

On the remains of Anthracotheriidae from the *Indricotherium*-strata.

by A. A. Borissiak*

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While Anthracotheriidae appear as a dominant group¹⁾ in the Lower Tertiary fauna of Southern Asia represented by a very great variety of forms, of which just a few are also known in Europe, the excavations from the *Indricotherium*-strata of the Turgai region have produced, as yet, very scanty material belonging to this family.²⁾ Inasmuch as this circumstance does not appear as the result of the as-yet very inconsiderable study of the beds mentioned, it could serve as new proof of the supposition, earlier expressed, regarding the isolation of Turgai fauna from its contemporary faunas from Bugti Hills of Baluchistan, probably as a result of the different physico-geographical conditions of these

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¹⁾ Compare, Russian Paleontological Society's Yearly, II, 1917, pp. 98 and 100.

²⁾ On the *Indricotherium*-strata and their fauna, see, *Reports of the Academy of Sciences*, 1916, 343; 1917, 287; 1918, 1319; 1920, 687; 1921, 397.

regions. Of the material collected, only the two following teeth belong to Anthracotheriidae.

Illustration, p.103:

a, b — ? *Hemimeryx turgaicus* n. sp.

c — ?*Hemimeryx* sp.

?*Hemimeryx turgaicus* n. sp. There is one lower posterior molar (M_3), of which only the crown is preserved (see illustration), without the root (1250).

Dimensions:

Length of the crown 27.4 mm

Width of the crown 12.2 mm

Height of the crown 12.5 mm

The crown is hypsodont, with well worked out, sharp, pyramidal small interior and large exterior selenodont tubercles, and with a quite poorly developed single complementary posterior blade (heel); the enamel is very much furrowed. The tooth is completely untouched by wear. The outline of the crown is a rectangular curve with a small protuberance at the posterior side of its interior end, corresponding to the heel (complementary blade). Each of the two blades of the crown consists of an interior pyramidal and an exterior semilunar tubercle, which is a little higher. The front interior tubercle (of the front blade) bears four keels, of which two form the ends of its wall and

the front one among them unites with the front keel of the exterior crescent; the latter bends around frontally the base of the interior tubercle and in such manner forms the front wall of the tooth, which descends gradually toward the interior side of the crown; the other two keels of the front interior tubercle are directed within the tooth almost symmetrically (at an angle of 30° in relation to one another), and the latter of them unites with the last keel of the exterior (front) crescent. The interior tubercle in the last lobe, narrower than the corresponding tubercle at the anterior lobe, likewise bears four keels, but not so regularly arranged: the two posterior are at a right angle to one another. The keels of the exterior (posterior) crescent, which is likewise smaller than the exterior anterior, proceed: the anterior, long one, in the direction toward the top of the anterior interior tubercle, reaching its base between its posterior keels; the posterior keel of the exterior crescent does not unite with the posterior keel of the interior tubercle; in front of the top of the posterior crescent, a small ridge separates from its anterior keel; it goes toward union with the anterior interior keel of the anterior interior tubercle (the same rudimentary keel exists in the exterior crescent of the anterior lobe). The complementary lobe is close to the interior side of the tooth and it forms a high, convexly conical tubercle of an almost circular base, doubly lower than other tubercles and with two small keels; the keels are mutually brought close to one another on the front-interior side of the tubercle and form a narrow groove, going in the direction of the mentioned groove, of the posterior end of the interior tubercle of the posterior lobe; however the keels of neither of them meet, but overlap, and the keels of the complementary tubercle ascend somewhat along the posterior side of the tubercle of the posterior lobe, at the same time increasing slightly. The cingulum is poorly developed; it is entirely lacking on the interior side, and

on the anterior, in the central valley and on the posterior side (between the posterior and complementary lobes) it is swollen in the form of small tubercles. The sculpture of the enamel consists of rough wrinkled lines, branching out irregularly and fusing together, it conditions the jagged character of the keels of the tubercles. This description leaves no doubt that we have here to do with the last molar of the lower jaw¹⁾, but its further determination, regardless of the fact that this tooth is one of the characteristic ones in the jaw of Anthracotheria – because of some special peculiarities of the given form – it presents considerable difficulties even in a specific relation.

As for the two most important groups of Anthracotheria, *Anthracotherium* and *Ancodus* (*Hyopotamus*), great similarity must be admitted of this tooth to the first group; only the colossal development of the heel and a lower crown in *Anthracotherium* appear as a distinction; the main similarity is in the arrangement of the interior tubercles, to which a “pyramidal” form is peculiar to the greatest degree of all other Anthracotheriidae. This similarity is especially conspicuous in comparison with the small representatives of the species mentioned, divided by Depéret²⁾ into the special species *Microselenodon*.

It is enough to compare the figure that Franzius³⁾ gives, and also the later form of the same branch, *A. breviceps*⁴⁾; both these forms undoubtedly represent the same type of structure of the crown as this tooth that is being described, although there is a considerable difference in the arrangement of the keels. The same must be said about the

¹⁾ It could be a milk tooth, which has three lobes over two tubercles and other characteristic of tubercles.

²⁾ Depéret, C. H. L’histoire géologique et la phylogenie des Anthracotheriidae, *C.R.* 146, 26 Janv. 1908.

³⁾ Franzius, Fossile Ueberreste von *A. minimum*, etc. *Z. d. d. g. v. Bd.* 1853, s.75, Pl. III. fig. E.

⁴⁾ Bottger, Ueber das Kleine A. etc., *Palaeontographica* XXIV, 1876-7, p. 161, fig. on p. 163.

“small form from Rochette” that V. Kovalevski assigns according to the arrangement of the keels as the closest to the tooth which we are describing.

Much more distant from our form is the second branch of Anthracotheriidae, represented by *Ancodus* (*Hyopotamus*). The beautiful figures and, for its time, and excellent description of this form by Owen makes it possible to establish well the differences in the structure of the last lower molar of these two types.

Our form differs from *Ancodus*, aside from a lesser hypsodont form of this crown, i.e. a lesser height and sharpness of the tubercles, aside from an incomparably better developed heel, also in the following traits.

The medial valley of this tooth is better closed; this is conditioned by the position of the front keel of the rear exterior ridge, which extends, as in *Anthracotherium*, toward the front interior tubercle, while in *Ancodus* it goes parallel to the same ridge of the front exterior tubercle, in the direction of the inter-space between the front tubercles, opening thereby the medial valley; in *Ancodus* – the front and the rear lobes are, in such manner, arranged more symmetrically.

The arrangement of the interior tubercles appears as the second characteristic of the tooth of *Ancodus*: although they have the same keels, only differently arranged, but the front upper keel of the front tubercle is lacking (this side of it is rounded) and it is poorly expressed in the last, and therefore the inner wall of the tooth of *Ancodus* does not have that characteristic planar form as that which is being described and although that of *Anthracotherium*³⁾ in a not smaller degree.

³⁾ *Hyopotamus americanus* described by Leidy (*Ext. Mamm. Dakota and Nebraska*, p. 202) differs by the characteristic symptoms of the species (a hypsodont crown, a more exposed medial valley, a better rounding of the interior tubercle). The first American species of Anthracotheriidae described by Osborn and

The general character of the crown obliges us to consider our form as belonging rather to some of those intermediate branches of Anthracotheriidae, in which the hypsodonty and selenodonty are expressed to a lesser degree than in *Hyopotamus* and to a greater degree than in *Anthracotherium*.

Brachyodus appears as one of the best-known forms among them, whose third lower molar crown at first sight has much in common with the crown being described, if one were not to count the much better developed and often double heel.¹⁾

However, showing the same type of arrangement, the keels of the tubercles, for instance, of *Brachyodus porcinus* Gerv.²⁾ described by Depéret present a different arrangement: thus the front keel of the front exterior tubercle in the crown being described does not form the front wall of the tooth reaching that far into the interior (almost to the interior end of the crown); then the exterior keels of the interior tubercles (i.e. the interior walls of the crown passing downwards) are much more distinctly expressed in our crown, while in *B. p.* the interior tubercles are more rounded, resembling that in *Hyopotamus*; in the last (second) lobe of *B. porcinus* the exterior semilunarity is more symmetrical – while in the Turgai form the last keel is more sharply directed inwards of the crown – and its front keel united with the front interior keel of the posterior interior tubercle much farther from the top. The relation of the keels of the heel to the keels of the posterior lobe is likewise different, inasmuch as it is visible on the

Wortmann (*Bull. Am. Mus. N.H.*, 1894, VI, p. 221), *A. curtum* and *A. carense*, are not subject to comparison, because there is neither formation nor description of the lower molars.

¹⁾ Compare Andrews, *Geol. Mag.* (4) VI, p. 484.

²⁾ Depéret, Les vertébrés oligocènes de Pyrimont-Challonges, *Mem. Soc. Paleont. Suisse* XXIX, 1902, p. 43, pl. V., fig. 14a.

drawing, but the heel is single, as in the tooth being described, and represents the same “crochet”, only a little wider and, which is important, incomparably larger one.

The tooth of *Brachyodus africanus*³⁾ has a slightly different habitus, with a still better developed heel, with planer interior tubercles (on the interior side of the crown) with more slantingly arranged exterior semilunarities (the last two symptoms bring this form closer to ours) but with the same distinction in the mutual arrangement of the keels of the tubercles.

Brachyodus has a wide distribution and represents one of the best-known forms among the intermediates between the *Anthracotherium* and *Ancodus* groups. If nevertheless a comparison of our scanty remains with it is so difficult, it is quite hopeless to make comparisons with a whole series of other forms, often described only by individual teeth, to which can be related with greater or smaller hesitations, these or other lower teeth found jointly.⁴⁾

Therefore it would be an almost fruitless work to consider possible relations with all the established species. A comparison with only those forms in which the presence of the lower posterior molar is known in every case appears more appropriate.

Some of the forms described by Lydekker appear as such. As early as 1877 an upper molar was sent to him from the deposits of lower Manchar Hindustan, on the basis of which he established his species *Hemimeryx*.¹⁾ In the following year he received

³⁾ Ch. Andrews, Fossil Mammalia from Egypt, *Geol. Magaz.*, N.S. (IV), VI, 1899, p. 481, pl. XXIII, fig. 2.

⁴⁾ As a great difficulty in the determination of this tooth appears likewise the absence in Petrograd of the latest works of Pilgrim (beginning with 1910!), dedicated in a considerable degree to the description of the remains of Anthracotheria from the contemporary deposits of Southern Asia (Hindustan, Baluchistan).

¹⁾ *Rep. Geol. Surv. India* X, p.78.

among the remains of this form also a lower molar,²⁾ which was described in more detail and modeled for the first time by him in the year 1881.³⁾ This is an incomplete M₃ with a broken heel, an incomplete posterior lobe and slightly abraded exterior tubercles. This tooth, modeled quite schematically, represents, of all the teeth described by anyone, the greatest similarity with our tooth. According to the author's determination, it differs from the tooth of *Merycopotamus* "by a low crown, with an almost covered transverse valley (and not uncovered) on the interior side, and with planer and less fully conical interior tubercles; this plane form of theirs is best visible on the interior side; this tooth resembles closest the lower tooth, related to *Hyopotamus palaeindicus* (*Ibid*, pl. XXIII, fig. 3) but it is distinguished by narrower and sharper tubercles and a narrower and deeper medial valley."

The illustration does not give enough data to make it possible to judge whether the interior tubercles are actually similar to those of our form, or whether they are actually "more planar," as the author writes. In any case the planar "interior side" of the interior tubercles, limited by sharply expressed keels, forms the distinctive peculiarity of both teeth mentioned. The character of the heel of both these teeth remains unexplained, and in the meantime the structure of the latter distinguishes our form from those inspected earlier.

Telmatodon,⁴⁾ likewise mentioned by Pilgrim, has many marks of similarity with the tooth being described, as related to this species established by him, on the basis of the wide form of the exterior semilunarity, pyramidal form of the interior, rough enamel etc.

²⁾ *R. G. S. India* XI, p. 79.

³⁾ *Palaeontologia Indica* (X), II, p. 167, pl. XXIII, fig. II.

⁴⁾ Pilgrim, E. Some new Suidae from the Bugti Hills, *R.g.S. India* 36, p. 45.

But the teeth of *Telmatodon* are of incomparably greater dimensions; its heel is likewise very large, but its keels and their relation to the posterior lobe approach to the type of our tooth, differing both from the large double heel of *Anthracotherium* and the wider heel of *Ancodus*.

The other described new forms (Andrews, F. Cooper etc.) offer no data for a comparison.

On the basis of everything that has been exposed, the species *Hemimeryx* can be considered with some degree of probability as the only one to which the tooth being described approaches closest by its symptoms, taking into consideration the fact that there is a lack of material and a lack of literature as well¹⁾, which do not permit of talking of an identity; of this does not permit either the unusually reduced heel²⁾ of the crown of the tooth being described, which gives it a completely peculiar character. ? *Hemimeryx* sp.

There is a very much abraded upper molar of the selenodont type (1¹⁴⁶³)

Dimensions:

Length of the crown.....20.5 mm

Width of the crown.....23.” ”

Height of the crown.....3 mm

¹⁾ See example 4 on p. 107.

²⁾ There are references in the literature to the variation of the complementary lobe – for instance, Teller, *Neue Anthracotherierreste tc. Beitr. Palaeont. Ost. Ung. Or.* IV, Bd. 1886, p. 90, – just as there are references to the reduction of its dimensions in younger geological forms: Andrews. *Catalogue Vertebrata Fayum* 1906, p. 179.

The crown is abraded almost to the foundation; about its structure can be said only that the semilunaries were narrow and deep, especially the exterior, slightly asymmetrical. Nothing can be judged on the number (4 or 5) of the semilunaries. Preserved are the medial deep valley and insignificant remains of the front one.

The crowns are preserved: two planar-conical exterior (flattened in the direction of the width of the tooth) and a single interior united of two cones.

The state of preservation of the crown does not allow of a closer determination. However, it must be pointed out that the front part of M² *Hemimeryx lydekkeri* F. Coop.¹⁾ (the posterior part is less abraded) recalls very much the front part of our tooth according to the character of the abraded crown – only this tooth is relatively wider. In dimensions, M¹ of the same series approaches more closely to the tooth that is being described, but abraded even more. *****

¹⁾ Forster-Cooper, C. New anthracotheres and allied forms from Baluchistan, *Ann. and Magaz.* (8) XII, p.518, fig. 4.