar. The base of the common plate of the coronoid and condyloid processes is in part preserved, with a broken beginning of the ectocrotaphyte ridge: these, with the postalveolar ridge and ectalveolar groove, repeat the characters of the more complete ramus (Plate XX. figs. 6 & 7). The size of both bone and teeth is the same in all. The present fossil, by the well-worn crowns of the molars, appears to be from an old individual. The formal characters are incompatible with a reference of those of size to immaturity.

All the specimens of *Phascolomys parvus* were in the Boydian Collection of fossils from the Lacustrine deposits of King's Creek, Darling Downs, Queensland, purchased by the British Museum, and are in the same mineralized condition as the remains of *Diprotodon* in the same collection.

I reserve for another communication the evidences of extinct Wombats exceeding in size the existing species.

EXPLANATION OF THE PLATES.

PLATE XVII.

- Fig. 1. Upper view of anterior portion of skull of *Phascolomys Mitchellii*.
- Fig. 2. Upper view of anterior portion of skull of *Phascolomys Krefftii*.
- Fig. 3. Right side view of anterior portion of skull of *Phascolomys Mitchellii*.
- Fig. 4. Left side view of the same skull.
- Fig. 5. Under view of the same skull.
- Fig. 6. Front view of the portion of skull of *Phascolomys Krefftii*.
- Fig. 7. Portion of left maxillary, *Phascolomys Mitchellii*.
- Fig. 8. Palatal surface and upper molars of *Phascolomys Mitchellii*.

PLATE XVIII.

- Fig. 1. Palatal surface and upper molars, *Phascolomys Mitchellii*.
 Fig. 2. Side view of the same portion of skull.
 Fig. 3. Front view of the same portion of skull.
 Fig. 4. Back view of the same portion of skull.
 Fig. 5. Side view of the left maxillary, *Phascolomys Mitchellii*.
 Fig. 6. Front view of the same portion of skull.
 Fig. 7. Palatal surface and molar teeth of ditto.
 Fig. 8. Outside view of right mandibular ramus of *Phascolomys Thomsoni*.
 Fig. 9. Upper view with grinding-surface of lower molars of the same fossil.

PLATE XIX.

- Fig. 1. Upper view of mandible and mandibular teeth, *Phascolomys vombatus*.
 Fig. 2. Upper view of mandible and mandibular teeth, *Phascolomys platyrhinus*.
 Fig. 3. Upper view of a portion of the left mandibular ramus with the last two molars, *Phascolomys Krefftii*.
 Fig. 4. Upper view of a portion of the right mandibular ramus, *Phascolomys latifrons*.
 Fig. 5. Upper view of a portion of the left mandibular ramus, *Phascolomys Mitchellii*.
 Fig. 6. Upper view of a portion of the left mandibular ramus, *Phascolomys parvus*.
 Fig. 7. Outer side view of the same fossil.

PLATE XX.

- Fig. 1. Upper view of mandible and mandibular teeth, *Phascolomys latifrons*.
 Fig. 2. Upper view of the fore part of the mandible, *Phascolomys Krefftii*: 2 a, transverse section of the incisors.
 Fig. 3. Upper view of a portion of the mandible of *Phascolomys platyrhinus*.
 Fig. 4. Under view of the same fossil: 4 a, transverse section of the incisors.
 Fig. 5. Side view of fore part of the same jaw.
 Fig. 6. Outer side view of the left mandibular ramus, *Phascolomys parvus*.
 Fig. 7. Inner side view of the same fossil.
 Fig. 8. Under surface of angular part of the same fossil.

PLATE XXI.

- Fig. 1. Inner side view of the right mandibular ramus, *Phascolomys vombatus*.
 Fig. 2. Inner side view of the right mandibular ramus, *Phascolomys platyrhinus*.
 Fig. 3. Inner side view of the right mandibular ramus, *Phascolomys latifrons*.
 Fig. 4. Inner side view of a portion of the right mandibular ramus, *Phascolomys latifrons*.

- Fig. 5. Outer side view of a portion of a left mandibular ramus, *Phascolomys Mitchelli*.
 Fig. 6. Inner side view of the same fossil: drawn without reversing.
 Fig. 7. Inner side view of a portion of the right ramus, *Phascolomys Thomsoni*.

PLATE XXII.

- Fig. 1. Outer side view of the right mandibular ramus, *Phascolomys vombatus*.
 Fig. 2. Outer side view of the right mandibular ramus, *Phascolomys platyrhinus*.
 Fig. 3. Outer side view of the right mandibular ramus, *Phascolomys latifrons*.
 Fig. 4. Outer side view of part of the right mandibular ramus, *Phascolomys latifrons*.
 Fig. 5. Outer side view of part of the right mandibular ramus, *Phascolomys latifrons*.
 Fig. 6. Outer side view of the hind part of the right mandibular ramus, *Phascolomys Krefftii*.
 Fig. 7. Outer side view of the fore part of the right mandibular ramus, *Phascolomys Krefftii*.

PLATE XXIII.

- Fig. 1. Under view of mandible, *Phascolomys platyrhinus*.
 Fig. 2. Under view of the left ramus and symphysis of mandible, *Phascolomys vombatus*.
 Fig. 3. Under view of the right ramus and symphysis of mandible, *Phascolomys latifrons*.
 Fig. 4. Under view of the symphysis of mandible, *Phascolomys Krefftii*.
 Fig. 5. Under view of the hind part of the left ramus of mandible, *Phascolomys Krefftii*.
 Fig. 6. Back view of the hind part of the left ramus of mandible, *Phascolomys parvus*.
 Fig. 7. Upper view of the same part of the fossil.
 Fig. 8. Transverse section of lower incisors, *Phascolomys platyrhinus*.
 Fig. 9. Transverse section of lower incisors, *Phascolomys latifrons*.

LIST OF WOODCUTS.

- Fig. 1. Nasal bones and their connexions, var. 2, *Phascolomys vombatus*
 Fig. 2. Nasal bones and their connexions, var. 3, *Phascolomys vombatus*.
 Fig. 3. Nasal bones and their connexions, *Phascolomys platyrhinus*.
 Fig. 4. Nasal bones and their connexions, *Phascolomys latifrons*.
 Fig. 5. Lacrymal and maxillary characters, *Phascolomys platyrhinus*.
 Fig. 6. Lacrymal and maxillary characters, *Phascolomys latifrons*.
 Fig. 7. Palatal surface of upper jaw and teeth, *Phascolomys platyrhinus*.
 Fig. 8. Palatal surface of upper jaw and teeth, *Phascolomys latifrons*.

All the figures are of the natural size.

Fig. 1.

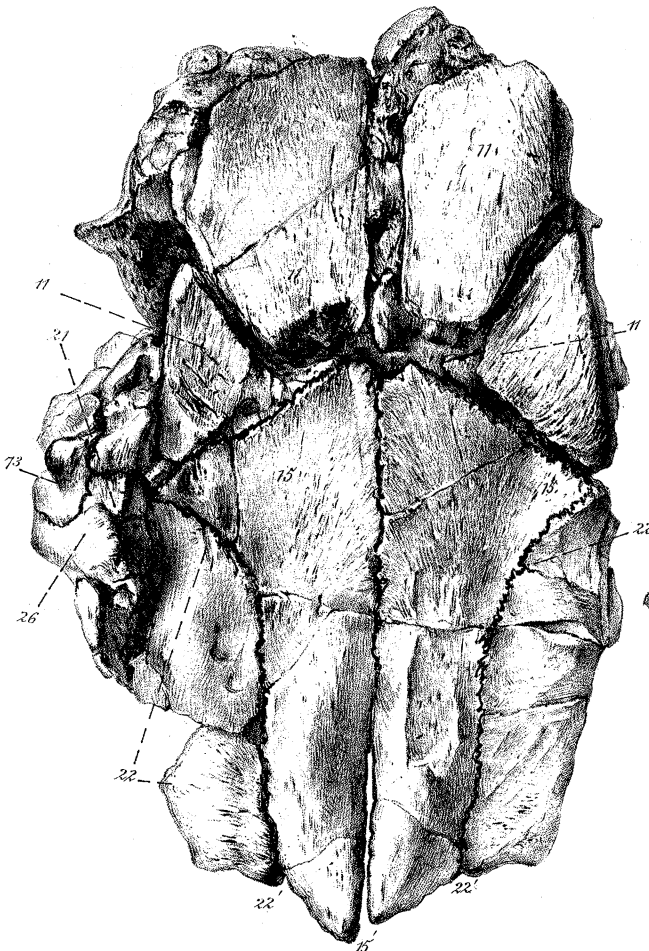


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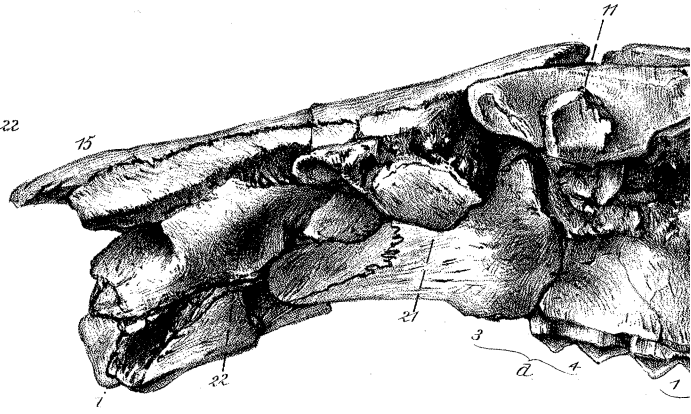
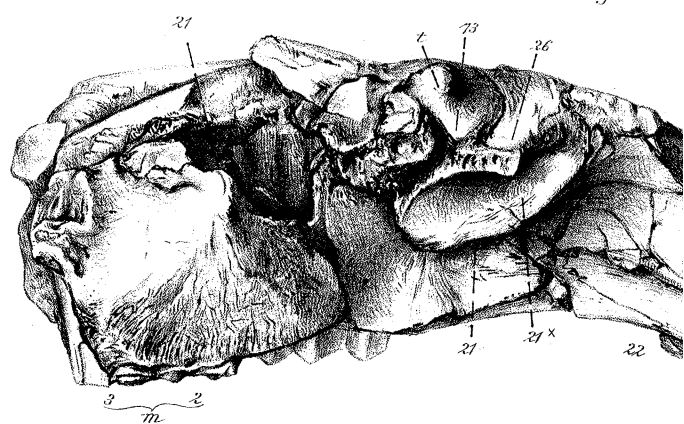


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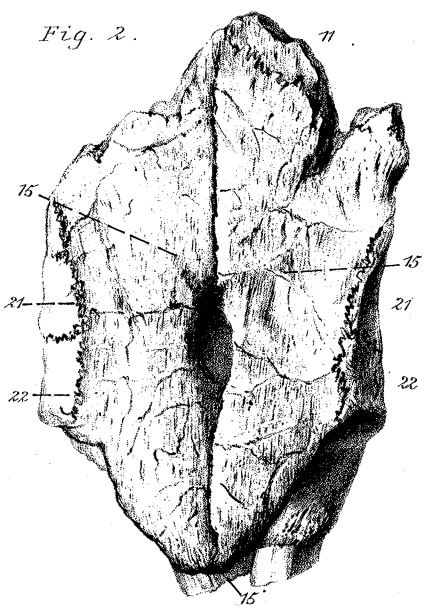


Fig. 8.

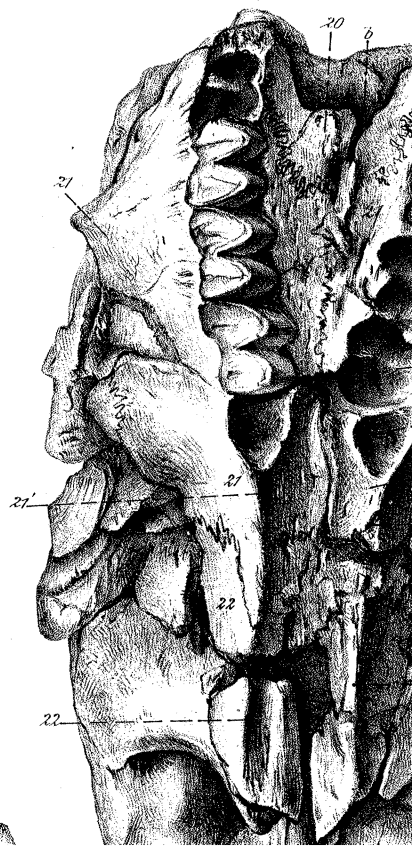
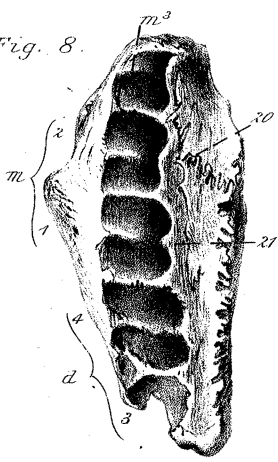


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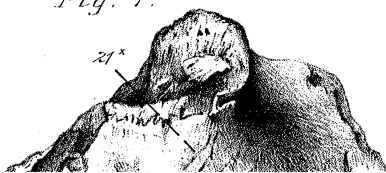


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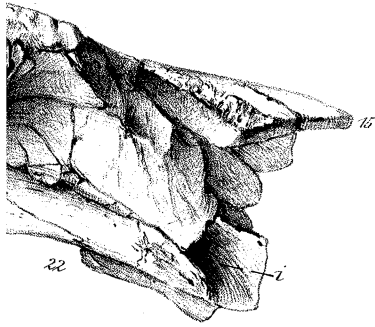


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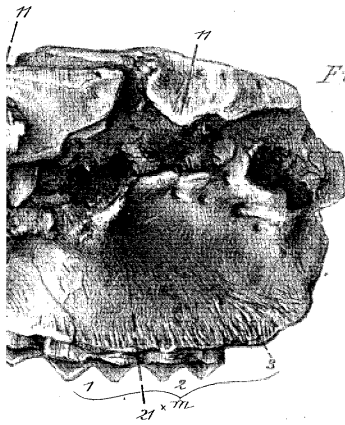
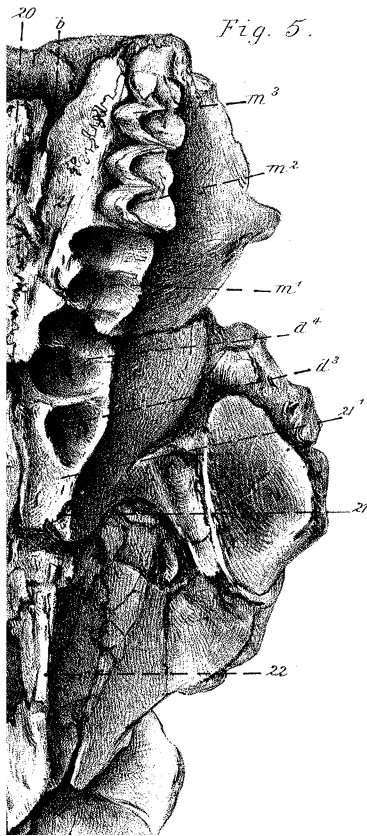


Fig. 5.



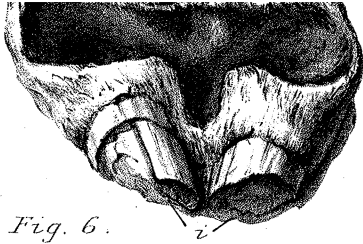
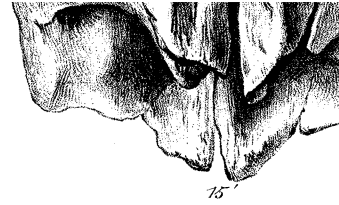
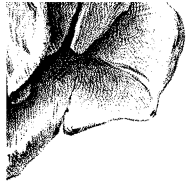


Fig. 6.

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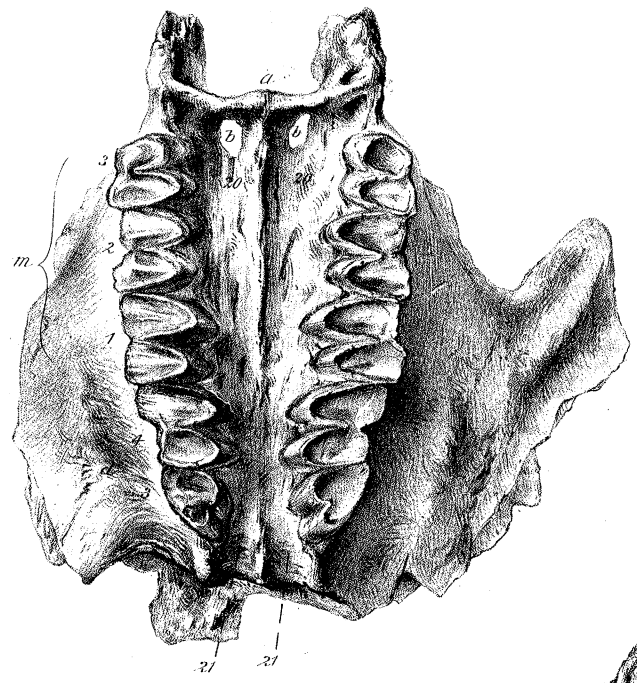


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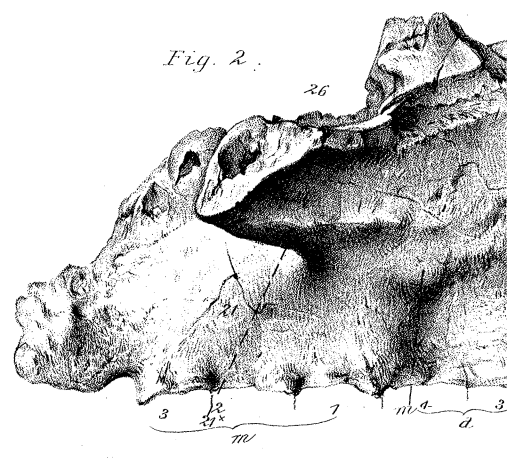


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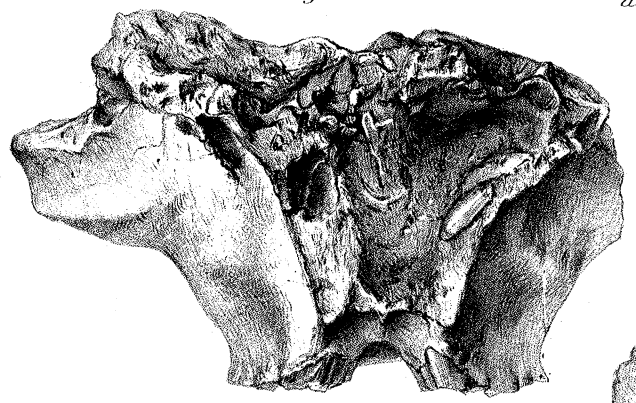


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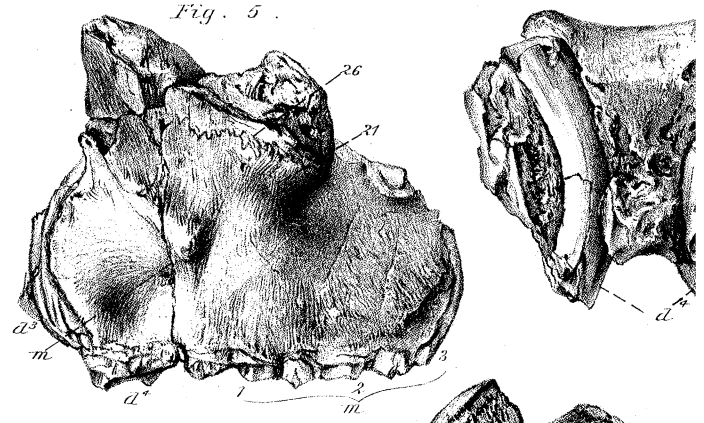


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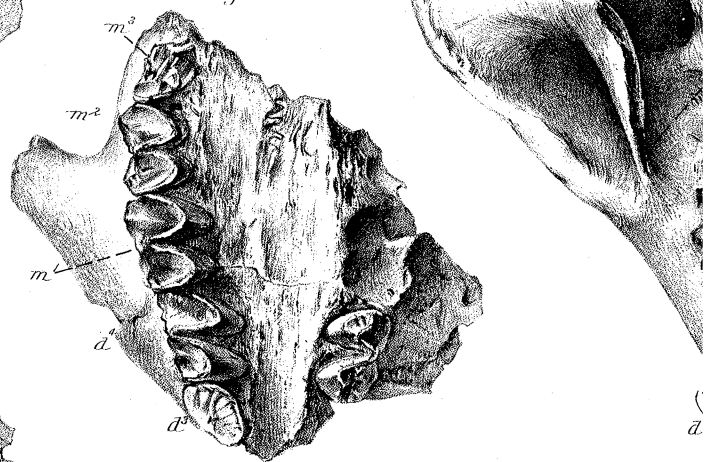
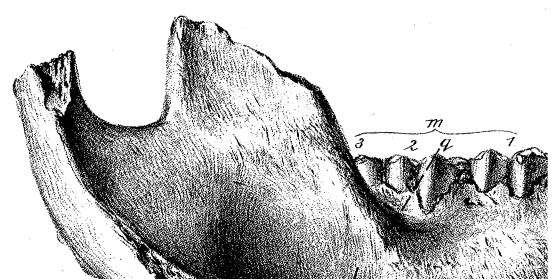
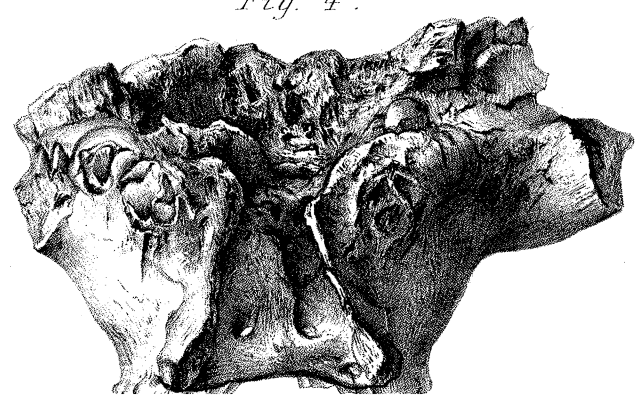


Fig. 4.



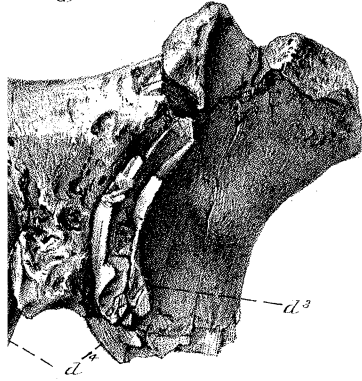


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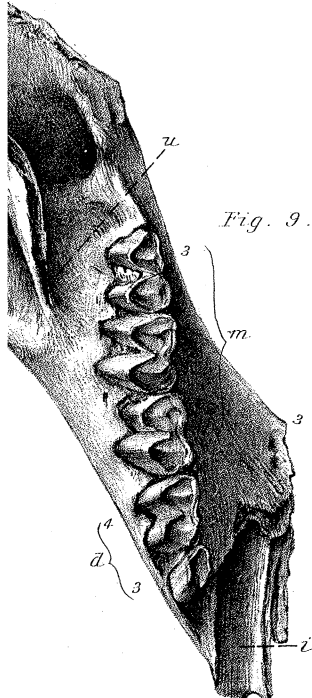
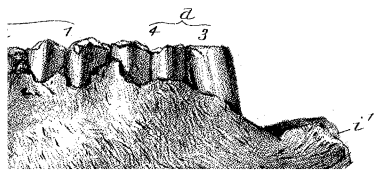
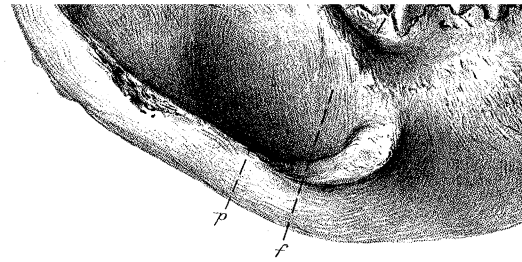
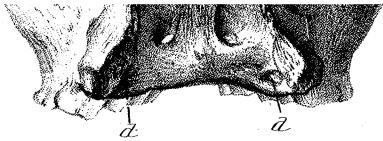


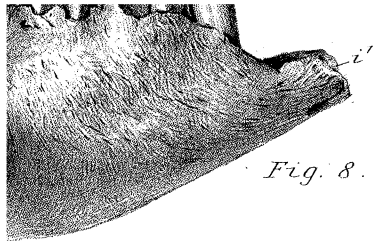
Fig. 9.





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Fig. 1.

Fig. 6.

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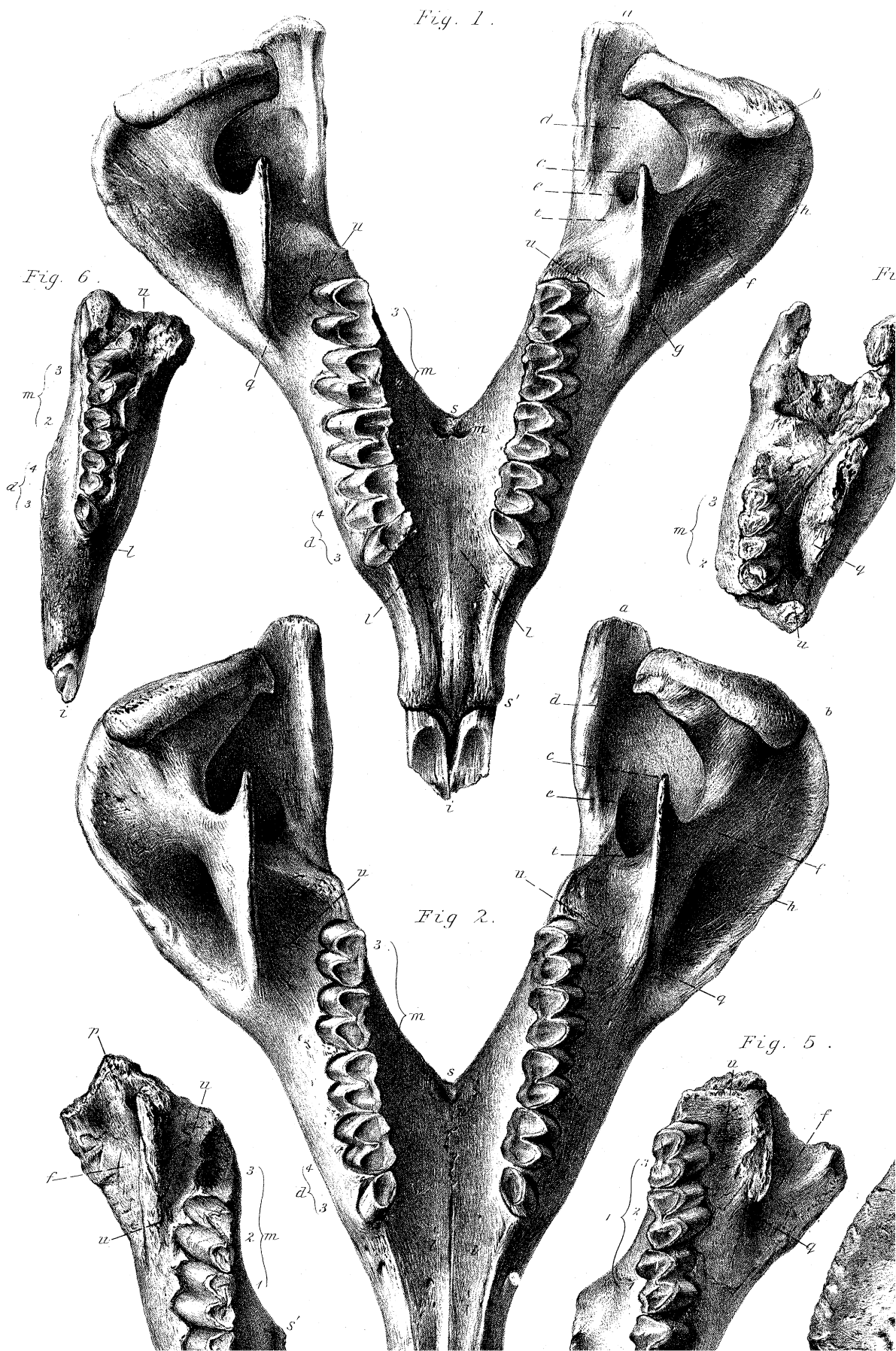


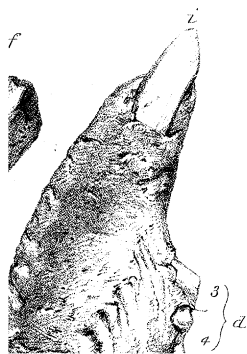
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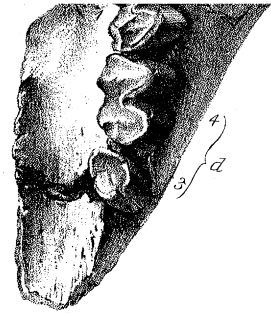
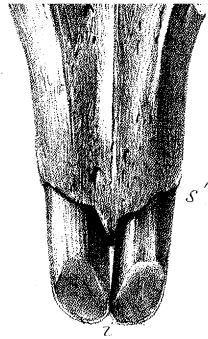
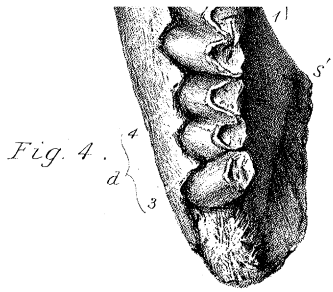


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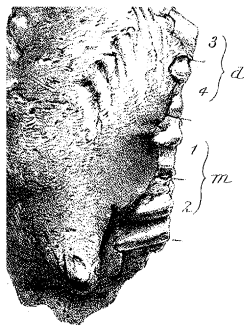
Fig. 7.





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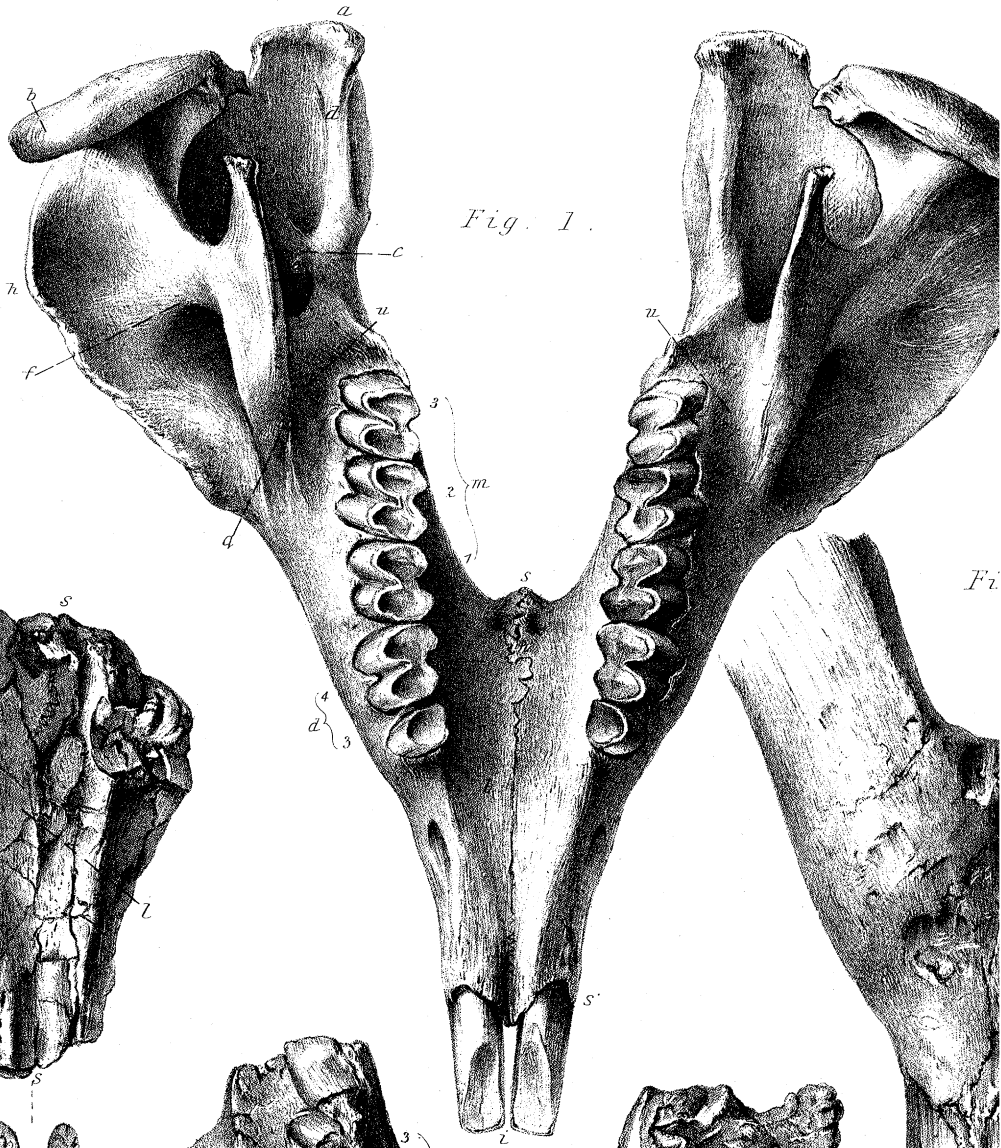


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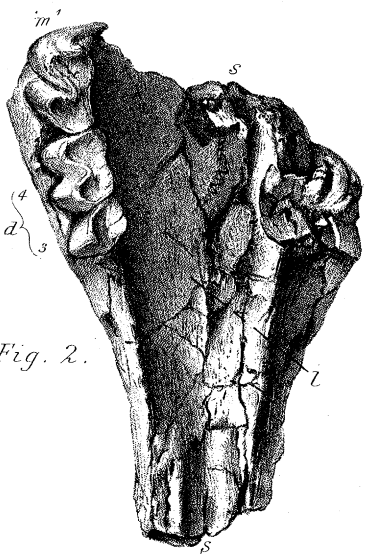


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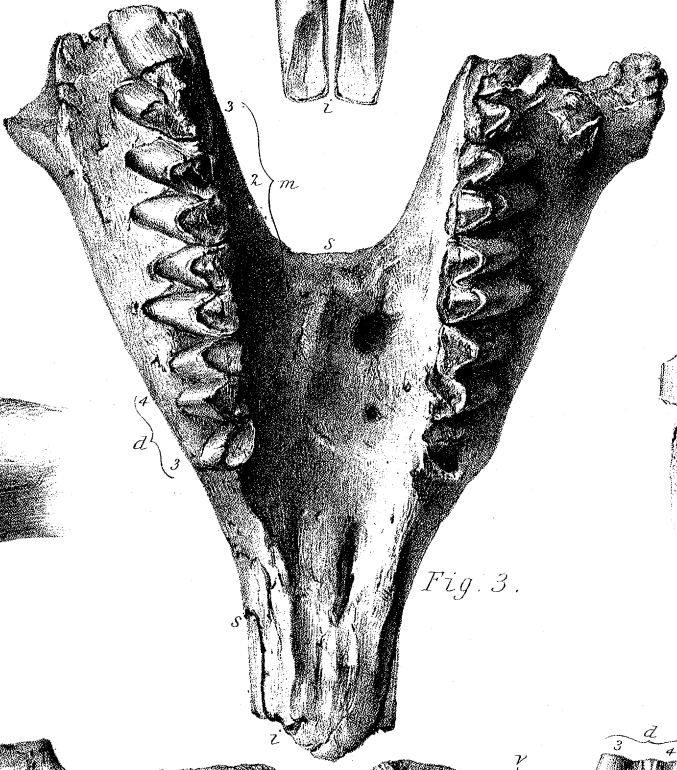


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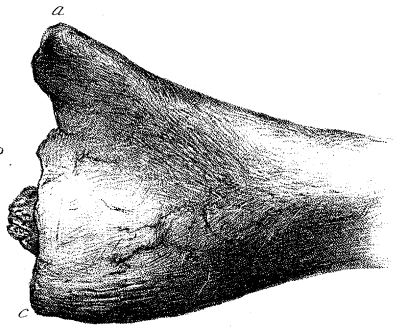


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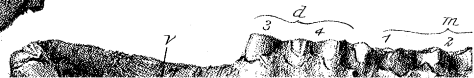
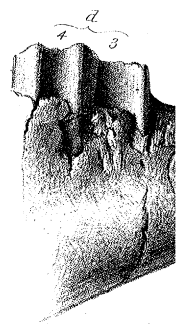




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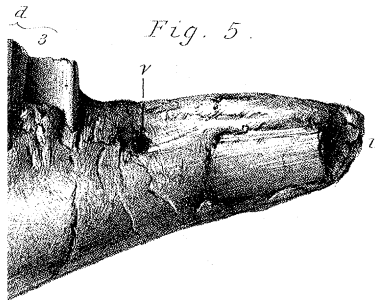


Fig. 5.



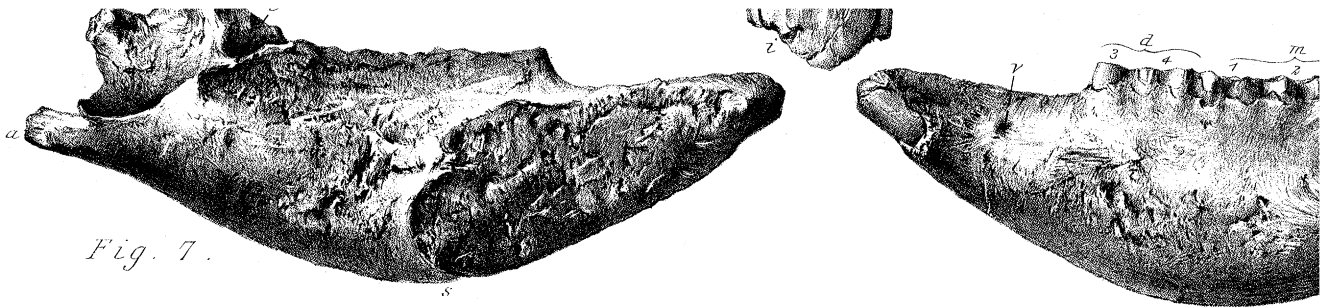


Fig. 7.

W. H. Wesley, ad. nat. Auto-Lith.

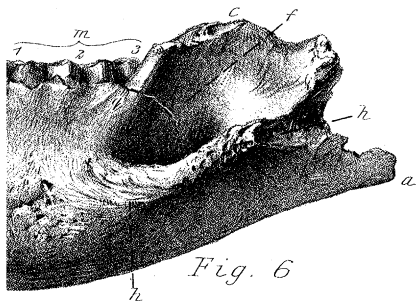


Fig. 6

Machure & Macdonald, Lith^{rs} London.

Fig. 5.

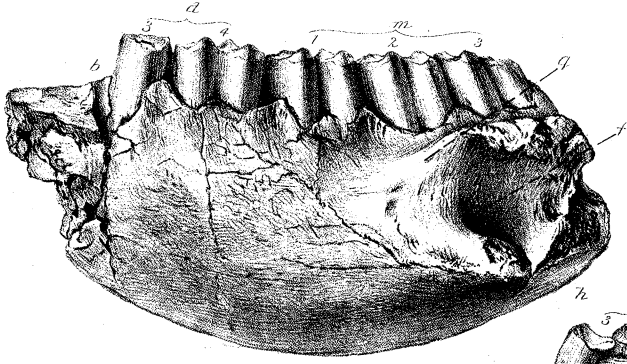


Fig. 1

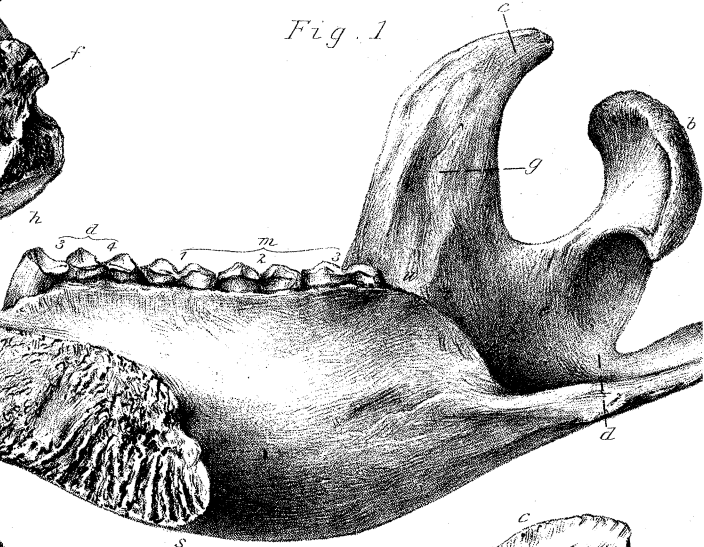


Fig. 4.

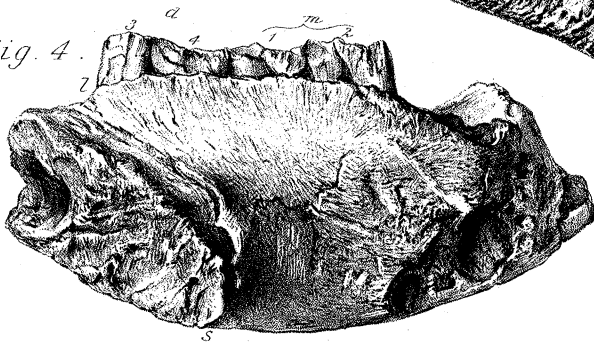


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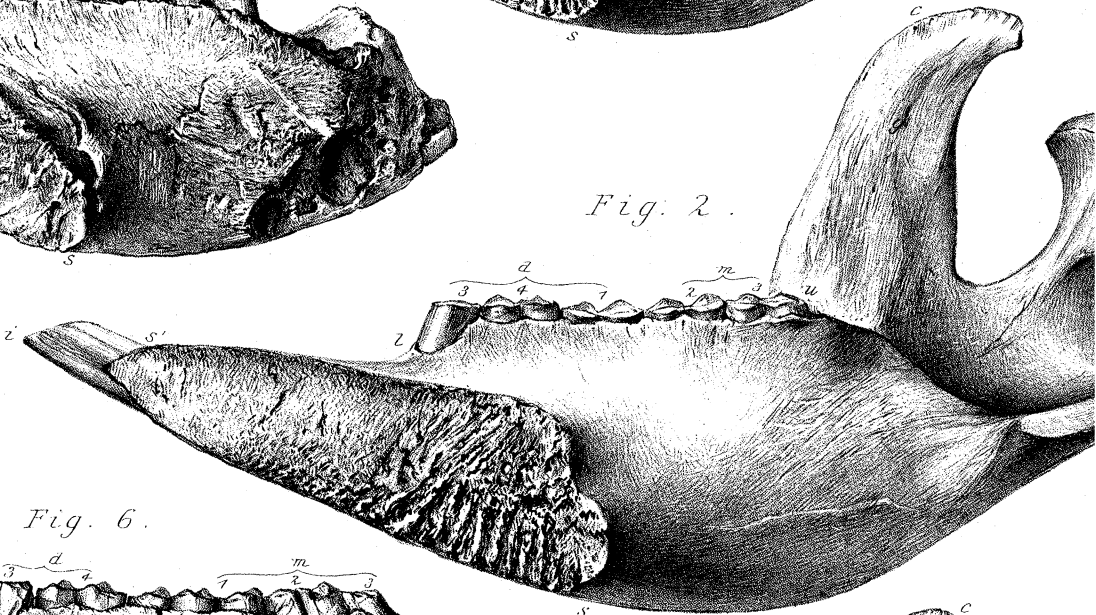


Fig. 6.

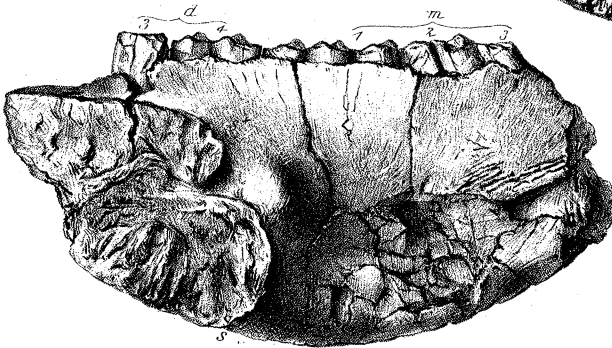


Fig. 3

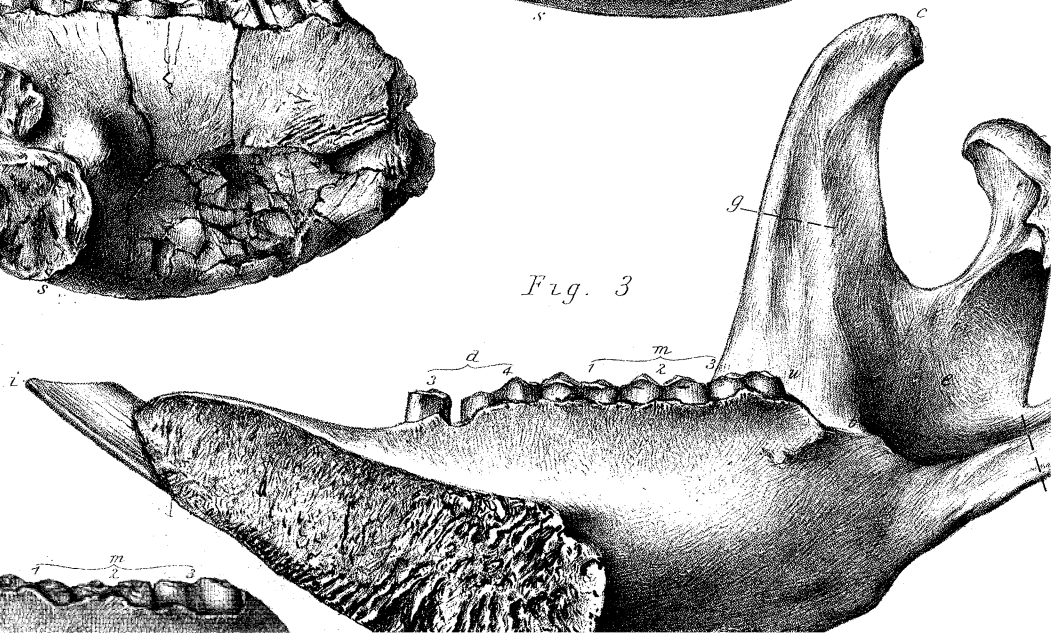
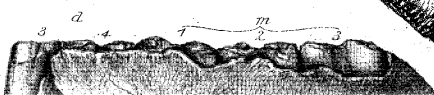
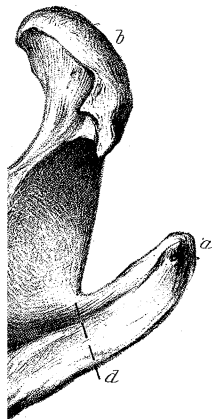
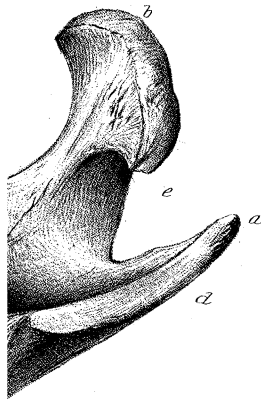
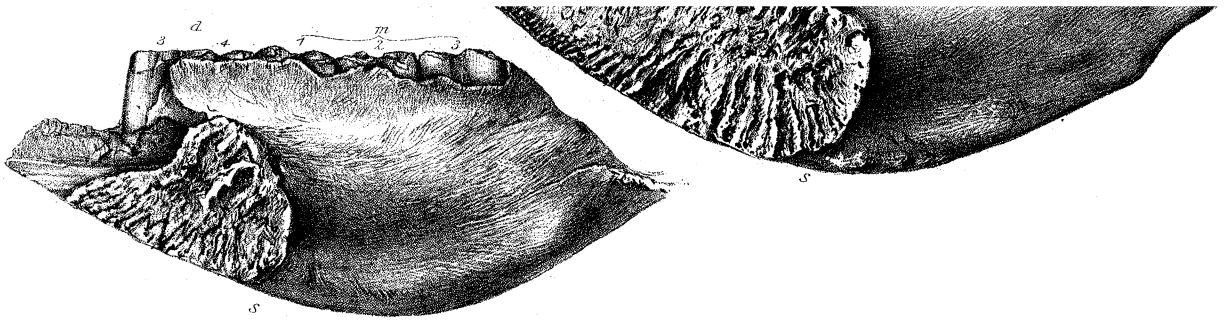


Fig. 7







» & Macdonald, Lith^{rs} London.

Fig. 1.

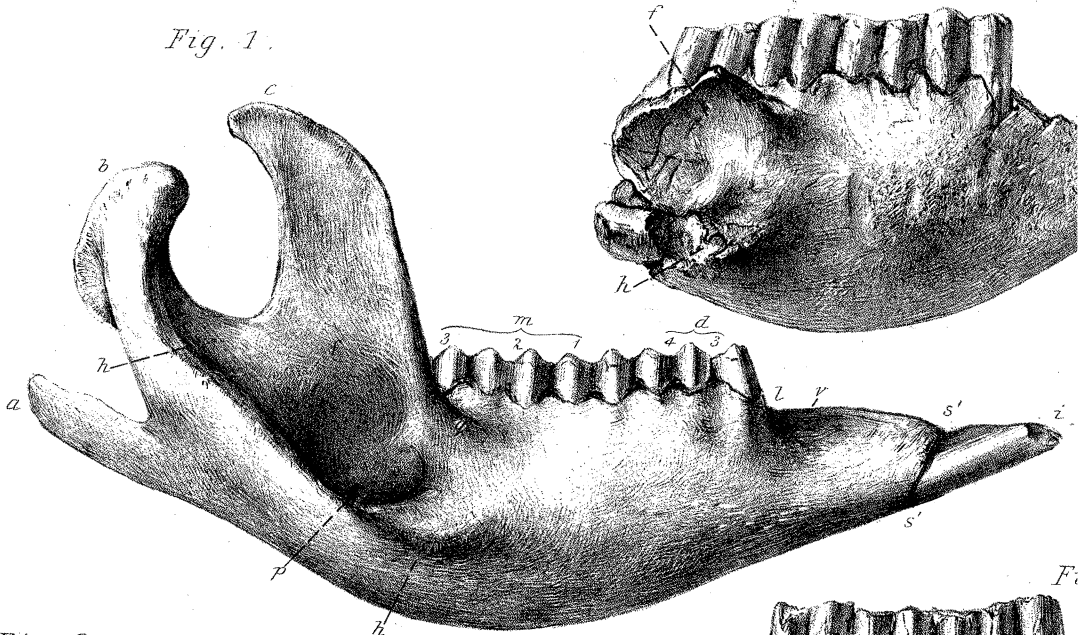


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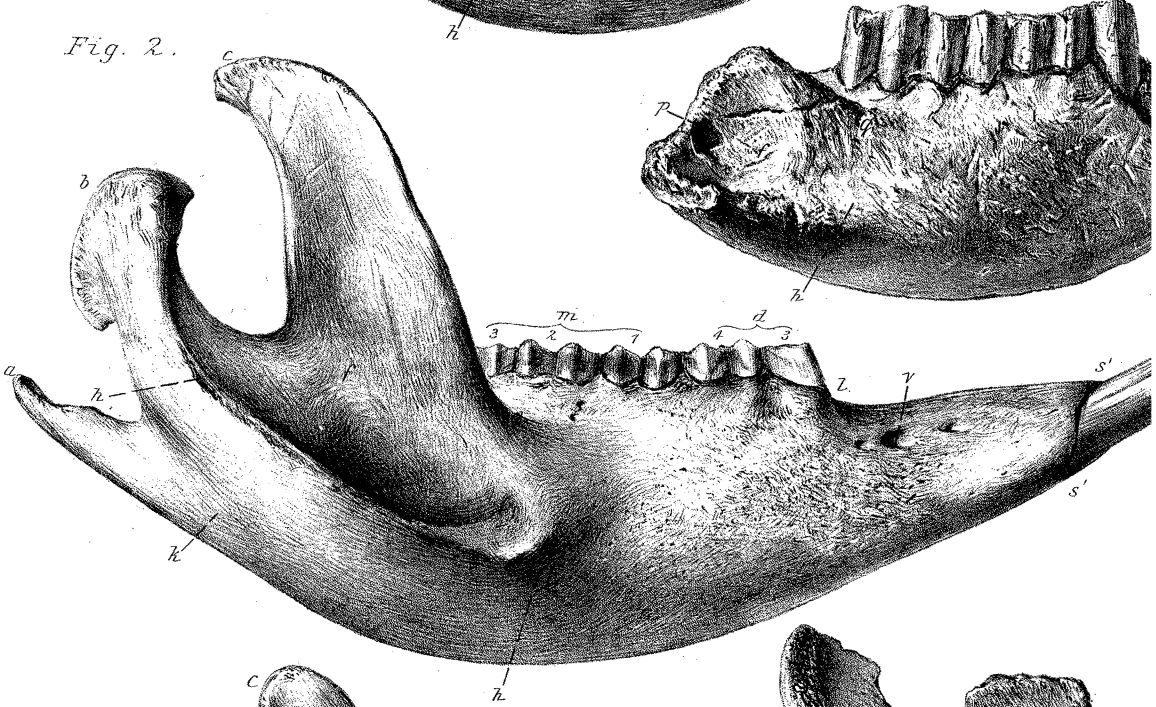
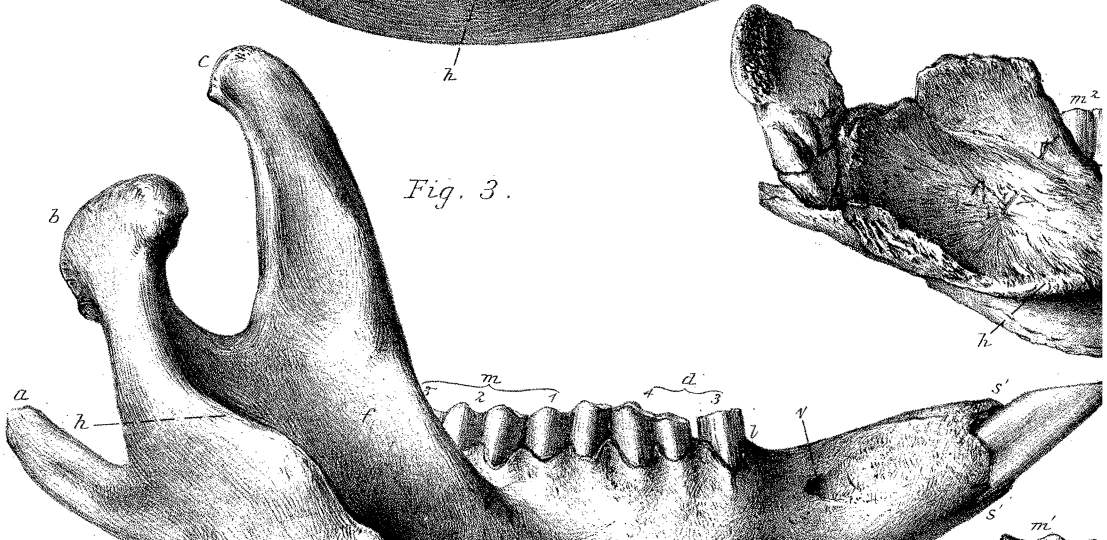


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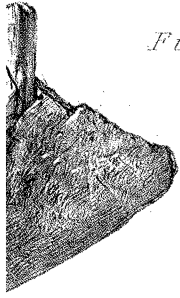


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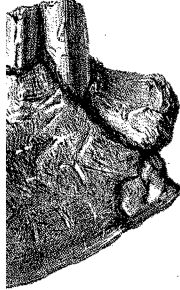


Fig. 4.

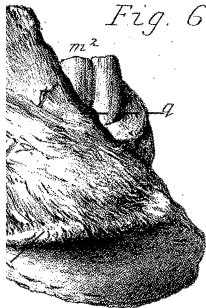
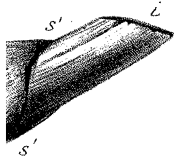


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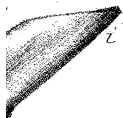
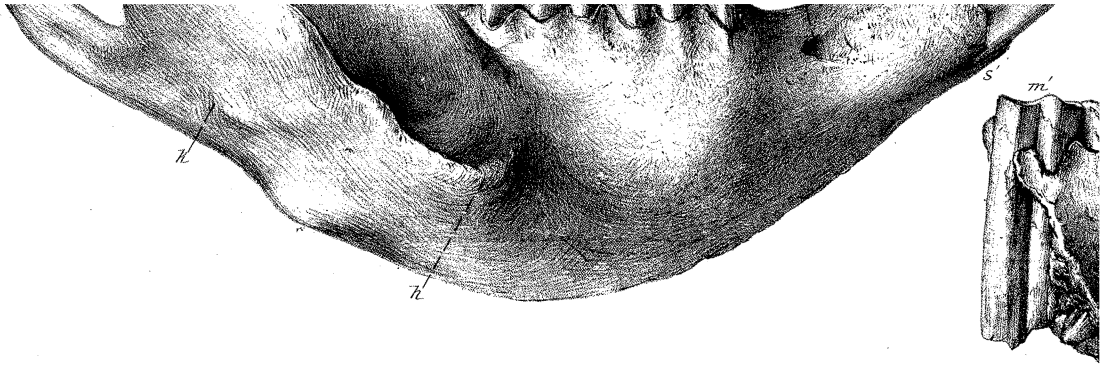


Fig. 7.



W. H. Wesley. ad. nat. Auto. Lith.

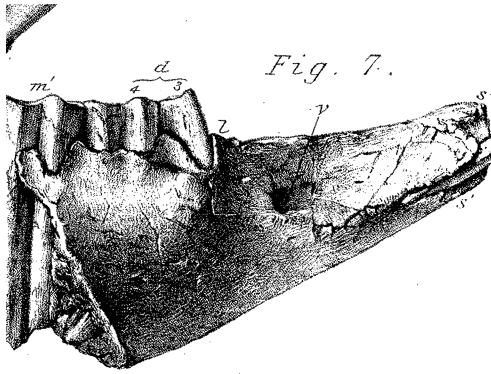
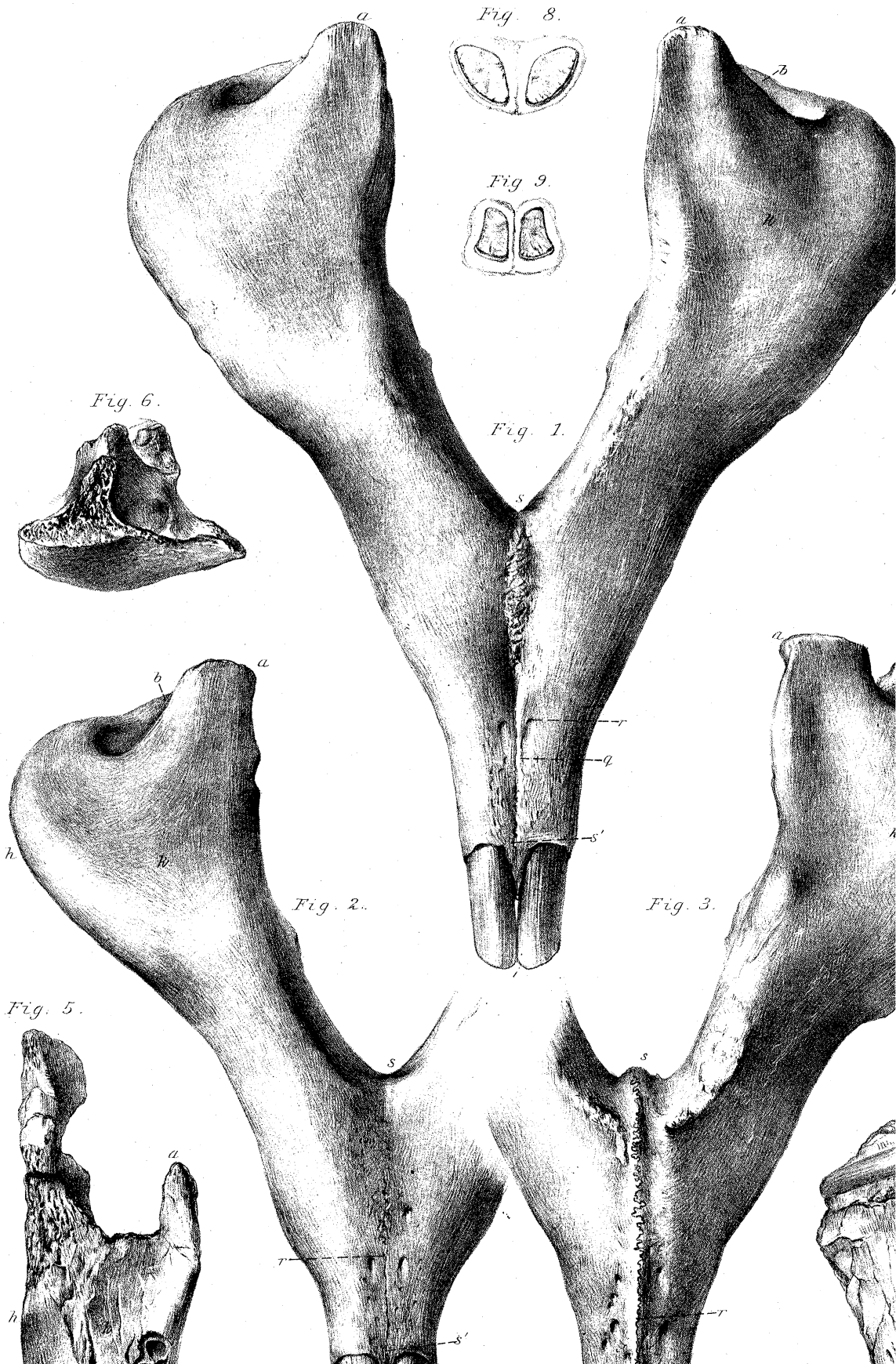


Fig. 7.



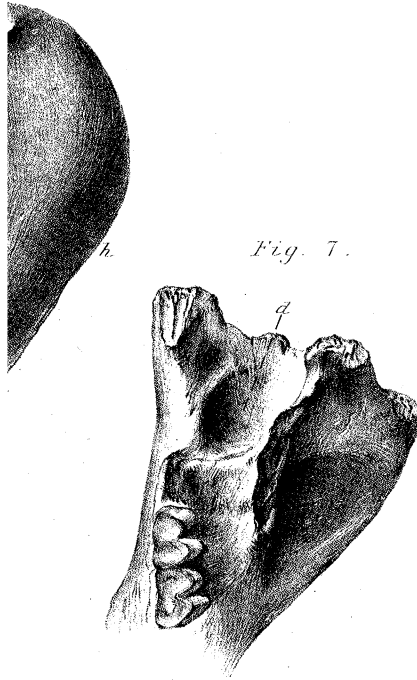


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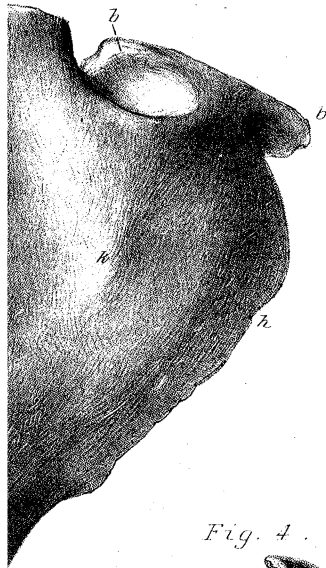
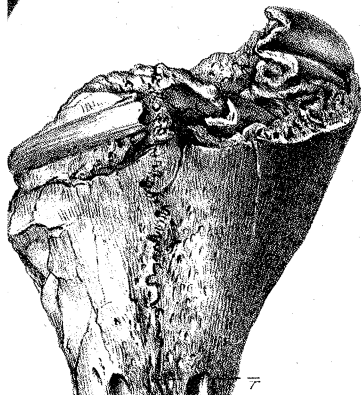
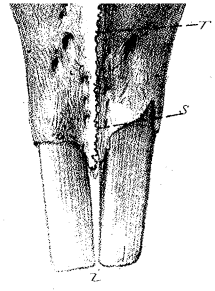
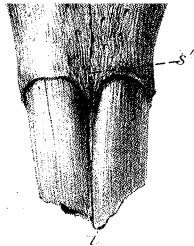
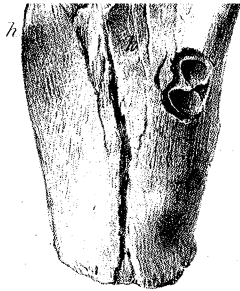
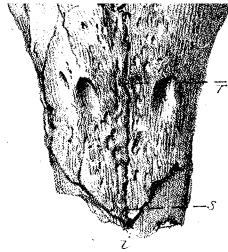


Fig. 4.





W. H. Wesley. ad. nat. Auto. Lith.



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Fig. 1.

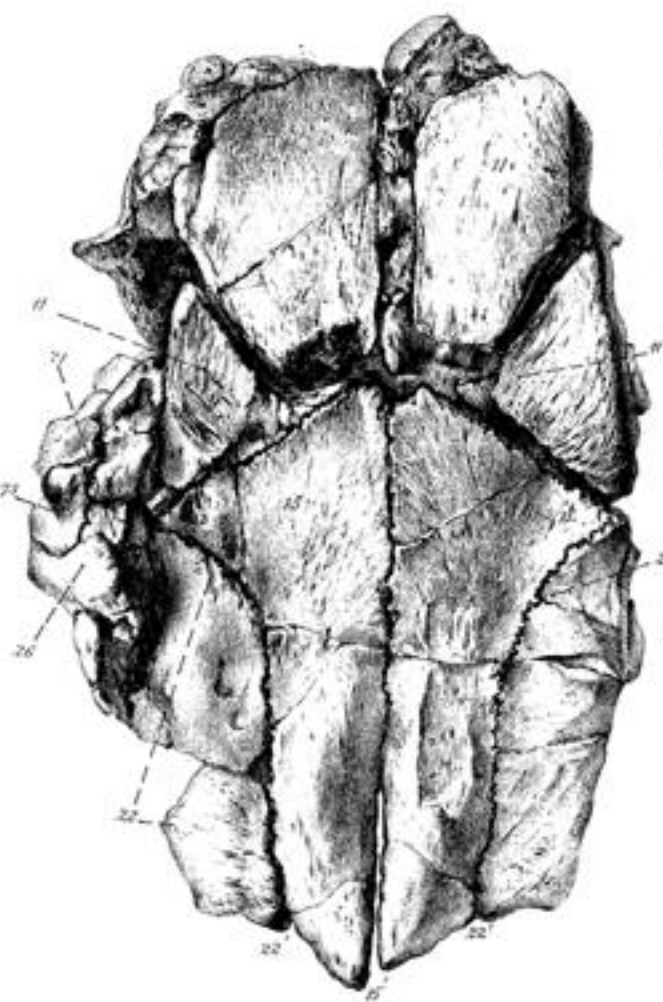


Fig. 3.

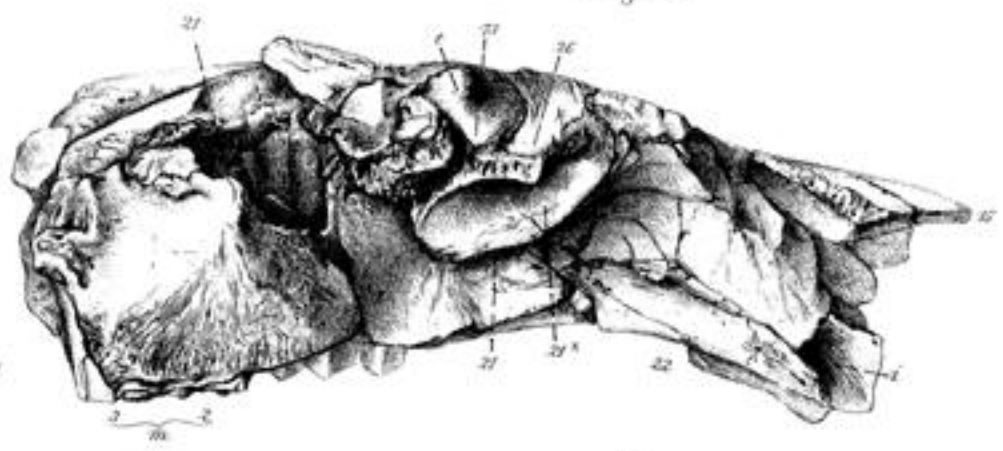


Fig. 4.

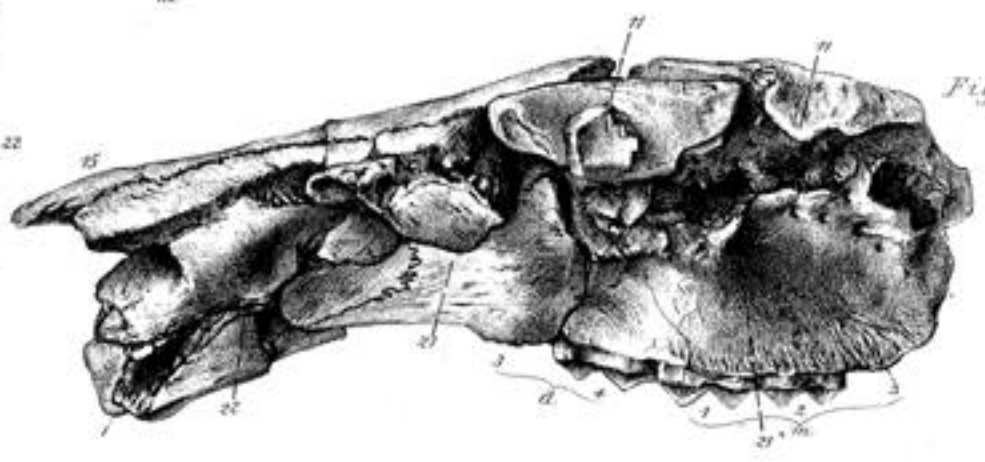


Fig. 2.

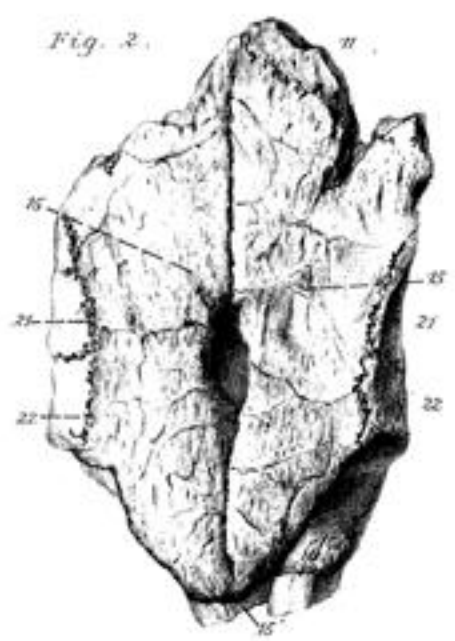


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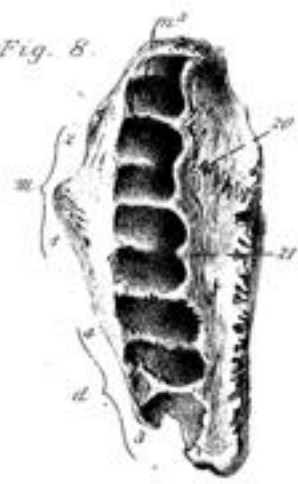


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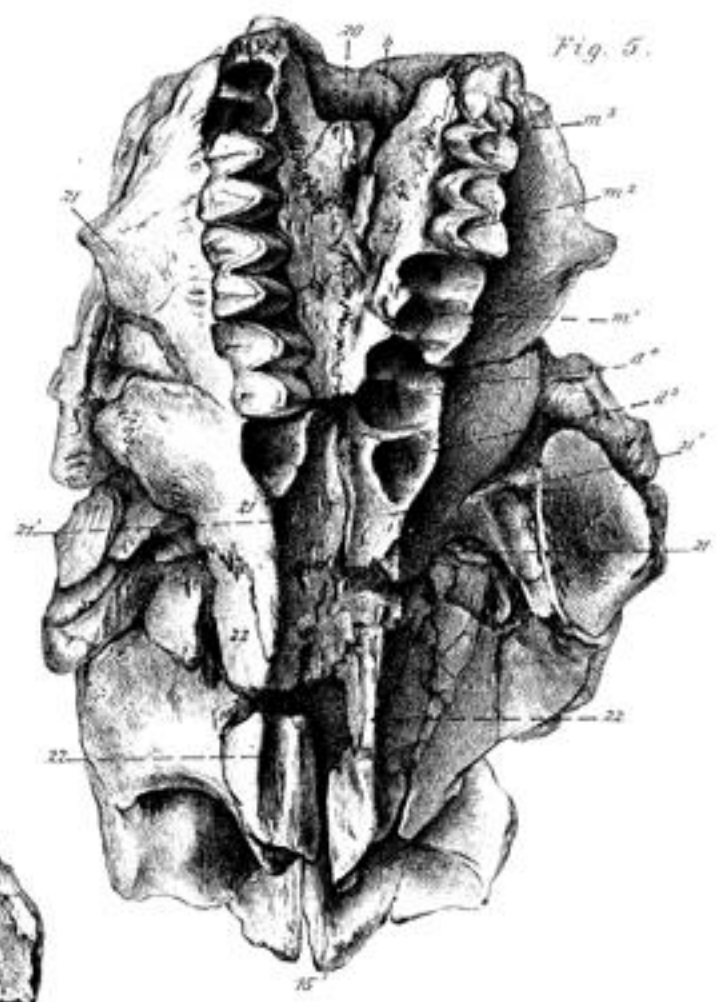


Fig. 7.



Fig. 6.



Fig. 1.



Fig. 2.

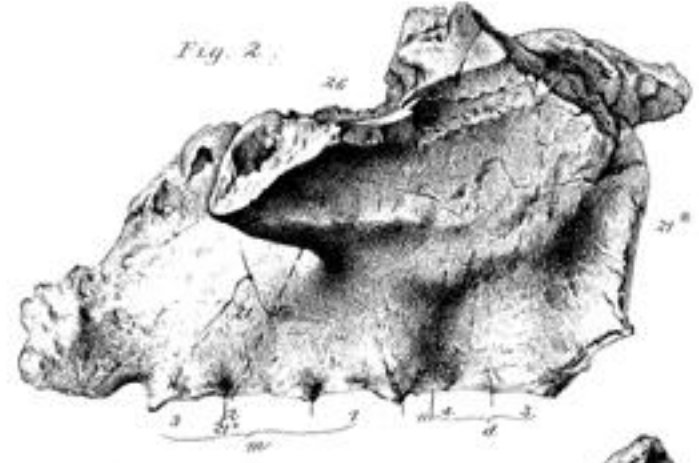


Fig. 5.



Fig. 6.



Fig. 3.



Fig. 7.



Fig. 9.



Fig. 4.

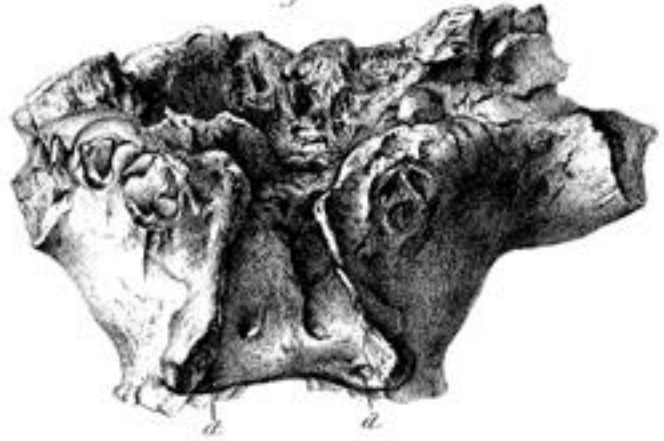
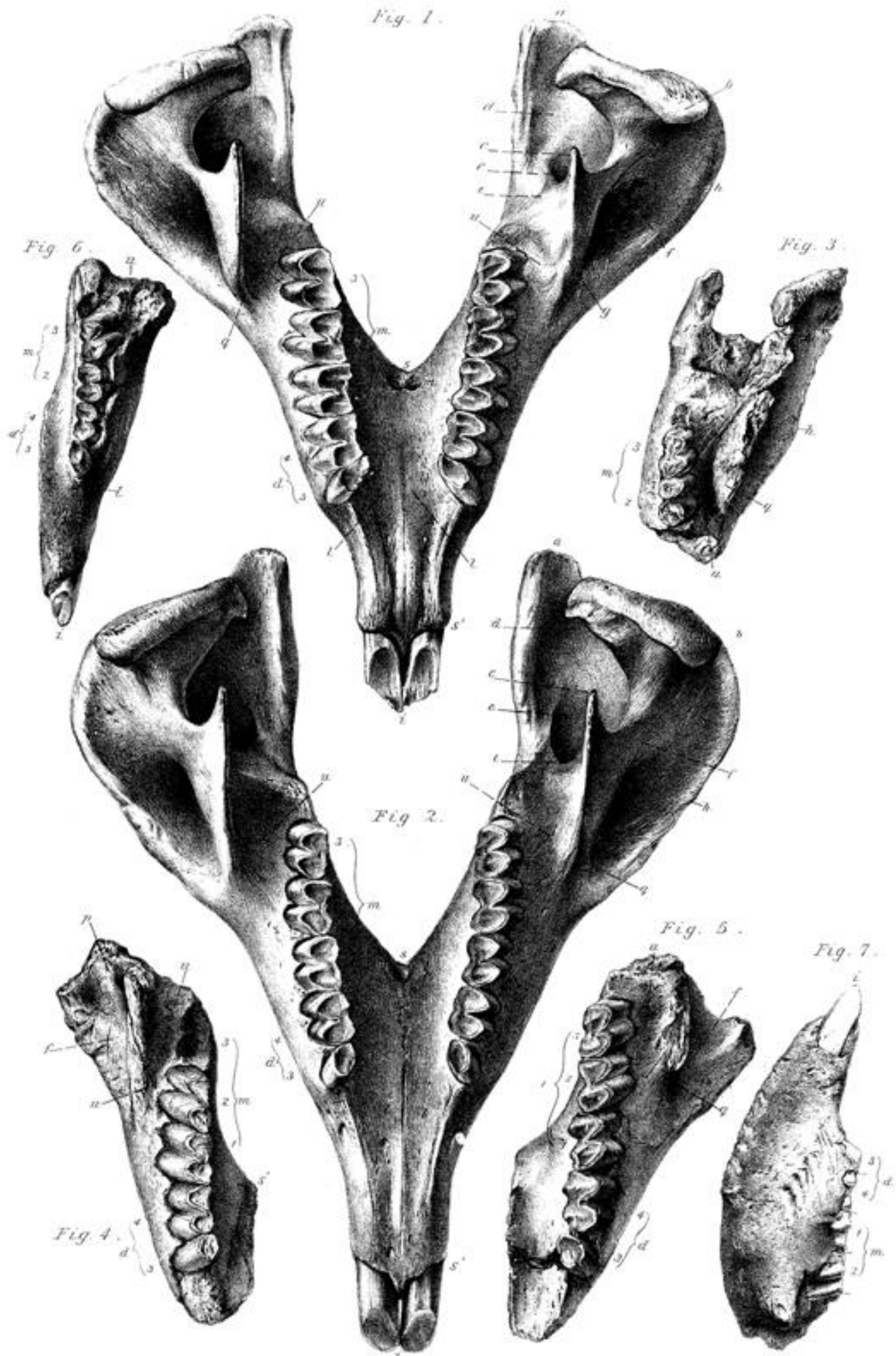


Fig. 8.





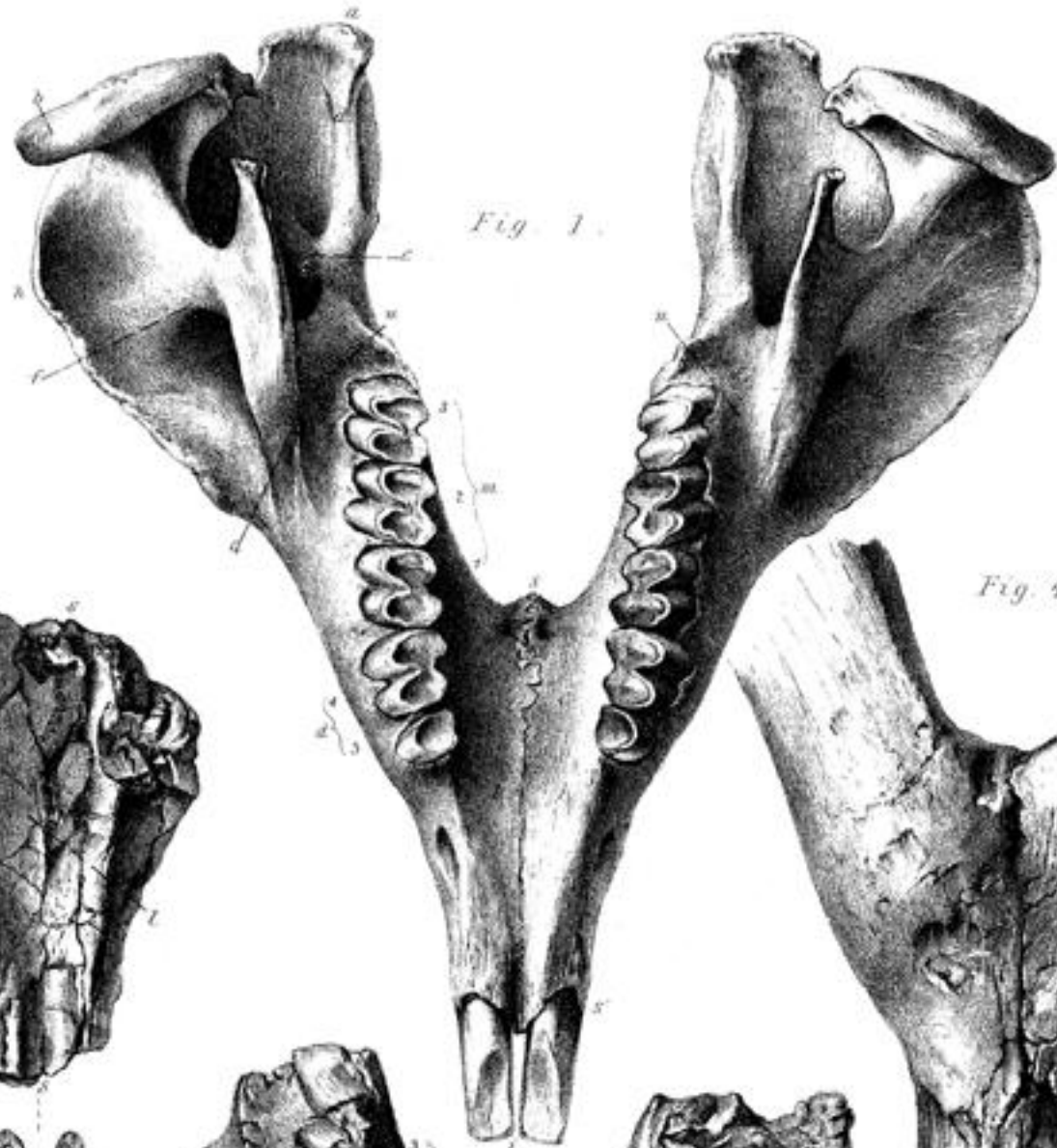


Fig. 1.



Fig. 2.



Fig. 4.

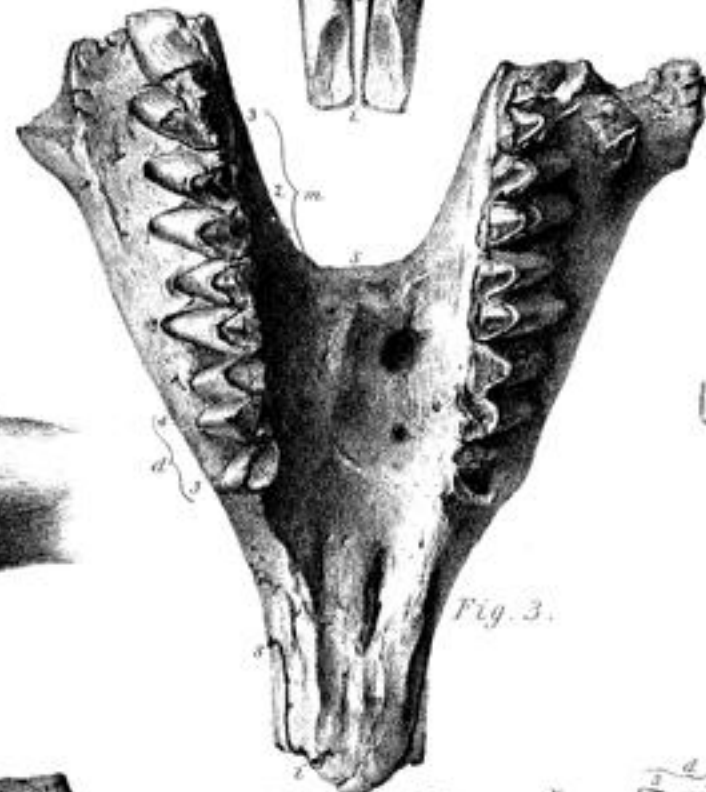


Fig. 3.

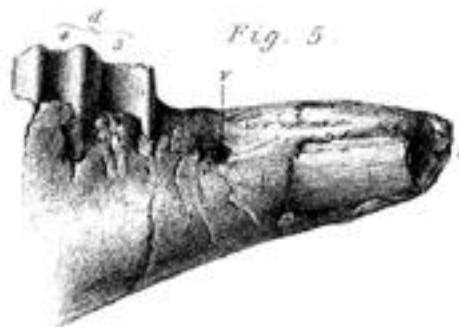


Fig. 5.

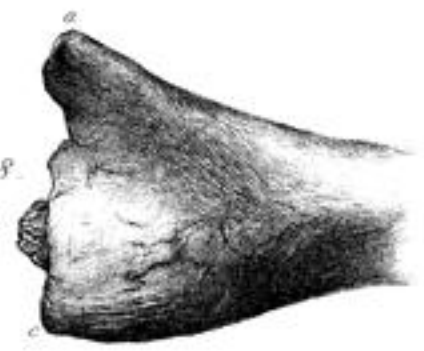


Fig. 8.



Fig. 7.

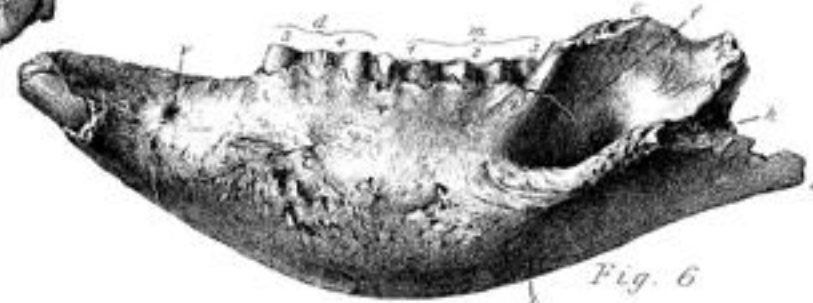


Fig. 6.

Fig. 5.

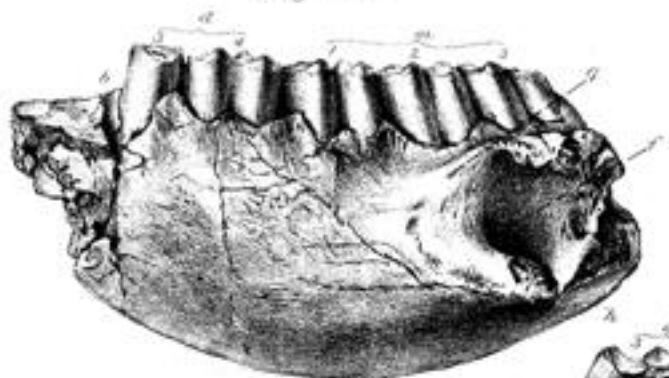


Fig. 1.

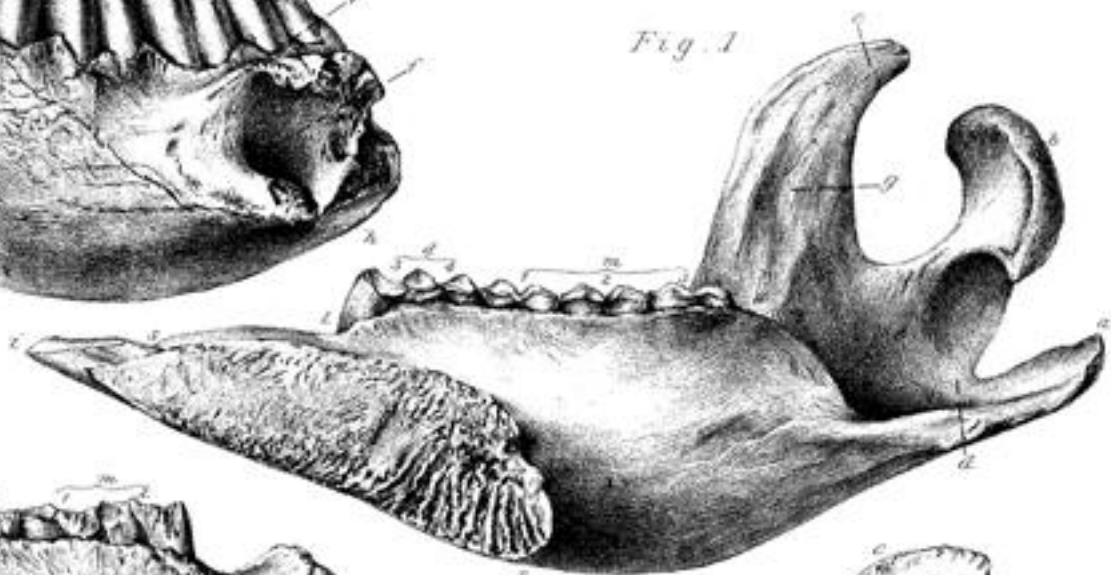


Fig. 4.



Fig. 2.

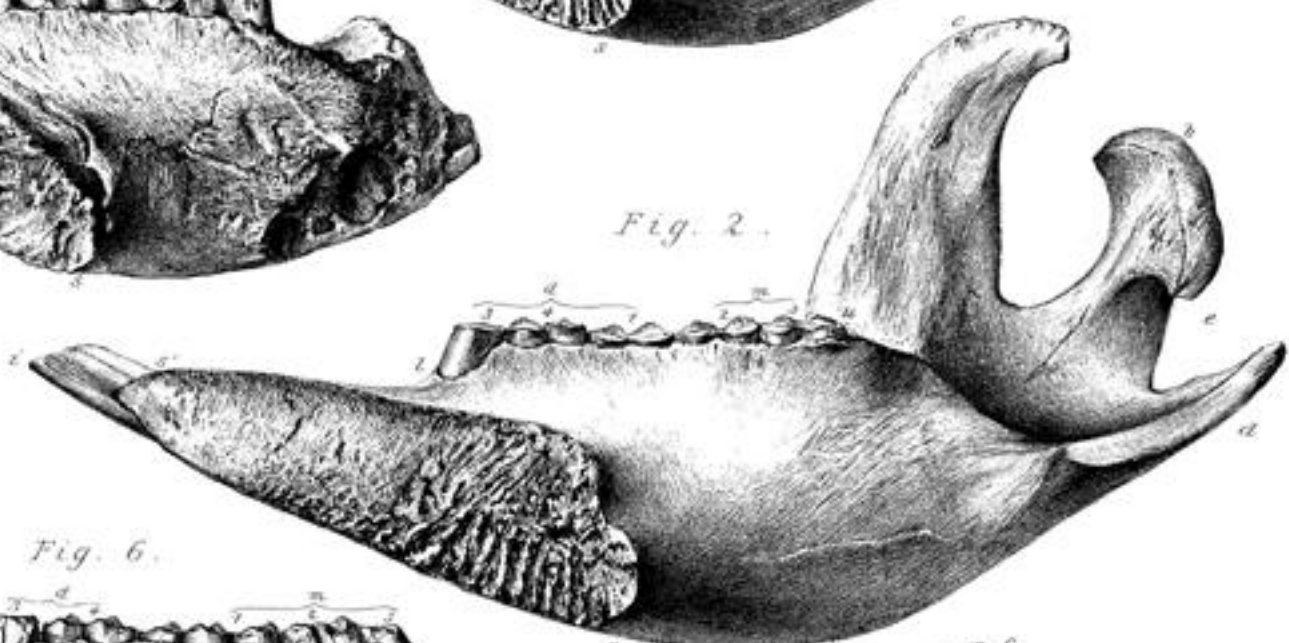


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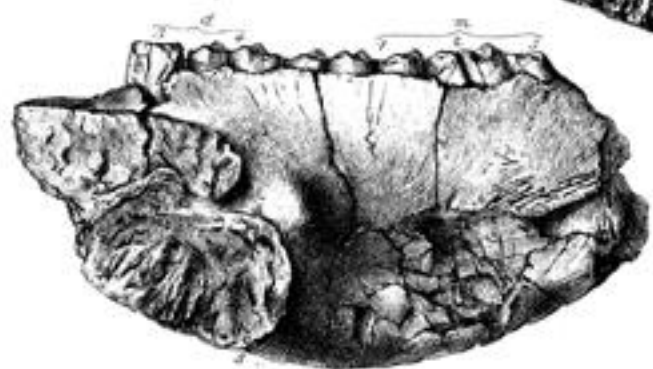


Fig. 3.

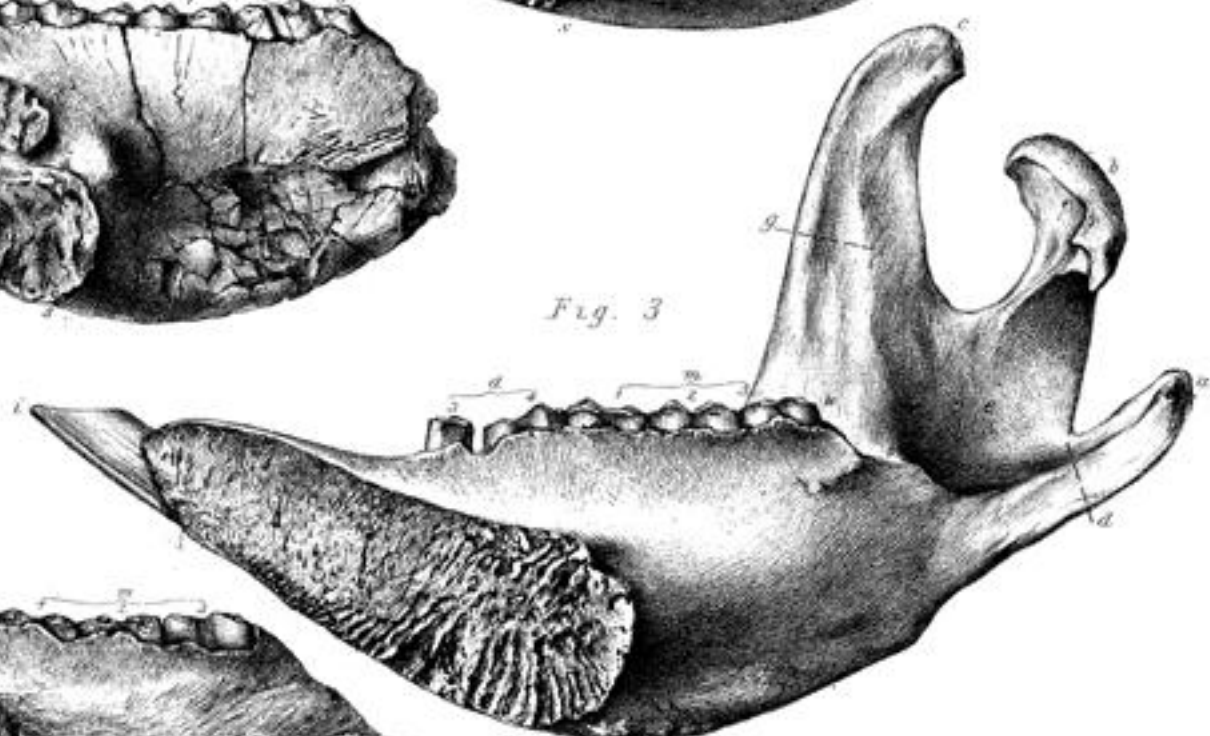


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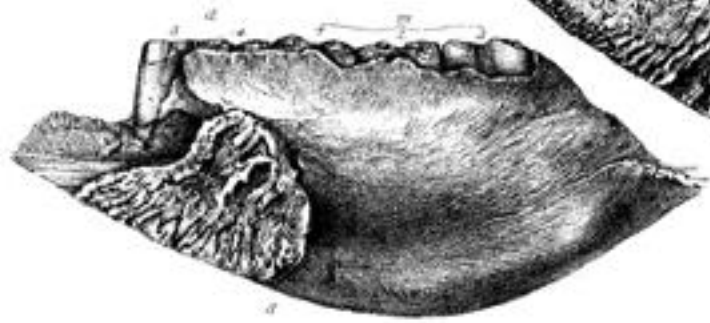


Fig. 1.



Fig. 5.



Fig. 2.

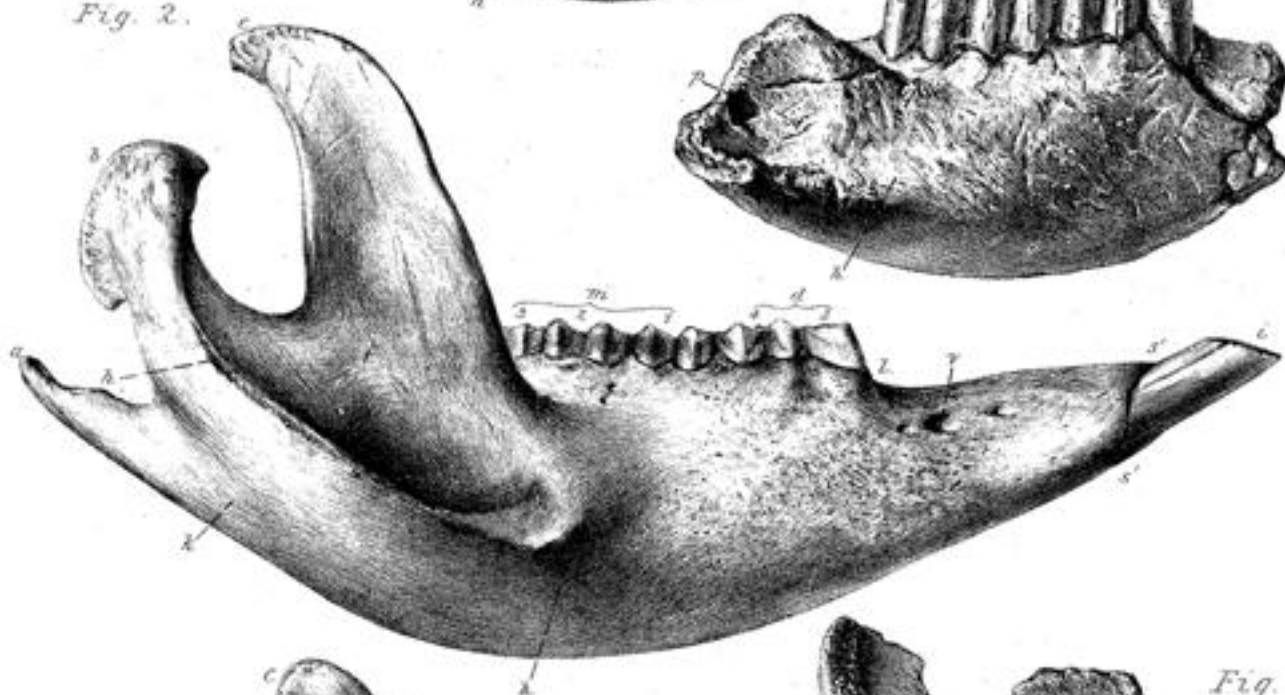


Fig. 4.



Fig. 3.

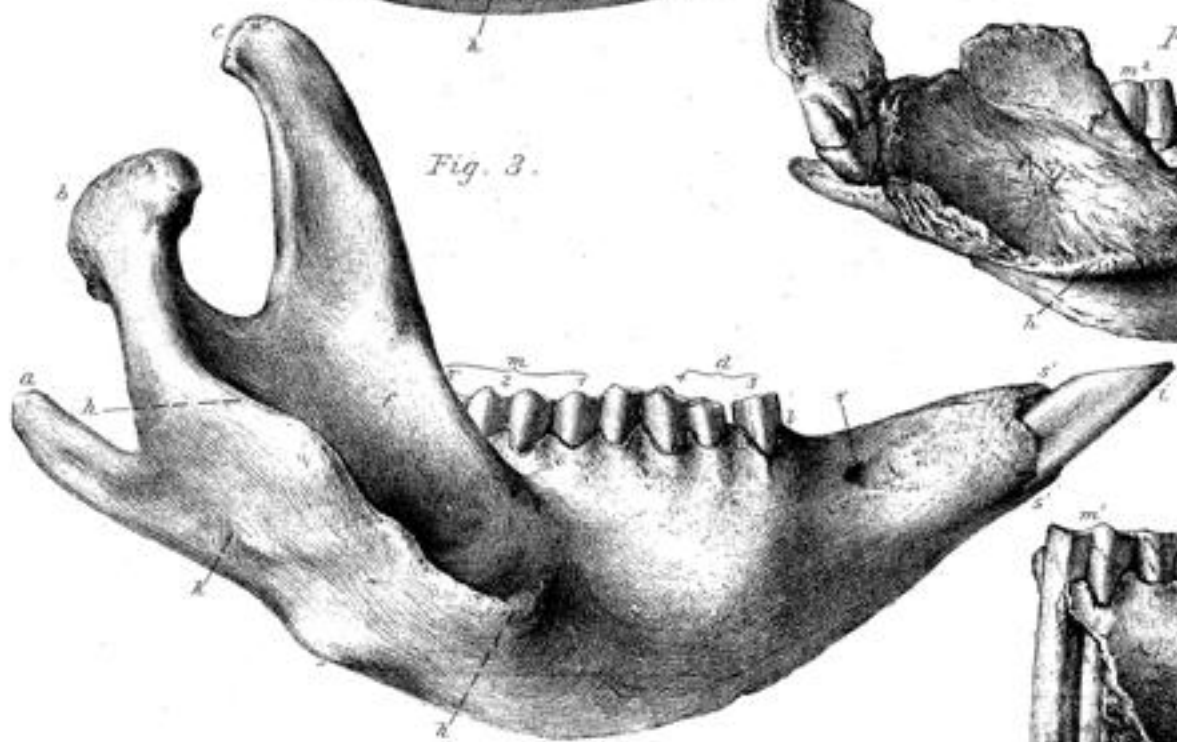


Fig. 6.

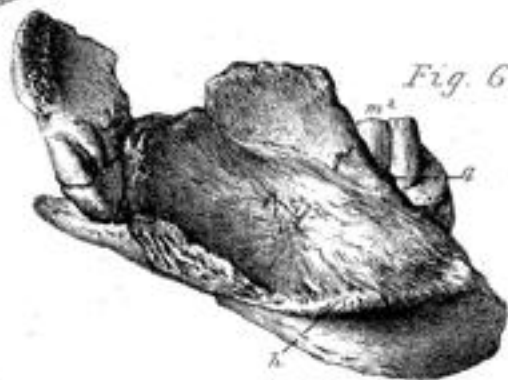


Fig. 7.

