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§ 1. Tichorine, leptorhine *and* megarhine species.

The remains of the fossil Rhinoceros are perhaps more widely spread throughout Europe and Asia than those of any other fossil quadruped, except the Mammoth. From the shores of Siberia in latitude 72°* southwards, as far as the Sivalik Hills,† they are found in greater or less abundance: from east to west the genus ranges from the banks of the Lena to the Straits of Gibraltar. Its range also in time is very extended—from the Miocene as far down as the later division of the Pleistocene, when the low-level gravels and brick-earths were being deposited in Britain.

Passing over the numerous continental and confining ourselves to the British Pleistocene species of the bone-caverns and river-deposits, we find evidence of the presence of three distinct

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* Probably also in the higher northern latitudes of the islands of New Siberia, and the Lächow group, the remains of the tichorhine rhinoceros are to be found in the vast accumulation of organic remains, of which—as the energetic Russian explorer Sannikow writes—the *whole soil* of the first of the Lächow Islands appears to consist. The occurrence of large quantities of the bones and skulls of oxen, buffaloes, horses, and sheep, associated with the Mammoth on the hills of the interior of New Siberia (lat. 75-6,) led him to infer that at the time when the island supported such vast herds of these animals, the climate must have been much milder than at present, when the icy wilderness produces nothing that could afford them nourishment.—See Wrangel's Siberia and Polar Sea, 1840. Edit. Major Sabine, Introduction.

† Falconer and Cautley's Fauna Antiqua Sivalensis.

species in Britain. The first of these, and the most common, is the *Rhinoceros tichorhinus* of Cuvier, described by Pallas in the year 1768,* determined by Cuvier in 1812,† and still more accurately by de Christol in 1835,‡ ranges through France, Germany, and Russia, along with the Mammoth from the Pyrenees to the high northern latitudes of Asia. Brandt in the year 1849 published an exhaustive account of this species, in the St. Petersburgh§ Transactions, having at his command the vast collections made by the Russian Government. In a previous number of this Review,|| its dentition has been defined after Brandt's method. The tichorhine species has indeed a literature of its own, more complete perhaps than that of any other fossil mammal.

The second species—the *leptorhine*—on the other hand, is involved in the greatest confusion, arising from the fact that the *leptorhine* of Professor Owen,¶ is not the same as that of Baron Cuvier. Its history is very remarkable. Some time before the publication of the first edition of the "Ossemens Fossiles" in 1812, Baron Cuvier received the drawing of a head of Rhinoceros from the Val d'Arno, in which the osseous septum between the nares, so characteristic of the tichorhine species, was absent. The proportions also of the skull, and the form of the lower jaws from the same deposit, and the slenderness of the bones, led him to found a new species which he named from the supposed absence of the septum, *R. leptorhinus*,** or "*Rhinocéros a narines non cloissonées.*" In 1835, M. de Christol, on the examination of careful drawings of the same skull, came to the conclusion that it belonged to the tichorhine species, and accounted for the absence of the bony septum by the supposition that it had been removed by violence. The drawings sent by Professor Cortesi to Cuvier, he proved to have been incorrect.†† The bones of Rhinoceros found in the same deposit, he ascribed to his species *R. megarhinus*. Whether or no the skull in question belongs to *R. tichorhinus* or *R. megarhinus*, or to *R. Etruscus* of Dr. Falconer, I have no opportunity of judging: but M. de Christol has satisfactorily proved that it is not

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* Nov. Comment. Acad. Petropol. Tom. xiii. p. 436.

† Oss. Foss. Tom. ii. Art. Rhinoceros.

‡ Annales de Sc. Nat. 1835.

§ Mem. Acad. St. Petersb. 6 Series, Tom. vii.

|| 1863, p. 552.

¶ British Fossil Mammals. 8vo. 356-382.

** Op. cit. p. 110.

†† Oss. Foss. III. edit. 1825. Tom. ii. p. 71.

what Cuvier supposed it to be, when from his imperfect drawings he made it the type of *R. leptorhinus*.* Desmarest† proposed the name of *R. Cuvieri* for the same skull, and Fischer‡ defined it specifically as "capite bicorni, dentibus primoribus nullis, septo narium nullo; naribus multo gracilioribus, ossibus-que nasalibus tenuioribus quam in *R. Africano*." In this confusion the remains of the non-tichorhine Pleistocene rhinoceros were left until the year 1846, when Professor Owen, after a comparison of the lower jaw, found with skull, teeth and bones at Clacton in Essex, and now in our National Collection, with the lower jaws from the Val d'Arno ascribed by Cuvier to *R. leptorhinus*, came to the conclusion that they belonged to one and the same species. In the British Fossil Mammals, figs. 131 and 138, he gives portions of the skull that exhibit not the total absence of the septum that Cuvier considered characteristic, but its partial development only. Whether the lower jaws from Italy, by which Professor Owen connects his species with that of the great anatomist, belong to the leptorhine as defined by the latter or not, may be an open question. But it is beyond all doubt that the assemblage of remains of Rhinoceros from Clacton belongs to some one species of rhinoceros that is not tichorhine. For that assemblage the name *leptorhinus*, which has stood in the catalogues for eighteen years, has a claim to be maintained: for, though Cuvier's definition of the species as *à narines non cloisonnées* be inapplicable, and the more accurate term would be *à narines demi-cloisonnées* (*R. hemitœchus* of Dr. Falconer), yet, as Professor Owen justly remarks, "since the nasal bones, notwithstanding their partial osseous supporting wall are actually more slender than those of *R. tichorhinus* there can be no valid objection to the Latin 'nomen triviale' *leptorhinus*, and every reason for retaining it." *R. leptorhinus* then, as defined by Professor Owen in 1846, the equivalent of *R. hemitœchus* of Dr. Falconer, is the second Pleistocene species found in Britain. It occurs in the brick-earths and gravel-pits of 'the lower terrace' of the Thames Valley at Clacton, Ilford, Crayford, and Peckham. It is the species that fell a prey to the hyenas of Kirkdale and Wookey Hole, and its teeth have been found in the ossiferous caverns of

* An upper molar tooth of Rhinoceros from the Val d'Arno belongs neither to the tichorhine, leptorhine, nor megarhine species, and possibly may belong to the same species as the skull in question from the same deposit.

† Mamm. 402, 632.

‡ Synopsis Mammalium, p. 416. 8vo. Stutgardtiæ, 1829.

Pembrokeshire, and Durdham Down near Clifton. I have identified the remains from Kirkdale, and the caves of Pembrokeshire in the Bucklandian Collection at Oxford. Those from Durdham Down associated with *Ursus spelæus*, *Hippopotamus major*, and *Elephas antiquus*, are preserved in the Bristol Museum. Both upper and lower jaws, associated with *Hippopotamus major*, have been obtained from the river deposits at Lexden, near Colchester. A comparison of the leptorhine with the tichorhine bones proves the former to have been a smaller and more slender animal.

Closely allied to the *R. leptorhinus* of Professor Owen in many points, but differing materially in its larger size, and the enormous development of its nasals, is the third species named by M. de Christol from its latter characteristic, *R. megarhinus*.* In his type specimen, from Montpellier, the bony septum is absent. He enumerates five points of difference between the upper molars of the megarhine and the tichorhine species.† "1. Ces molaires (megarhine) n'ont habituelment que deux fossettes sur la couronne. 2. Le crochet de leur colline postérieure ne se joint jamais à l'anterieure. 3. Ce crochet est bifurqué ou trifurqué dans les molaires de remplacement, et simple dans les arriere molaires. 4. Un crête verticale part l'angle de la couronne et se dirige vers l'issue du vallon. 5. Un large bourrelet est appliqué contre le bord interne des molaires de remplacement." These characteristics apply with but slight modifications to the leptorhine teeth also; but as the latter was not properly defined as a species until the year 1846, M. de Christol, who wrote in 1835, cannot be blamed for not being cognisant of the existence of two species very closely allied in their dentition. The vast accumulation of materials for satisfactorily defining the species of fossil Rhinoceros in our great National Collection, and in many private museums, give the naturalist of the present day opportunities, such as Cuvier, Pallas, De Blainville, and De Christol never had. Out of it I have chosen the *milk* and *permanent* dentition of *R. megarhinus* for the subject of this essay, as being the most imperfectly known of the three Pleistocene species. In mapping out the various parts of the teeth I have followed the system of Professor

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* Recherches sur les caractères des grandes espèces de Rhinoceros fossiles, Ann. Sc. Nat. 2nd series, Zool. Tom 4, 1835, p. 42-112.

† Op. cit. p. 95.

Brandt with a few modifications, as in my first essay on the dentition of *R. tichorhinus.*

The detailed description of the teeth is based upon an examination of between 70 and 80 specimens.

So far as I can make out the synonomy of *R. megarhinus* and from figures and descriptions, it appears to be the equivalent of *R. Schleiermacheri** of Kaup, *R. Kirchbergensis*† of Jäger, and *R. incisivus* (in part) of Cuvier.‡ M. de Blainville confounds it with the leptorhine of Cuvier, and the equivocal species from the Val d'Arno.§

The teeth of *Rhinoceros megarhinus* have been obtained from three localities in the valley of the Thames, in which alone its remains occur in Britain. All the figured specimens were found at Grays Thurrock, and are preserved in the British Museum. In the cabinets of Dr. Spurrell and Mr. Grantham are some upper molars, from the south bank of the Thames, near Crayford, in Kent, while in the beautiful collection of Mammalia, from Ilford, made by Dr. Cotton, F.G.S., are two molar teeth. All the three species—the megarhine, leptorhine, and tichorhine, are found together at Crayford and Ilford.

The three species are bicorn.

§ 2. Enamel Structure.—The sculpturing on the enamel surface affords a ready means of determining the teeth of the three species. In the tichorhine the enamel is traversed by irregular rugæ, with but the faintest trace of parallelism, in the megarhine by fine striæ, for the most part parallel, that scarcely roughen the smooth surface, while in the leptorhine it partakes of the characters of both species, being smoother and more regularly marked than the former, less so than the latter. In the milk dentition, and especially in the lower molar series, these characters are not so well marked.

§ 3. Milk Dentition of *R. megarhinus.*—Analogy would lead us to expect to find but little difference in the milk teeth of the three

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* Isis, 1832, p. 898-904.

† Ueber die Fossilen Saugethiere welche in Würtemberg aufgefunden worden sind Von Prof. Jäger, Stuttgardt, 1835, folio, p. 179.

‡ M. de Serres Bibliothéque Universelle, 1835, in his "observations sur les Rhinocéros Fossiles et Humatiles," and De Christol, in his paper quoted above, prove that of Cuvier's three species, tichorhine, leptorhine, and incisor-bearing Rhinoceroses, the first is the only valid one. The other portion of Cuvier's *R. incisivus,* Kaup relegates to the large hornless rhinoceros of Darmstadt, *Acerotherium incisivum.* 1832, p. 34, tab. xviii.)

§ Ostéographie Art. Rhinoceros, Pl. xiii.

fossil species of the same genus: but though in many points they are remarkably alike—such as in the development of the *combing plates* (G H) in the upper jaw, yet they present considerable points of difference. In the tichorhine milk molars, the thickness of the enamel surface and its sculpturing, in the leptorhine the small size as compared with the megarhine, afford a ready means of differentiation.

R. megarhinus presents us with the same milk molar dentition as the two other species, $\frac{\text{Dm } 4.}{\text{Dm } 4.}$

§ 3 A. Upper Milk Molars.—The posterior wall of the tooth or the third collis (F) (= *collis tertius* of Brandt), in all the upper milk molars is depressed in its middle part instead of bearing a cusp, as in the tichorhine homologues. The grinding surface of the teeth is more excavated by wear than in the tichorhine species, where it is nearly flat. The fangs are four in number, the two outer free, the two inner confluent. They are hollowed beneath by the pressure of the germ of the successional tooth.

The first tooth of the milk series in the upper jaw (Dm 1: Figs. 1 and 2) is remarkable for its large size as compared with its homologue in *R. tichorhinus*. The external surface or lamina, L of Fig. 1 and 2, is smooth, and with a regularly convex contour, both vertical and horizontal, instead of being traversed by costæ as in the above species. The anterior valley, A, is wide, and traversed by two small involutions of enamel. Anteriorly it communicates with the exterior and anterior surface by a deep cleft descending almost to the base of the crown, and insulating the anterior collis, D, from the external lamina. It is smaller than the posterior valley B. There is but faint trace of the development of 'combing plates,' and con-

Fig. 1.

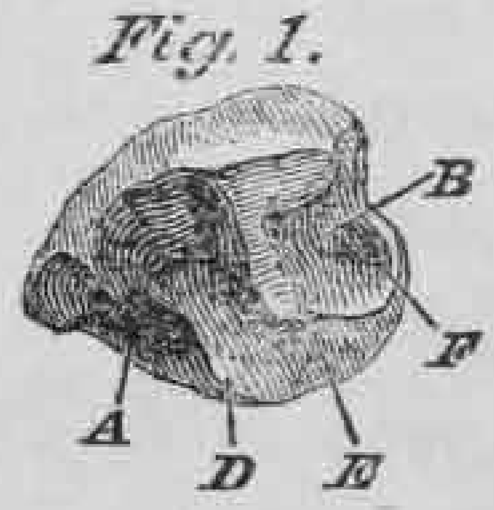
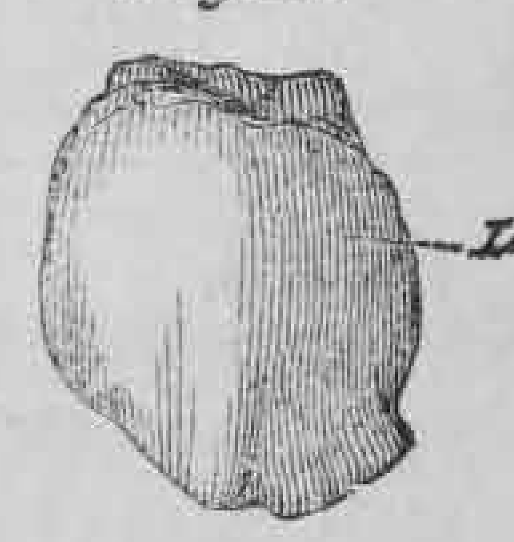


Fig. 2.



sequently there is no accessory valley mapped off. At the base of the cleft that separates the anterior collis, D, from the lamina are two small ridges, the one on the inner surface of the former, the other on the outer surface of the latter.

A comparison of figures 1 and 2 with Fig. 1 of Pl. iii. of the Nat. Hist. Rev. for 1863, will show at a glance the difference between the megarhine and the tichorhine first milk molars.

The second upper milk molar (Dm 2, Fig. 3 and 5) is differentiated from its homologue in the tichorhine species by its size, and by the smoothness of its posterior area, N. The external lamina, L, bears two costæ, K 1 and K 2, of which the second is the higher, and is divided from the broad first by a depression that passes *obliquely backwards* from the base to the summit of the crown.

The anterior collis, D, equals the posterior in size, and is not divided by a cleft from the external lamina as in R. *tichorhinus*. (Conf. Nat. Hist. Rev. 1863, Pl. iii. Fig. 2). The anterior valley has a wide entrance. In one specimen the accessory valley C is mapped off by two combing plates that meet and become fused. In a second the head of the anterior valley is traversed by two involutions of enamel. The posterior wall of the tooth, F, or the third collis (Collis

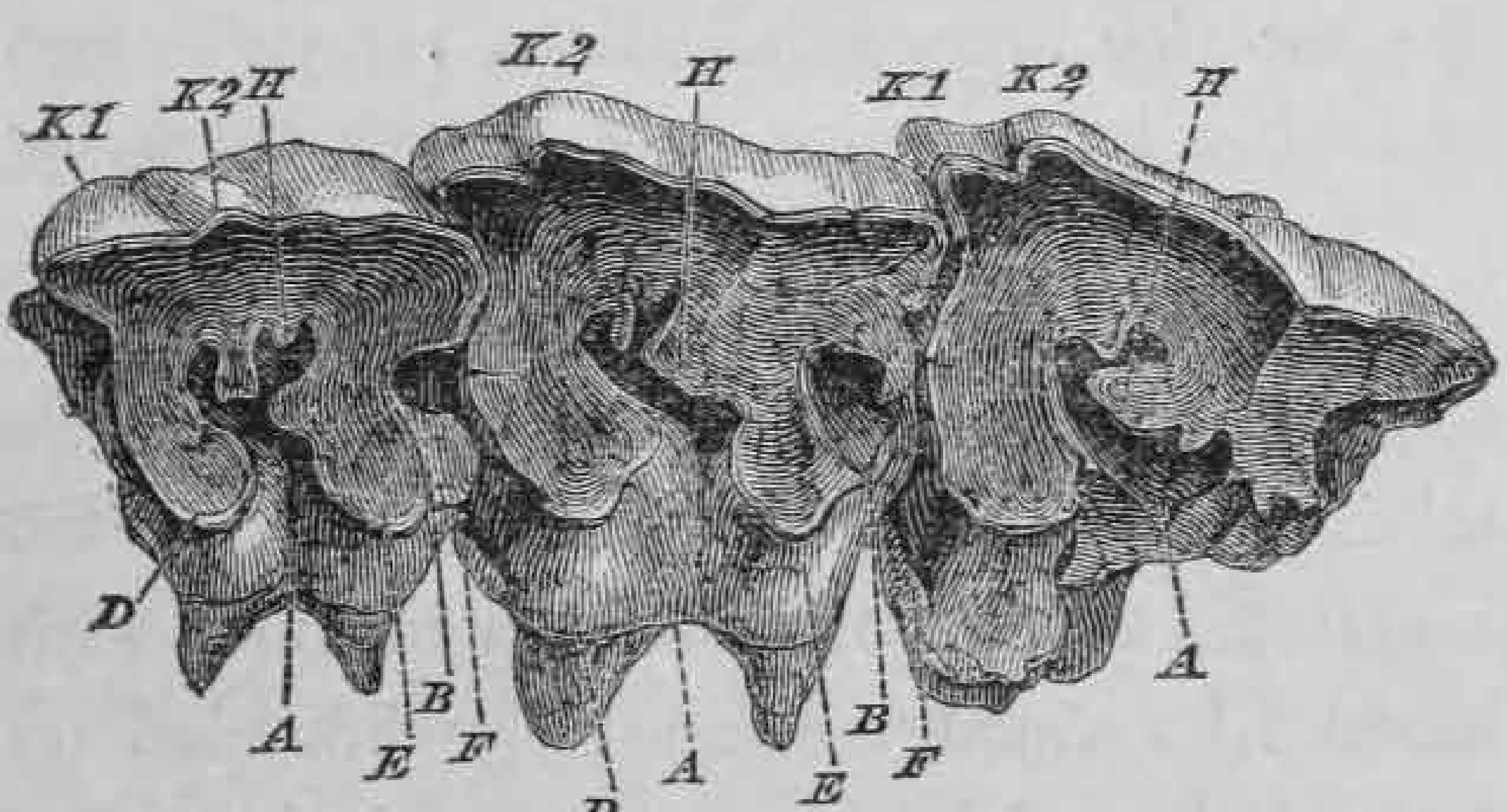


Fig. 3.

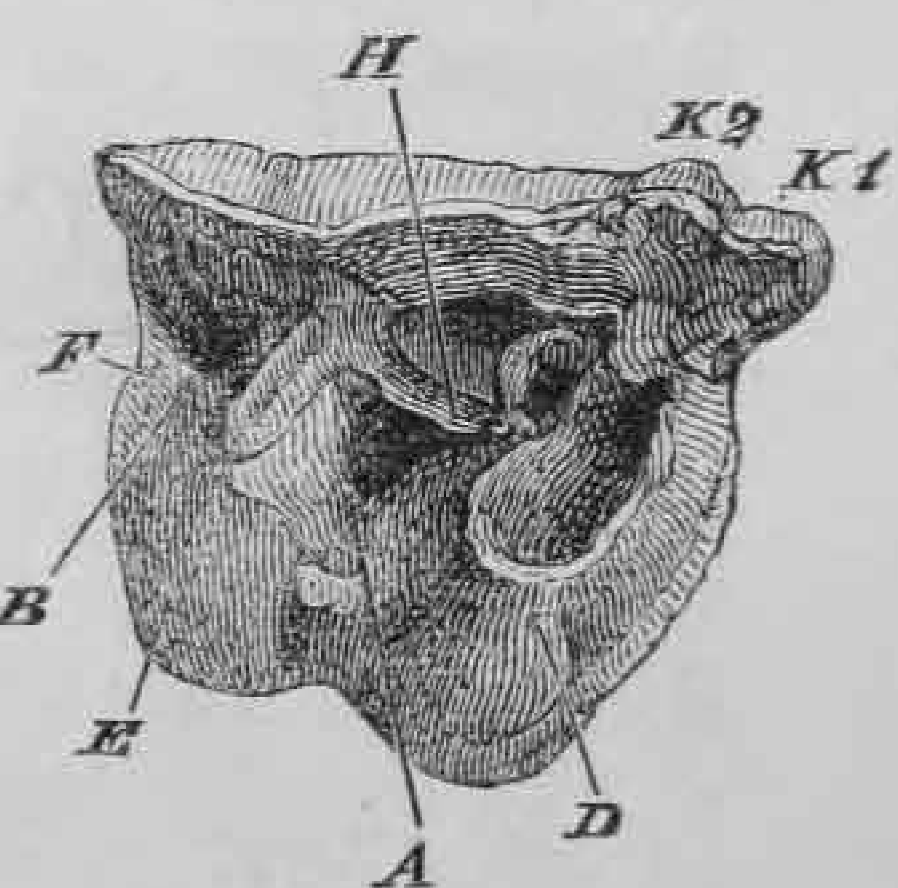


Fig. 4.

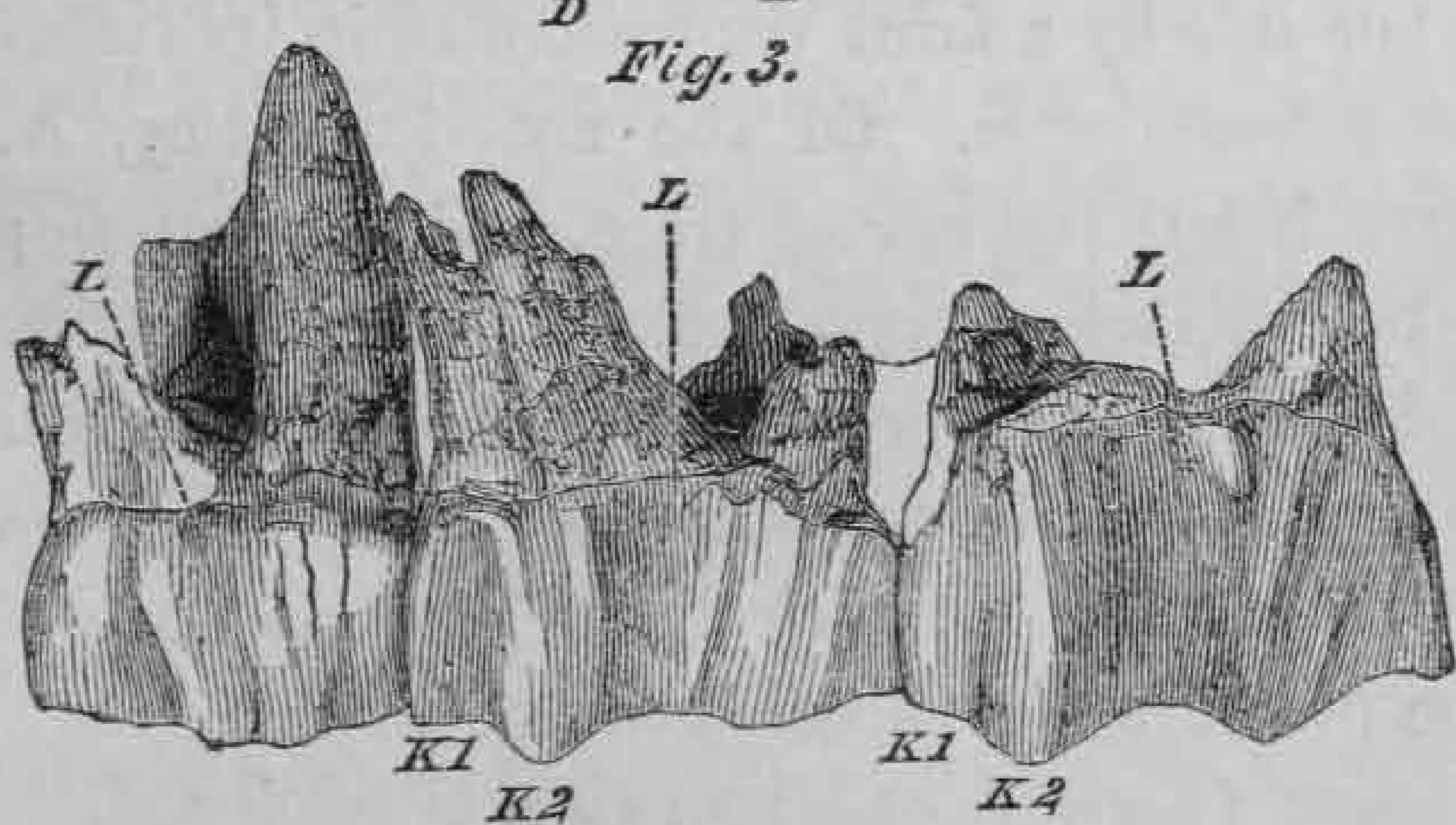


Fig. 5.

tertius of Brandt,) is depressed in its middle part, and without a cusp in the 2nd, 3rd and 4th milk molars.

The third milk molar (Dm 3) is only to be differentiated from the fourth by its smaller size (Figs. 3 and 5). In both the external lamina, L, bears two costæ on its anterior area, of which the second is the higher. The groove between them is deep *and vertical.* The posterior area, N, is faintly undulating and bears but the faintest trace of the costæ visible in the corresponding teeth of *R. tichorhinus.* The entrance of the anterior valley, A, is wide, and the combing plates, G and H, sometimes map off an accessory valley C. In some cases the head of the valley is more or less filled with accessory folds of enamel. The posterior valley is small. The inner side of the anterior and median colles, D and E, slopes abruptly from the base towards the summit of the crown. The guard or obliquely ascending ridge of enamel on the anterior aspect of the tooth is very strongly developed, and circumscribes a deep pit at the inner angle of the anterior collis. On the base of the external lamina of the fourth milk molar (Fig. 4) is a small abnormal cusp.

§ 3 B. Lower Milk Molars.—The large size and the slight development of the ribs on the anterior area differentiate the three last milk teeth from the tichorhine homologues, the former character from the leptorhine.

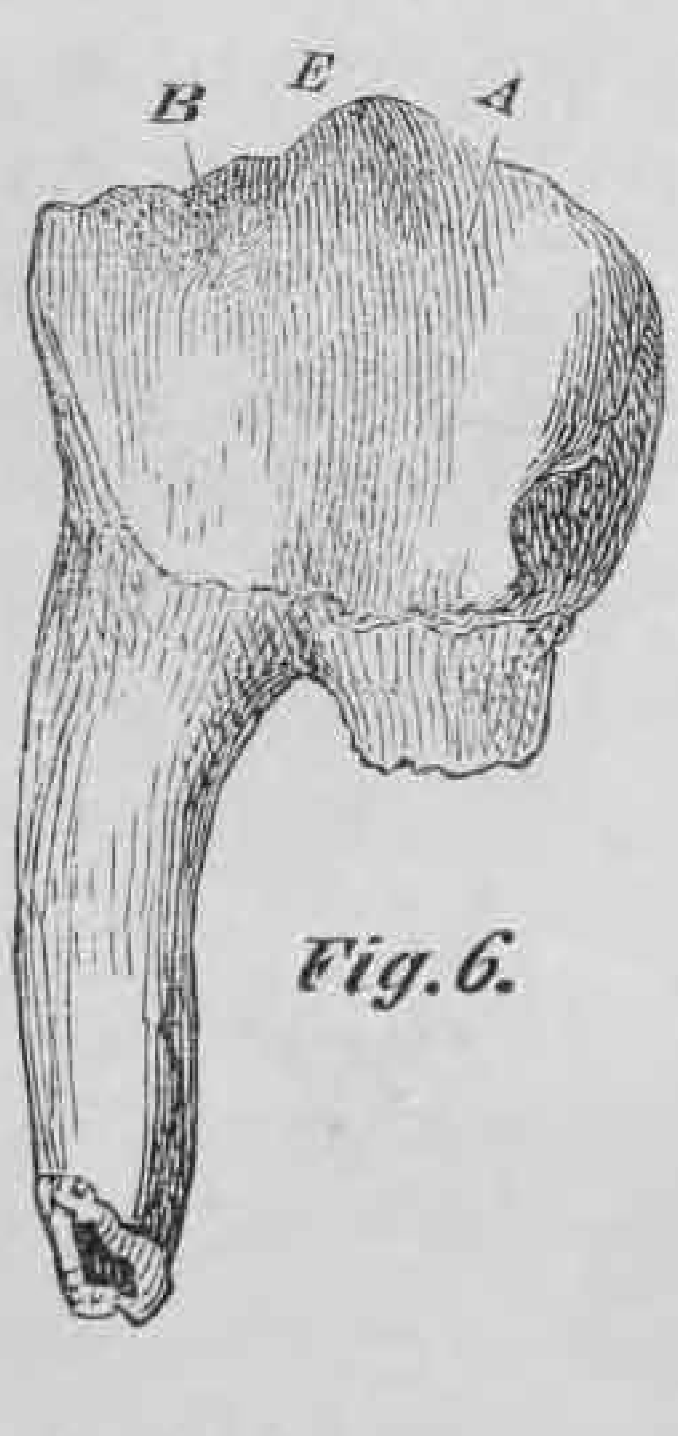


Fig. 6.

The first small trenchant milk molar (Fig. 6.) presents but the faintest shadow of the structure obtaining in the rest of the lower milk series. The external surface or lamina, L, is tumid, with a broad ill defined median ridge bounded on either side by a faint depression as in its tichorhine homologue. Of the anterior valley, A, there is but the merest trace, and the posterior is but slightly mapped off. The median collis, E, is small and very oblique, the anterior can hardly be said to exist at all. The two fangs are stout and cylindrical, and show no trace of the pressure of a successional tooth.

In the second milk molar (Figs. 7, 8), the external lamina, L, is divided into two areæ, M and N, by the median groove of which the larger, the posterior, is tumid, and projects more outwards than the anterior. The latter bears two ill-defined costæ. The anterior valley, A, is more shallow than the posterior, and has its entrance at a much lower level. On its posterior wall is a slight fold. The anterior collis, D, is faintly developed, and is mapped off from the external lamina that extends beyond it by a depression. One tooth, but slightly worn, presents the anomaly of the posterior valley being completely insulated by the normal entrance being blocked up by a wall of enamel.

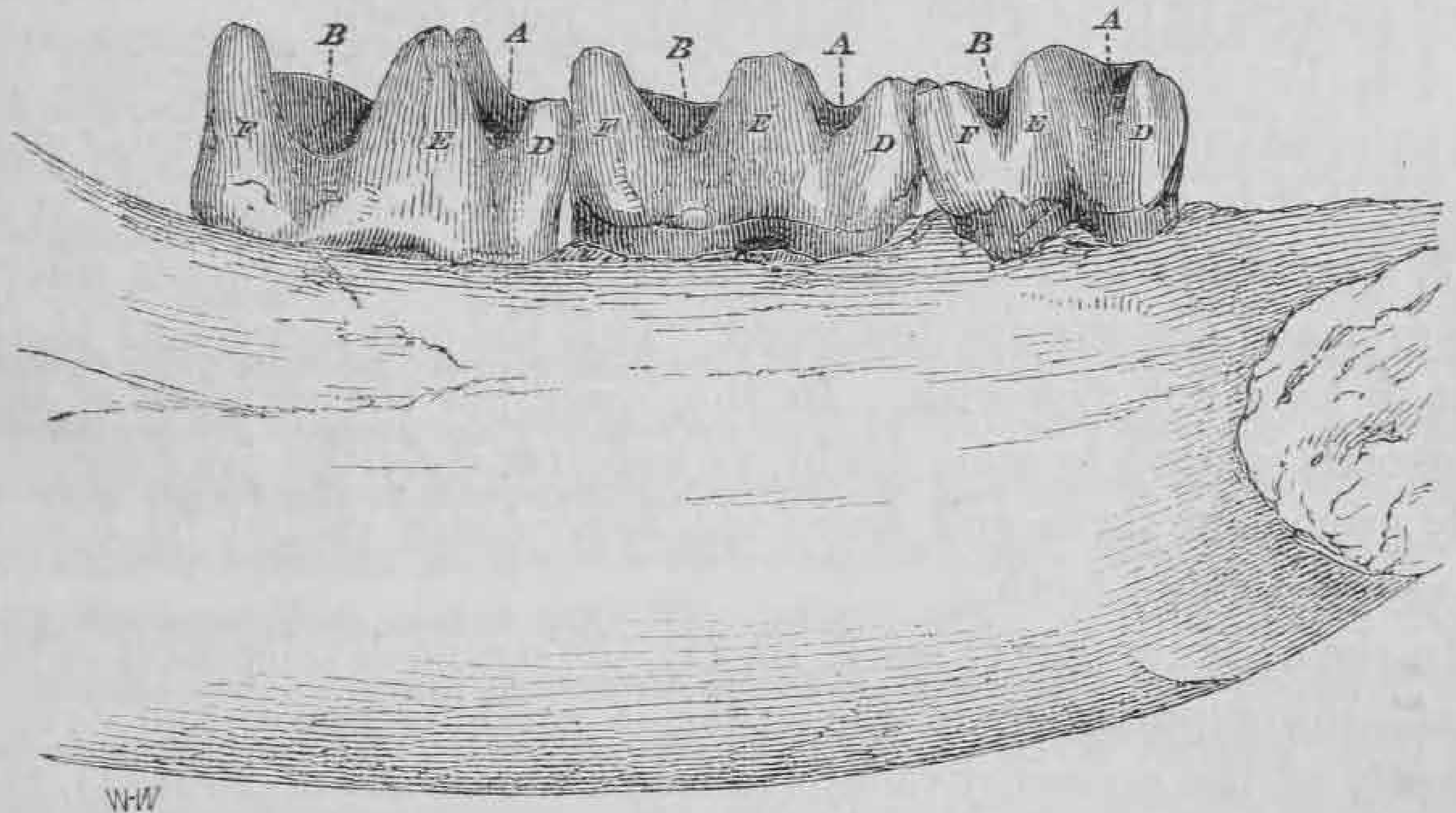
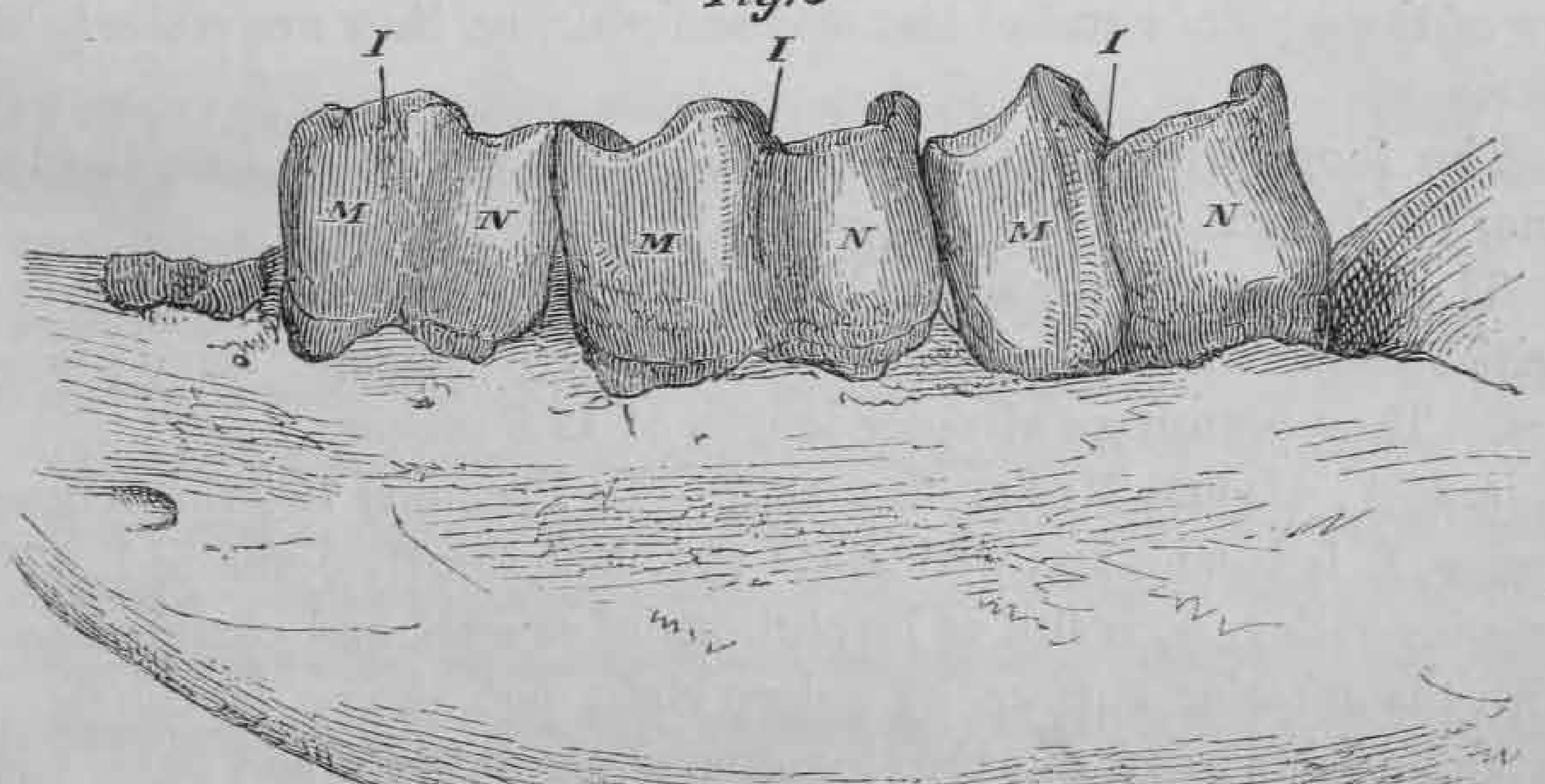


Fig. 7.

The external lamina of the third milk molar (Figs. 7, 8) is divided by a deep groove I into two equal areæ. Anteriorly it projects slightly beyond the point of juncture, with the anterior collis, D. The anterior valley, A, is smaller and more V-shaped than the posterior, B. Of the three colles the median is the larger, and the first and third equal in size. There is a small cusp, probably accidental, on the anterior edge of the median collis.

Fig. 8



In the fourth milk molar, (Figs. 7, 8) the anterior area, M, is flattened, and at a higher level than the posterior. The latter sweeps regularly round from the well defined median groove. The anterior valley, A, is about half the size of the posterior; the anterior collis, D, is the smallest of the three, and the median, E, the largest. The tip of the third is flattened on the inner side and bent forward, leaving a small process in the section afforded by a worn tooth.

§ 4. Permanent Dentition.—The abrasion of the enamel on the anterior surface of premolar two by the pressure of premolar one, proves that in the upper jaw the molar dentition consisted of *Pm* 4, *M* 3, a point in which this species differed from *R. tichorhinus*, where the premolar one was not developed. It is the only megarhine tooth that I have not met with. In the lower jaw the number of the premolars is open to some doubt, as unfortunately the jaws present only premolars three and four, and dependence cannot be placed upon the isolated teeth.

In the upper molars (Figs. 9, 10, 11), the strong development of the guard, the suppression of the anterior combing plate, and consequently of the accessory valley (vallecula accessoria of Brandt), the accessory folds in the anterior valley, A, the pyramidal form of the presence of first and second colles, D, E, the absence of a cusp from the summit of the third, F, and of ribs from the posterior area differentiate the megarhine from the tichorhine species. The grinding surface also is very much more concave in the former than the latter.

The small size, the presence of a third costa on the posterior area, and the excavation of the lower third of the external lamina, characterise *R. leptorhinus*, as compared with *R. megarhinus*. Irrespective of these points and of size and sculpturing, they are remarkably alike.

The fangs are four in number, the two outer being free, the two inner confluent.

The right upper jaw figured (Fig. 9) as a type specimen of the British megarhine Rhinoceros contains three true and three premolars. They occupy an alveolar length of 12.8 inches.

§ 4. A. Upper Molar Series 2.—In Premolar two the external lamina, L, is tumid, and with costa two, K 2, faintly developed. The anterior valley, A, is full of involutions of enamel, and communicates with the anterior surface by a deep cleft, not shown in the figure, extending down as far as the cingulum at the anterior and outer angle of the tooth. Its entrance on the inner side is in vain to be looked for, as it is completely blocked up by the inner wall of the tooth.

The difference between Premolars three and four is one merely of size. They are characterised by the tumidity of their external

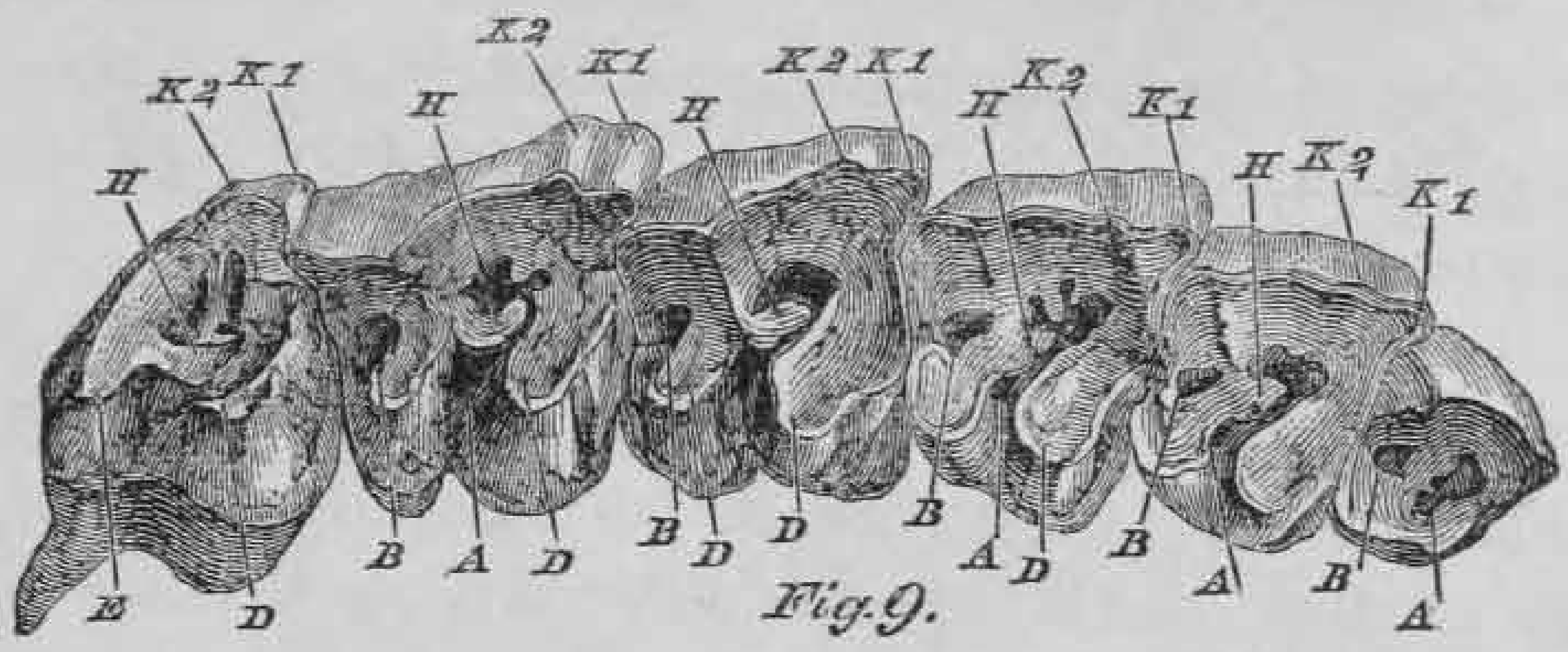


Fig. 9.

lamina, L, and by the absence of any trace of a third costa, that is developed so persistently in their leptorhine homologues. The anterior valley, A, is traversed by irregular processes of enamel, as in the teeth figured by M. de Christol. Its entrance is from 1.05 to 1.0 inches from the base. The ascending ridge or guard on the anterior aspect sweeps round the inner base of the crown and ascends the median collis. This is also the case with the leptorhine teeth of Professor Owen, but the guard in the latter is less prominent, and a glance at the enamel structure affords a ready means of differentiation. The leptorhine teeth moreover throughout are smaller than the megarhine.

The only points of difference between the true molars one and two is, that in the former the stout ascending guard on the anterior aspect extends inwardly as far as the middle of the inner base of the anterior collis, D, in the former, while it never extends so far in the latter. In the latter (Figs. 10, 11) also the posterior lobe is, relatively, smaller in transverse measurement than the anterior.

In both these teeth the second costa, K 2, is strongly developed and is higher than the first. The median depression so constant in the external lamina of the tichorhine homologues is absent, and the posterior area in place of bearing costæ presents a smooth and gently waved contour, N. The entrance to the anterior valley is wide in some, narrow in other teeth, at times it is blocked up by a small cusp. The posterior combing plate, H, developed from the anterior surface of the median collis is constant, and extending forwards partially insulates the head of the anterior valley. This, rounded in some, trihedral, in others, is traversed by vertical folds of enamel. The posterior valley is triangular in outline. The anterior collis, D, is traversed anteriorly by a strongly developed guard that circumscribes a deep pit on its inner and anterior base. The median

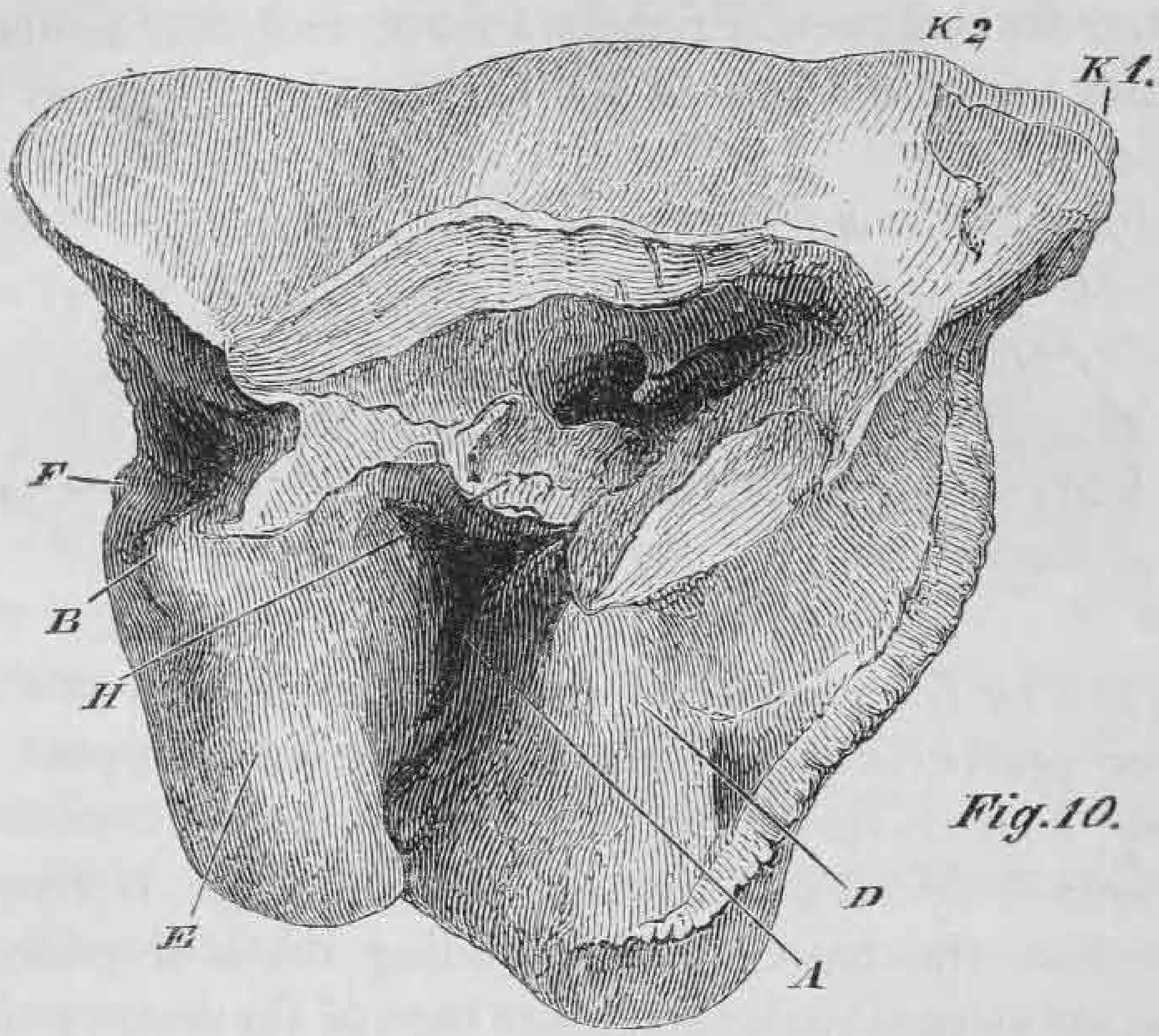


Fig. 10.

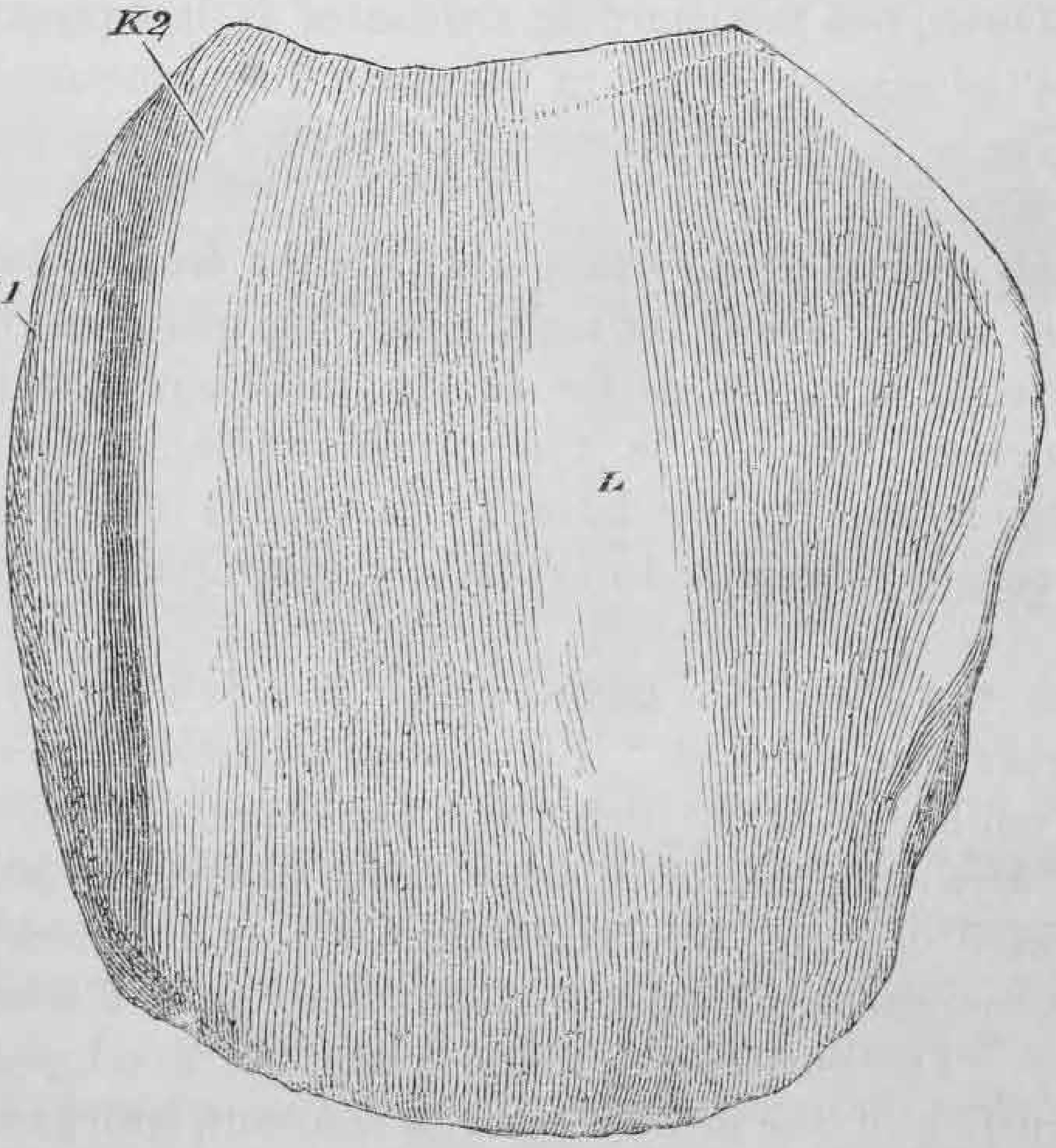


Fig. 11.

collis, E, tumid at the base, is hollowed out in the middle on its inner aspect, which therefore presents a concave vertical contour. This is the case also with the anterior but not to so great an extent.

The posterior collis, F, is divided by a notch from the median in the unworn tooth, and in place of bearing a cusp is widely notched apically.

In the third molar (M 3) the second costa, K 2, of the external lamina, L, is the higher, and the posterior area is slightly waved without trace of ribs. The entrance to the anterior valley is very large and wide, and is sometimes blocked up by a cusp, and the posterior combing plate is very strongly developed. In the portion of the anterior valley mapped off by it are accessory folds of enamel. The anterior collis, D, is narrower than in the tichorhine species. The third collis is represented by a small cusp as in the majority of the tichorhine homologues. The guard on the anterior aspect is very prominent.

§ 4 B. Lower Molar Series.—The lower molar teeth (Fig. 14) are so much like one another, with the exception of the first and last of the series, that size alone is the clue to their exact position in the jaw of the animal. In the premolar series the two valleys are V-shaped, and at a higher level relatively than those of the true molars.

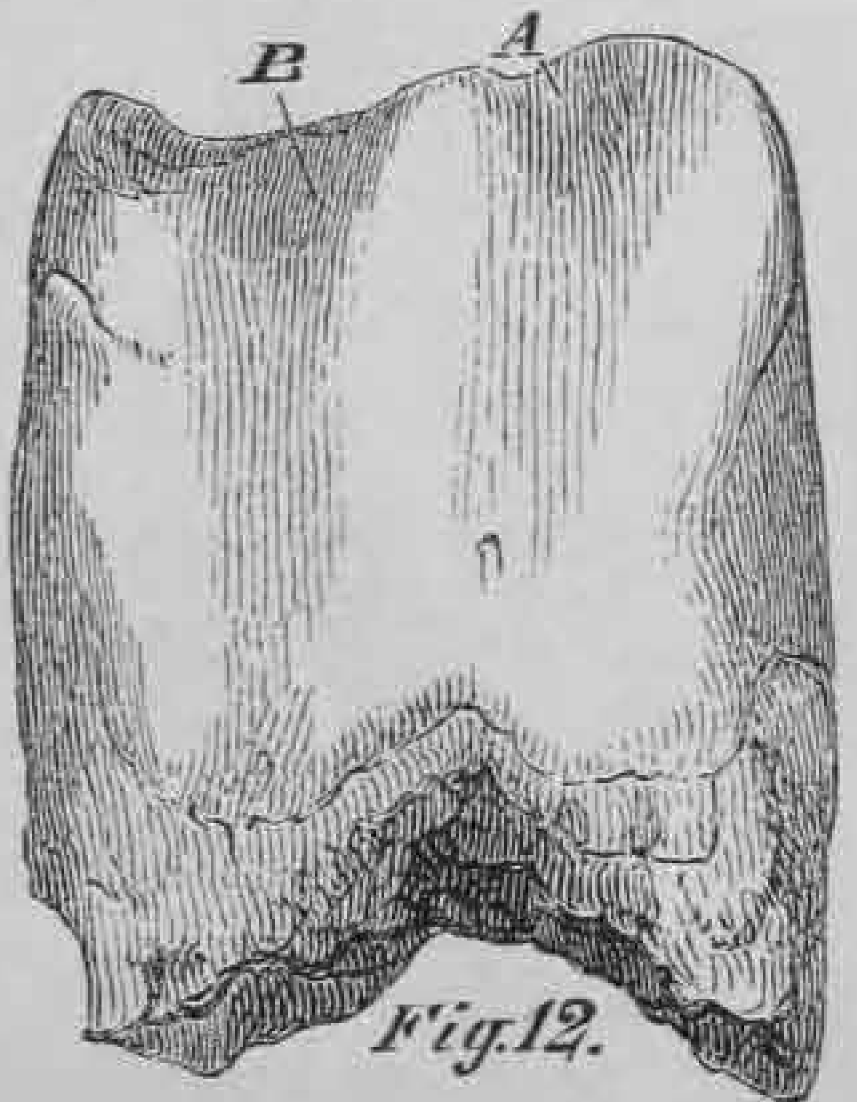


Fig. 12.

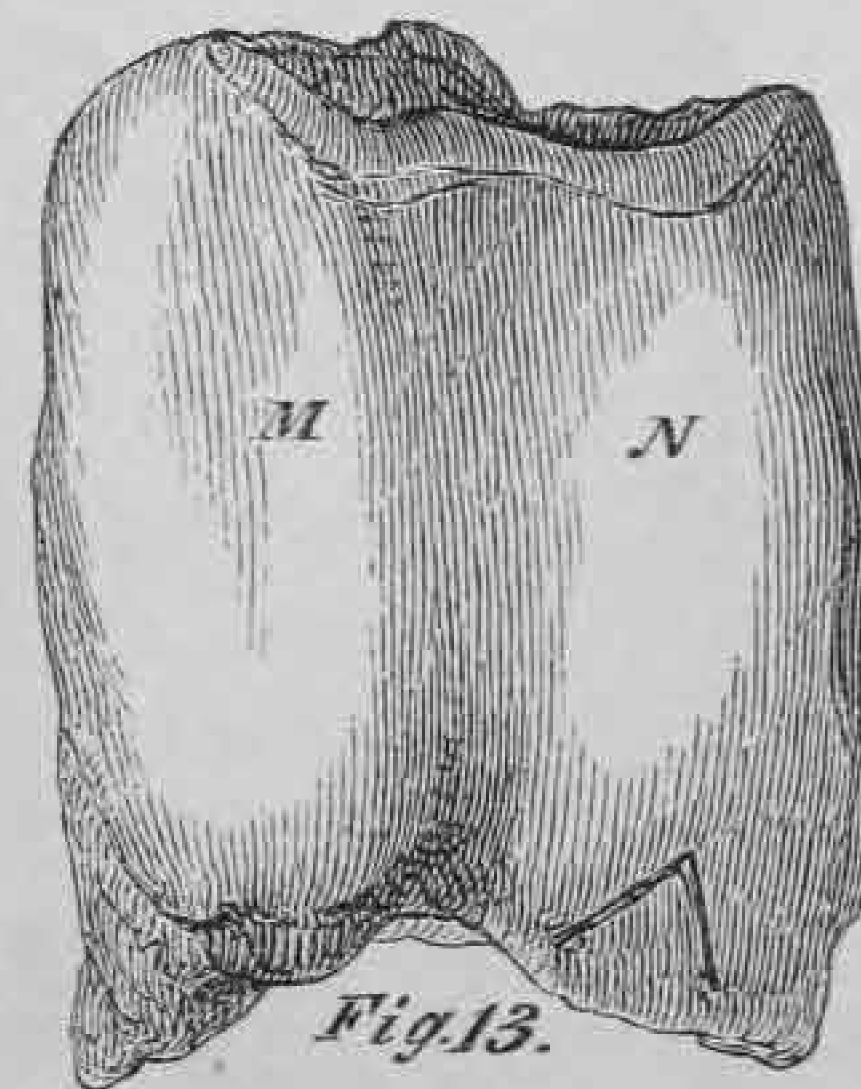


Fig. 13.

The first premolar (Figs. 12, 13) is trenchant, and the external lamina presents a smooth horizontally convex surface with a faint depression apically. The anterior valley is faintly impressed, and the posterior is extremely shallow, the inner surface of the tooth figured presenting a flat square slightly undulating area.

In premolars three and four the median groove traverses the base of the external lamina, which it never does in the tichorhine homologues. In premolars three, four, and true molar one, the inner aspect of the tooth is much more hollowed than in the tichorhine or leptorhine species. In the two latter a ridge passes down from the anterior collis, D, obliquely backwards and inwards as far as the neck of the tooth, and is continuous with the small guard that passes transversely from the outer to the inner side of the anterior aspect. These two points differentiate the megarhine from both the other

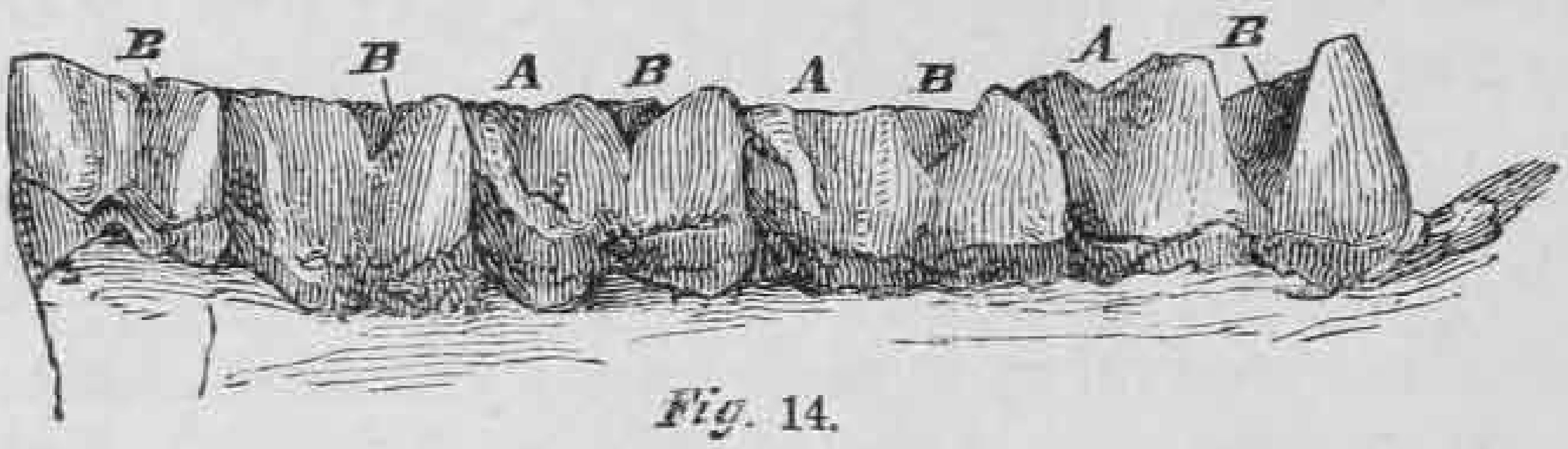


Fig. 14.

species. The tumidity of the areas, M N, which compose the external laminæ, and the absence of ribs from the anterior area are also salient points of difference in the lower molar series (See Fig. 15). The posterior fang of M 3 is cylindrical in section and reflected, which is never the case with the other teeth. The obliquity of the wear of the enamel on the outer aspect, owing to a different habit of mastication, as compared with its even wear in the tichorhine species, is worthy of note.

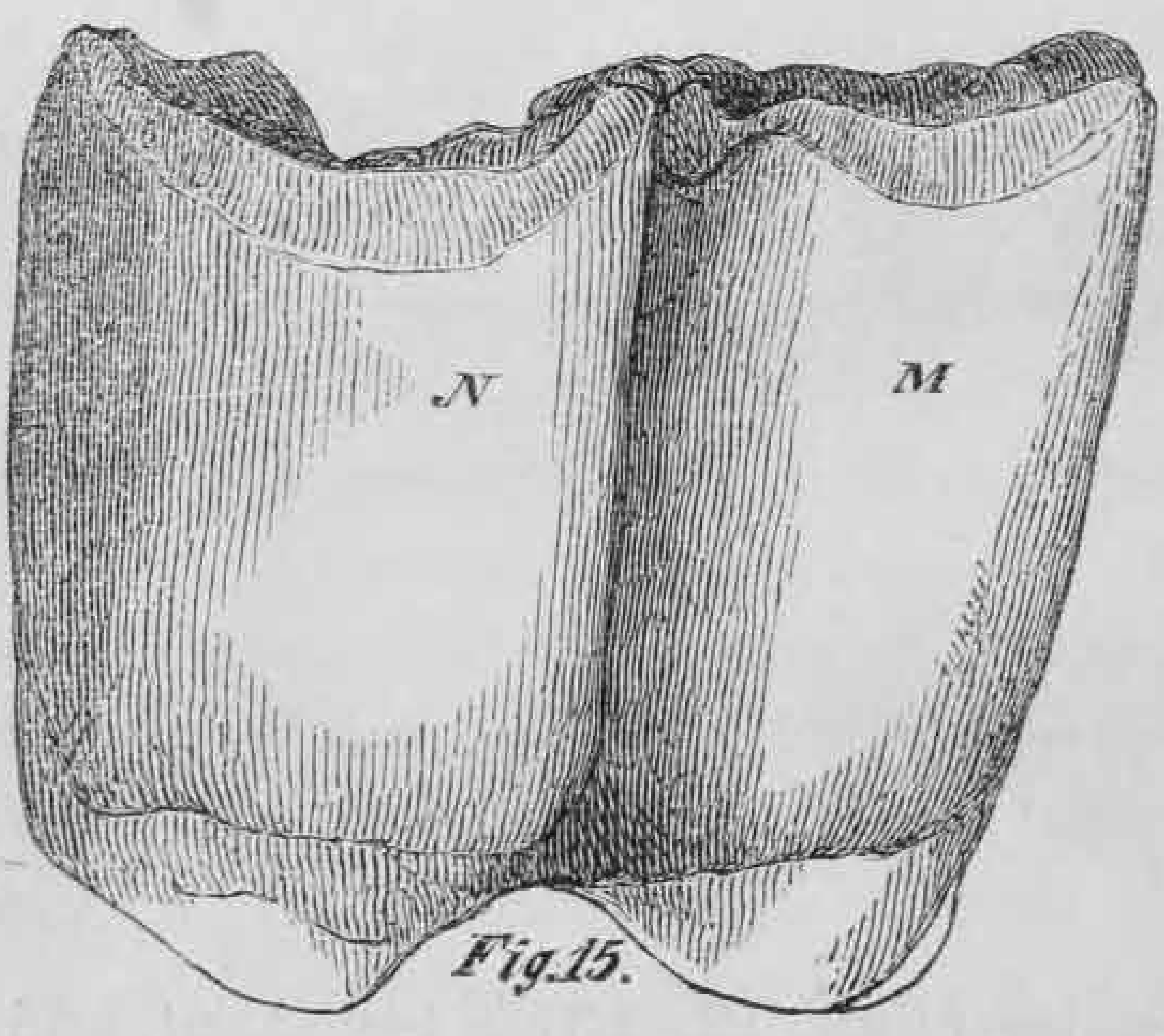


Fig.15.

§ 5. Measurements. The measurements taken at the base of the crown in inches and tenths, are uniform with those used in my essay on the Dentition of the tichorhine Rhinoceros. (Nat. Hist. Rev. iii. p. 525.) They are :—

1. Antero-posterior, taken along the outside of crown.
2. Antero-transverse, taken across the anterior lobe of the tooth.
3. Postero-transverse, „ „ posterior „ „

TABLE OF MEASUREMENTS.

Milk Dentition.

No. in Cat. Brit. Mus.	Upper Jaw	1.	2.	3.
18755	Dm 1	1·08	0·95	0·95
	—	0·86	0·62	0·9
18791	Dm 2	1·35	1·6	1.65
18798	—	1·53	1·79	1·78
18791	Dm 3	1·69	1·98	1·8
18755	—	1 6	1·91	1·72
18751	Dm 4	1·86	1·97	—
18755	—	1·9	2·02	1·86
	Lower Jaw			
27902	Dm 1	0·85	0·49	0·55
18790	Dm 2	1·22	0·64	0·75
	Dm 3	1·65	0·91	0·87
	Dm 4	1·8	1·02	1·02

Permanent Dentition.

No. in Cat. Brit. Mus.	Upper Jaw	1.	2.	3.
22020	Pm 2	1·29	1·6	1·8
	—	1·32	1·41	1·7
	Pm 3	1·6	2·5	2·35
	Pm 4	1·9	2·7	2·27
	M 1	2·0	2·76	2·55
	—	2·05	2·79	2·64
	M 2	2·5	2·95	2·46
	—	2·1	2·65	2·2
	M 3	2·35	2·6	2·4
	—	2·1	2·34	2·25
	Lower Jaw			
18753 c	Pm 2	1·18	0·61	0·72
	Pm 3	1·55	0·93	1·08
	Pm 4	1 69	1·14	1·42
	M 1	1·9	1·28	1·4
	M 2	1·98	1·39	1·33
	M 3	2·09	1·28	1·28

§ 6. A minute comparison of the megarhine teeth with those of the living species of Rhinoceros proves the truth of Professor Owen's* remark, that each recent species may be identified with absolute certainty by one isolated upper molar. In the fossil species also the maximum amount of specific variation is to be found also in the upper molar series. Choosing the salient characters of the megarhine teeth, we find remarkable points both of agreement and difference.

1. *The accessory valley.* The anterior combing plate meeting the posterior insulates the accessory from the anterior valley in the †Unicorn Rhinoceros of India, the *R. simus* (Burchell's Rhinoceros) of South Africa; and in *R. bicornis*, true molars one and two being excepted; while in the *R. Sumatranus* and *R. Javanus* the anterior combing plate is undeveloped, and therefore there is no accessory valley defined, as in the leptorhine and megarhine species.
2. *The Colles.* The anterior and middle colles taper from the base towards the summit of crown; and the latter of them is slightly hooked, in the bicorn African, bicorn Sumatran, and

* Odontography, Article Rhinoceros.

† Fischer (tom. cit. p. 414 et seq.) and Van der Hoeven (Handbook of Zoology, Vol. ii.) give the synonymy of the various living species of Rhinoceros, to which reference can be made. The names used in the text are those of the catalogues of the Hunterian and British Museums.

Unicorn Javan species. The third collis is notched and cuspless in *R. Javanus*, and *R. bicornis* of Sennaar: all of which are points of agreement. In the Sumatran species, on the other hand, the third Collis bears a cusp, as in the tichorhine Rhinoceros.

3. *The guard.* The *R. unicornis* of India, *R. Javanus*, *R. bicornis* and *R. Sumatranus*, bear a strongly defined guard on their anterior aspect as in the megarhine species.
4. *The external lamina.* In the four last-named species, as in the megarhine, the second costa of the external lamina, in *R. simus* on the other hand and *R. tichorhinus* the first, is the higher.

In fine, the dentition of the megarhine species presents a combination of characters now scattered among widely-isolated species of the same genus. The curious problem as to how the characters of the extinct became shared among the living species, and how others, not found in the former, were superinduced in the latter, is, to my mind at least, incapable of any other solution than that offered by Mr. Charles Darwin's "Theory of descent with modification." The unicorn *R. Javanus*, and the bicorn *R. Sumatranus* approach more closely to the extinct bicorn *R. megarhinus* than any other living species.

LIST OF WOODCUTS.