

Descriptions of Some New Fossil Mammals from Kani District,
Prov. of Mino, with Revisions of Some Asiatic
Fossil Rhinocerotids.

BY

HIKOSHICHIRO MATSUMOTO.

With Two Plates.

Introductory.

Recently, I have received for study some fossil remains of an archetypal Equid and a Tapirid, from Mr. H. YAGI, Principal of the Tōnō Middle School, Mitake Town; of a Rhinocerotid from Mr. T. SAGA, in Kaminogo-mura, Kani District; and of a Sciurid from Mr. K. HIRAI in the same village. All these remains were evidently obtained from the fossiliferous formation of fresh-water deposit, viz., Hiramaki Formation, of the Kani District, Prov. of Mino. It is the same formation, that yielded the material of *Amphitragulus minoënsis* already described and of *Trilophodon* of *angustidens*-type briefly noticed by the present writer.¹⁾ The material of the Equid consists of a right upper cheek-tooth, which is probably a third premolar (P³), and of a left lower cheek-tooth, which is probably a fourth premolar (P⁴). Both the specimens are quite similar in general structure and in size to the corresponding teeth of *Anchitherium* of the Lower and Middle Miocene of Europe, and it is probable in a certain degree, that they may be referred to this genus, though a connection of the metaloph to the ectoloph, as an important characteristic of this genus, is not actually observed in the broken crown of the present unique upper cheek-tooth. These specimens differ from the corresponding teeth of *Mesohippus* of the Lower to Upper Oligocene of North America in their much larger size, in the protocone²⁾ being larger than the metacone³⁾ (in casts representing a skull and a series of upper cheek-teeth *Mesohippus* at hand, the protocone is shorter and more compressed antero-posteriorly than the metacone); and in the better developed and antero-posteriorly longer metaconid-metastylid and entoconid; from those of *Miohippus* of the Upper Oligocene of North America in their much larger size and in the absence of an internal basal cingulum to the upper cheek-tooth (I am not informed as to the lower cheek-teeth of *Miohippus*, though there is a certain reason to suppose that they might be in the evolutionary stage of *Mesohippus-Kalobatippus* but not in that of *Anchitherium-Hypohippus*); from those of *Parahippus* of the lower Miocene to Lower Pliocene of North America in their more brachyodonty and in the much less differentiated metaconid and metastylid; from those of *Archaeohippus* of the Middle Miocene of the North America in their much larger size and in the absence of internal basal cingula from the upper and lower cheek-teeth; from those of the genotype and other many species of *Hypohippus*, viz., *Hypohippus* excluding *H.* (or *Anchitherium*) *equinus*, of the Middle Miocene to Lower

1) See this journal, vol. III., 1918, p. 80.

2) The present writer means by these terms also the analogous cones of premolars as those of molars: see GREGORY- THE COPP-OSBORN "theory of trituberculy," &c.; Bull. Am. Mus. Nat. Hist., vol XXXV., art. XIX., 1916.

Pliocene of North America and China in their much smaller size and in the slightly more brachyodonty; and from those of *Hypohippus* (or *Anchitherium equinus* of the Middle Miocene of North America in the slightly higher protocone²⁾ and hypocone²⁾ and in the absence of an internal basal cingulum from the upper cheek-tooth. It is evident, that these specimens do not belong to any known American species; and even probable, that the species represented by the present specimens is not congeneric with the American genera except *Hypohippus*. There is a possibility or even a probability, that the species in question is to be included in *Hypohippus* as far as the latter includes *H.* (or *Anchitherium*) *equinum*; but then, the differences between *Anchitherium* and *Hypohippus* are consequently very trifling. The present writer intends to refer the specimens at hand provisionally to *Anchitherium*. The material of the Tapirid is a large fragment of a right ramus of a mandible with P₂ to M₂ *in situ* and a detached M₃ belonging to the same. As this material does not include any upper cheek-teeth, its generic determination is by no means easy. In earlier Tapirids, the ratio of the united length of the premolars to that of the molars is comparatively small, while in later Tapirids, the same ratio is comparatively large. This ratio in the present specimens corresponds nearly to 80 per cent, and this value appears to indicate an evolutionary stage either intermediate between *Protapirus* and *Palaeotapirus* or corresponding to the last-mentioned genus. That the present specimen cannot be referred to genuine *Protapirus* of the Middle Oligocene of Europe is evident: because, firstly, the teeth of the former are much larger than the corresponding teeth of the latter; secondly, the successive teeth of the former are very gradually larger toward the back and not toward the front, while those of the latter increase in size very rapidly; and thirdly, the anterior and posterior sides of the teeth of the former are truncate, so that the teeth are fully in contact with one another, while those of the latter are rounded, so that the teeth are in contact only to a short extent. Following SCHLOSSER¹⁾, American *Protapirus* may not be called congeneric with genuine *Protapirus*, differing distinctly from it in the incompleteness of the hypolophid of the lower cheek-teeth. That the present specimen is not congeneric with American "*Protapirus*" is also evident: because, firstly, the teeth of the former are larger than the corresponding teeth of the latter; secondly, the scale of the successive teeth becoming larger backwards and not forwards, is more gradual in the former than in the latter; and thirdly, the hypolophid is completely formed in the former, while it is incomplete in the latter. Finally, that the present specimen cannot be referred to *Tapirus* is also very evident: because, firstly, the premolars are much smaller than the molars in the former, but not so much so in the latter; secondly, in each premolar of the former, the anterior lobe is distinctly much narrower than the posterior, while in that of the latter, the anterior lobe is not so much narrower than, but nearly as wide as, the posterior; and thirdly, the former is more distinctly brachyodont than the latter. As a whole, the present specimen appears to represent an evolutionary stage more progressive than the *Protapirus* and more archetypal than *Tapirus*. Such a stage is represented in Europe by *Palaeotapirus* (= *Paratapirus*); and it is naturally probable, that the present specimen may belong to this genus. In North America, however, such a stage may possibly be represented by "*Tapiravus*," which is very imperfectly known and is almost *insertae sedis* to science at present.

The occurrence of Rhinocerotid remains in the Miocene of Kani District was formerly mentioned by TOKUNAGA, however without any generic and specific determination. Mr. SAGA's specimen, which is to be described here, is the fairest one of the specimens, upon which TOKUNAGA's information has been based. It is a fragment of a skull representing a palate with P²—M³ of both sides *in situ*. This specimen indicates a very brachyodont Rhinocerotid; and it is evident that, it does not belong to any of those genera, which include modern representatives. The contrast in size between the premolars and the molars of this specimen is very great, the ratio of the united length of the premolars (excluding P¹) to that of the molars corresponding to ca. 66-68 per cent. Such a great contrast may indicate its belonging to *Teleoceras*, but not to *Aceratherium*, *Aphelops* and *Peraceros*. Further, it is evident from the very

1) Zittel, Grundzüge der Paläontologie, Vertebrata, 1911, p. 448.

brachyodonty of this specimen that, so far as *Teleoceras* should be subdivided into two subgenera, *Brachypotherium* and *Teleoceras*, s. s., it is to be referred to the first subgenus.

The material of the Sciurid is represented at present only by a single right upper incisor. As this material is very poor, it may be desirable to avoid any generic and specific consideration.

DESCRIPTION OF SPECIES.

Anchitherium hypohippoides, sp. nov.

Pl. XIII. (I), figs. 1-5.

Type-specimens: a left lower premolar, which is probably P₄, and a broken right upper premolar, which is probably P³.

Locality: Yamazaki, Omori, Hiramaki-mura, Kani District.

Horizon: a bed of tuffaceous sandstone of the Hiramaki Formation.

These two specimens measure as follows.

	P ³	P ₄
Length	19.5 mm. + a (20.5 ,, ±)	20 mm.
Width at the anterior lobe... ..	21 ,,	14 ,,
Ditto at the posterior lobe... ..	18 ,, + a (19 ,, ±)	15 ,,
Hight of the crown at the outer side	—	14 ,,
Ditto at the inner side	13 ,,	12 ,, + a (13 ,, ±)

The upper premolar is very imperfectly represented, the ectoloph, parts of the protoloph and meta-
loph and parts of the prefossette and postfossette being broken away. The anterior side of the protoloph,
especially of the parts corresponding to the protoconule, is provided with conspicuous longitudinal folds
and grooves. The antecrochet is distinct, though very slightly differentiated from the protoloph. The
protocone is distinctly stouter than the hypocone in an internal view. The anterior and posterior basal
cingula are well-developed. The inner side of the protocone and the hypocone is almost entirely free of
such a cingulum, though a very insignificant tubercle, which corresponds to the rudiment of the internal
basal cingulum is present at the bottom of the very entrance of the prefossette. That the internal basal
cingulum is usually absent or but slightly developed in this tooth makes it quite distinct from the upper
cheek-teeth of *Anchitherium aurelianense* and *Hypohippus* (or *Anchitherium*) *equinus*. The protocone and
hypocone appear to be higher than those of *A. aurelianense* and *H.* (or *A.*) *equinus*. The inner surfaces
of the protocone and hypocone are nearly smooth.

The lower premolar is only very slightly worn. The basal part of the paraconid and the very tip
of the metaconid-metastylid are broken off. The protolophid, metalophid, hypolophid and entolophid all
together are shaped like a W in an upper view. The paraconid, corresponding to the inner end of the
protolophid, is scarcely cusp-like. The protolophid is flexed at the part corresponding to about three fifths
of its extension from the tip of the protoconid, so that it runs inside this flexion not antero-internally but
inwards and very slightly backwards; and inclines in height from the protoconid to the paraconid, so that
the latter is very low. The metalophid is concave in the antero-posterior view and is distinctly crenulat-
ed. The hypolophid is constricted off from the metastylid by a furrow running along the posterior outer
side of the latter within the postfossette, and is also concave in the antero-posterior view and crenulated.
The entolophid is flexed at the part corresponding to about three fifths of its extension from the tip of the
hypoconid, so that it runs inside this flexion not postero-internally but nearly inwards; and is concave

in the antero-posterior view, the bottom of the concavity corresponding to the point of the flexion just mentioned. The outer surface of the protoconid and the hypoconid is bluntly keeled at their tips and broadly rounded at their bases. The metaconid and metastylid are imperfectly differentiated, as a characteristic of *Anchitherium* and its allies. The entoconid is more or less prominent, though not so high as the metaconid-metastylid. The entostylid, viz., posterior talon, is distinct, lying just on the posterior surface of the entoconid, and its tip abutting nearly to the point of the flexion of the entolophid. A well-developed, continuous basal cingulum is present along the anterior, outer and posterior sides of the crown. This cingulum is moderately crenulated and is characteristically high, measuring 3 mm. and 4 mm. in height at the bases of the protoconid and hypoconid respectively. This cingulum appears to be much higher than that in *A. aurelianense*. The surface of the enamel is rough, being provided with irregular, discontinuous, vertical ridges and grooves and with regular, continuous, horizontal striæ. The vertical ridges and grooves just mentioned converge upwards to the tips of the protoconid and hypoconid on the anterior outer, outer, and posterior outer sides of the same, and downwards to the very bottoms of the prefossette and postfossette on the anterior outer, outer, and posterior outer walls of the same.

Both the specimens are strongly mineralized and black in colour. Their matrix is hard, compact, fine clayish sandstone of tuffaceous origin. This new species may be distinguished from *A. aurelianense* CUVIER of the Burdigalian and Vindobonian of Europe by the slightly higher protocone and metacone of the upper cheek-tooth, by the practical absence of an internal basal cingulum to the upper cheek-teeth and by the higher basal cingulum of the lower cheek-tooth. *A. esquerre* H. v. MEYER of the Vindobonian, esp. Sarmatian, of Spain appears, so far as specifically distinct from *A. aurelianense*, to be a slightly larger species allied to it.

***Palætapirus yagii*, sp. nov.**

Pl. XIII. (I.), figs. 6-11.

Type-specimens: a right mandibular ramus with P_2 - M_2 *in situ* and a detached M_3 belonging to the same ramus.

Locality: Tanohira, Obora, Kaminogô-mura, Kani District.

Horizon: a bed of tuffaceous sandstone of the Hiramaki Formation.

The mandibular ramus measures as follows.

Length of the specimen as preserved	184 mm.
Length of the symphysis	45 ,, + a
Transverse thickness of the ramus at the anterior side of P_2	18 ,,
Ditto at the anterior side of P_4	17 ,,
Ditto at the anterior side of M_1	19 ,,
Ditto at the anterior side of M_2	24 ,,
Ditto at the anterior side of M_3	27 ,,
Height of the ramus at P_2	40 ,,
Ditto at P_4	48 ,,
Ditto at M_2	40 ,, + a

The teeth measure as follows.

	Length.	Width.	Height of crown
P_2	19 mm.	13.5 mm.	10 mm.
P_3	18 ,,	15.5 ,,	10 ,,
P_4	18 ,,	17 ,,	11 ,,
M_1	21 ,,	16 ,,	9 ,,
M_2	22.5 ,,	16.5 ,,	12 ,,
M_3	25 ,,	17 ,,	13 ,,

The first premolar, viz., P_1 , is moderately worn; it is irregularly triangular in outline, rather short and very wide, being abruptly narrowed forwards. Such an outline of P_1 is somewhat peculiar, and more or less reminds us of that in such a very archetypal Tapirid as *Colodon*. The crown is divided into three— anterior, middle and posterior—parts, the anterior part consisting of the paraconid, the middle part of the protoconid and metaconid, and the posterior part of the hypoconid and entoconid. The tip of the protoconid lies almost on the median longitudinal line of the tooth, instead of lying outside of the same. The protolophid is flexed inwards very slightly at about three fifths of its extension from the protoconid; and back of this flexion, the protolophid almost coincides with the median longitudinal line of the tooth, so that the tip of the paraconid lies slightly inside the same. The metaconid is rather inconspicuous and lies in the back of the tooth and inside the protoconid. The protoconidal fold, which runs backwards, outwards and downwards from the tip of the protoconid, is extremely prominent, so that the basis of this fold corresponds to the most externally projected part of the tooth in an upper view; and consequently, the middle part of the tooth is distinctly wider than the anterior and posterior parts. The extremely prominent protoconidal fold and the very wide middle part of the tooth may be peculiar characteristics of this specimen. The tips of the hypoconid and entoconid are completely connected by the hypolophid, which runs transversely. The tips of the metaconid and hypoconid are also connected by a feeble, but distinct, oblique ridge. A very feeble cingulum is present along the posterior side of the tooth, but it does not extend so far as to reach the inner and outer sides of the tooth. There is a distinct mark of compression against the next tooth, on the posterior side of the tooth.

The second premolar, viz., P_2 , is also moderately worn, it is trapezoidal in outline, being very wide posteriorly and rather abruptly narrowed forwards. The paraconid, protolophid and protoconid lie outside the median longitudinal line of the tooth. The paraconid is much less prominent, and the protolophid less prominent and shorter, than those of the preceding tooth. The metalophid runs transversely as a whole and is curved backwards. The hypolophid is complete, transverse and curved backwards. A feeble, oblique ridge is present, connecting the hypoconid and the middle part of the metalophid. An anterior and a posterior cingula are present, the anterior cingulum of this and the following teeth corresponding to the anterior part of the preceding tooth. The anterior part of this tooth, which corresponds to the middle part of the preceding tooth, is much narrower than the posterior part. Marks of compression against the adjacent teeth are evident on both the anterior and the posterior side.

The last premolar, viz., P_3 , is also moderately worn. It is trapezoidal in outline and is very wide posteriorly and narrowed forwards. The general structure of this tooth is essentially similar to that of the preceding tooth, though the paraconid is more insignificant, the protolophid shorter and less prominent, the metalophid more extensive and less flexuous, the metaconid and the entoconid higher, and the valley between the last-mentioned cusps consequently deeper.

The first molar, viz., M_1 , is much worn. It is oblong quadrangular in outline, and is longer and narrower than the just preceding tooth. The anterior part, which consists chiefly of the metalophid, is slightly wider than the posterior part, which consists chiefly of the hypolophid. The cingula and marks of compression against the adjacent teeth are similar to those of the just preceding tooth.

The second molar, viz., M_2 , is moderately worn. It is almost similar in shape and general structure to the first molar, but larger. All the paraconid, protolophid and the oblique ridge connecting the hypolophid and the middle part of the metalophid are very feeble and almost indistinct, so as to be practically negligible. The anterior lobe is slightly wider than the posterior, but the metalophid and hypolophid are subequal and slightly curved backwards. The two lophids are higher, and the valley between them is deeper, than those of any of the premolars and the first molar. The anterior and posterior cingula are distinct, but very feeble. Marks of compression against the adjacent teeth are also evident on both the anterior and posterior sides.

The last molar, viz., M_3 , is slightly worn. It is also subquadrangular, and is more oblong, with more rounded angles, than the first and second molars. The paraconid and protolophid are quite indistinct, and the ridge connecting the hypoconid and the middle part of the metalophid is also nearly so. The anterior lobe is wider than the posterior, but the metalophid and hypolophid are subequal and slightly curved backwards. The anterior and posterior cingula are also feeble; the latter is much less extensive transversely than the former. A mark of compression against the just preceding tooth is evident on the anterior side.

The present species differs from *P. helveticus* (H. v. MEYER)¹⁾ of the Burdigalian of Europe in the larger cheek-teeth, in the anterior lobe of each lower premolar being much narrower than the posterior, and especially in the comparatively short and wide P_2 . In short, the former appears to be more progressive than the latter in the size of the teeth, but just the reverse in the general plan of structure of the same. Judging from GAUDRY's figure²⁾, *P. douvillei* FICHOL³⁾ of either the Oligocene or the Miocene of France appears to be more progressive than *P. helveticus* in the general plan of structure of the upper premolars. So that, there is very little probability that it is conspecific with the present new species, which is more archetypal than *P. helveticus* in the general plan of structure of the lower premolars. As to *P. meyeri* KAFKA⁴⁾, the present writer could not get its original description owing to the last great war; and he cannot, at present, try any comparison between this Bohemian and the new Japanese species, though it is hardly to be expected that, one and the same species of Tapirids should occur in two lands so far distant from each other.

Teleoceras (Brachypotherium) pugnator, sp. nov.

Pl. XIV. (II).

Type-specimen: a palate bearing P^2 — M^3 of both sides *in situ*.

Locality: Nino, Hiramaki-mura, Kani District.

Horizon: a bed of tuffaceous sandstone of the Hiramaki Formation.

The palate measures as follows.

Width of the palate, including the teeth, at P^2	178 mm.
Ditto at M^1	210 "
Ditto at M^3	220 "
Width of the palate, excluding the teeth, at P^2	57 "
Ditto at M^1	75 "
Ditto at M^3	85 "

The teeth measure as follows.

	Length.	Width.	Ditto at grinding surface.	Height of crown at outer side.
P^2 {R. :	23 mm. + a	48 mm. \pm	35 mm. + a	15 mm. \pm
{L. :	25 " + a	48 " \pm	37 " + a	15 " \pm
P^3 {R. :	42 "	61 "	52 "	18 "
{L. :	41 "	62 "	52 "	19 "
P^4 {R. :	48 "	63 " + a	55 " + a	17 " + a
{L. :	47 "	70 "	59 "	18 "
M^1 {R. :	59 "	75 "	61 "	13 "
{L. :	54 " + a	73 " + a	60 " + a	12 " + a

1) Die fossilen Reste des Genus *Tapirus*; Palaeontogr., Bd. XV., 1867.

2) La dentition des ancêtres des Tapirs; Bull. Soc. Géol. France, ser. III., T. XXV., 1867.

3) Études sur les vertébrés fossiles d'Issel; Mém. Soc. Géol. France, ser. III., vol. V., 1888.

4) Recente und fossile Huftiere Böhmens; Arch. Naturwiss. Ld. Durchf. Böhmen; Bd. XIV., 1913.

M ²	{R. :	65 mm.	76 mm.	65 mm.	14 mm.
	{L. :	65 "	76 "	64 "	15 "
M ³	{R. :	60 "	69 "	58 "	25 "
	{L. :	64 "	70 "	59 "	18 "
Estimated united length P ² -P ⁴					115 mm. ±
United length of M ¹ -M ³ of right side					170 "
Ditto of left side					173 "

All the cheek-teeth are well worn, but not so very strongly as the valleys have entirely worn away from the grinding surface. They are very low-crowned; and the degree of being worn down is rather nearly uniform, instead of being much differentiated, American *Teleoceras*, viz., subgenus *Teleoceras* s. s., is stated by OSBORN¹⁾ and by SCHLOSSER²⁾ to be hypselodont and its cheek-teeth appear to wear very unequally³⁾. In the brachyodonty just mentioned, the species represented by the present specimen appears to differ much from, and to be more archetypal than, American *Teleoceras*.

The second premolars of both sides are incomplete, their anterior parts being broken away. They might perhaps measure ca. 30 mm. in length, before they were broken. The antecrochet is very imperfectly differentiated from the protoloph. As a result of wearing, the antecrochet and the metaloph are joined together, so that the prefossette is entirely closed. The crista is indistinct. The crochet is exceedingly feeble. The internal cingulum is very well-developed, and is interrupted at the inner side of the protocone; it is distinctly crenulated.

The third premolar of either side is short and wide, as a characteristic of *Teleoceras* in contrast to *Aceratherium*. The antecrochet is well differentiated, though the protocone is not very strongly constricted. The antecrochet and the metaloph are also connected as a result of wearing. The crista is indistinct. The crochet is very imperfectly differentiated from the metaloph and is very feeble. The parastylar and paraconal folds are indistinct, and the metaconal fold is much more so. The internal cingulum is well-developed, and is interrupted at the inner side of the protocone; it is distinctly crenulated.

The last premolar is almost similar to the just preceding tooth in general structure, but larger in size. As the degree of wearing is less than in the preceding tooth, the antecrochet and the metaloph are not connected, so that the prefossette is not yet closed.

The first molar is not so short in proportion to its width as in the third and last premolars. The antecrochet is well-developed, and the protocone is strongly constricted off from the other part of the protoloph. As a result of wearing, the antecrochet and the metaloph are connected. The crista is almost indistinct. The crochet is very imperfectly differentiated from the metaloph. The parastylar and paraconal folds are faintly developed, and the metaconal fold is exceedingly inconspicuous. The cingula are well-developed along the anterior inner side of the protoloph and along the posterior inner side of the metaloph, but not along the inner side of the tooth.

The second molar is almost similar to the first molar in general structure, but larger. The entrance of the prefossette is widely open, being distinctly wider than that of the first molar. And at this entrance, a small cluster of a few irregular tubercles is present, corresponding to a rudiment of the internal cingulum.

The last molar is subtriangular in outline. The antecrochet is very well-developed, though the protocone, is less markedly constricted off than in the first and second molars. The crista is more or less distinct. The crochet is well-developed. The parastylar and paraconal folds are rather conspicuous. The

1) New Miocene rhinoceroses with revision of known species; Bull. Am. Mus. Nat. Hist., vol. XX., art. XXVII., 1904.
 2) Loc. cit.
 3) As to American *Teleoceras*, see also MATTHEW: Hitherto unpublished plates of Tertiary Mammalia and Permian Vertebrata prepared under the direction of COPE; Am. Mus. Nat. Hist., Monograph series, No. 2, 1915.

cingulum is well-developed only along the anterior inner side of the protoloph. The entrance of the prefossette is very widely open, being distinctly much wider than that of any other cheek-tooth. And at this entrance, a cluster of a few irregular tubercles is also present.

The European representatives of *Teleoceras* were thoroughly reviewed formerly by OSBORN¹⁾ and recently by REPÉLIN²⁾. According to the statements of these authors, *T. aurelianense* (NOUËL) of the Burdigalian of France appears much to resemble the present new species in many dental characteristics, though the latter can be distinguished from the former by the larger size and by the better developed antecrochet and the more strongly constricted protocone of the upper cheek-teeth. A comparison of the cheek-teeth of the present species with those of the other Asiatic and American representatives of *Teleoceras* may be made as follows. (p. 8).

So far as the dental characteristics are concerned, the present species appears to be not very close to any of the known Southern Asiatic *Teleoceras*; and indeed it appears to be farther from any of the latter than it does to *T. aurelianense* of the European Burdigalian. Further, the present species appears to be closer to the American species than any of the Southern Asiatic species to the same, though the present species is distinctly more archetypal and the American distinctly more progressive,

Sciurid, gen. & sp. indet.

Pl. XIII. (I), fig. 12.

Specimen: a right upper incisor,

Locality: Banjōbora, Kaminogō-mura, Kani District.

Horizon: a bed of tufaceous sandstone of Hiramaki Formation.

The incisor measure as follows.

Anterio-posterior diameter	...	...	...	...	...	...	...	...	...	...	3.8 mm.
Transverse diameter	...	...	...	...	...	...	...	...	...	...	3 "
Height in straight line	...	...	...	...	...	...	...	...	...	...	17 " ±
Ditto along the anterior curve	...	...	...	...	...	...	...	...	...	...	20 " ±

This incisor is compressed transversely and is subtriangular in cross section; it answers well to an upper incisor of the *Sciurinae* in general structure. As the present material is too poor, the generic and specific consideration of the Hiramaki Sciurid is to be deferred to future discoveries.

Geological Correlation.

The present writer has already suggested that, the fresh-water deposit of Kani District, which has yielded the fossil remains of certain terrestrial Mammals, is to be referred to Lower Miocene. The additional material at present simply appears to emphasize the same view. The present writer wishes, in this instance, to proceed to a more precise comparison of this fauna to that of some more typical Mammalian horizons of foreign lands.

The fresh-water deposit of Kani District is named "Hiramaki Formation" by SAGA in the manuscript of a report of geological research of Kani District and its vicinities. As fossil remains of horses are very important horizon-determiners, this Hiramaki Formation may again be called *Auchitherium-zone*.

1) Phylogeny of the rhinoceroses of Europe; Bull. Am. Mus. Nat. Hist., vol. XIII, art. XIX., 1900.

2) Les Rhinocerotides de l'Aquitainien supérieur de L'Agenais (Laugnac); Ann. Mus. d. Hist. Nat. de Marseille, t. XVI., 1917.

<i>T. fatchiangensis.</i>	<i>T. blanfordi.</i>	<i>T. persica.</i>	<i>T. pugnator.</i>	<i>T. habeneri.</i>	<i>T. medicornutus.</i>	<i>T. fossiger.</i>
L. Miocene of India (Gaj).	L. to M. Miocene of India (Gaj and L. Siwaliks).	Pontian of Persia (Maragha).	L. Miocene of Japan (Hiranaki).	<i>Hyparrion</i> -fauna of China (Shansi, Shensi and Szechuan).	M. Miocene of N. America (Pawnee Creek).	U. Miocene or L. Pliocene of N. America (Republican River and Archer).
? Known P ₄ wide. Anterochet not well-developed in known P ₄ , rather well-developed in known M ₂ . Crista almost indistinct. Crochet rather strong. Protocone strongly constricted. Outer folds very strong.	? P ₃ and P ₄ wide. Anterochet well-developed in P ₃ -M ₃ . Crista faint or almost indistinct. Crochet rather strong. Protocone strongly constricted. Outer folds faint.	? ? Anterochet well-developed. Crista feeble or almost indistinct. Crochet very strong. Protocone most strongly constricted. Outer folds very feeble, being almost indistinct.	Cheek-teeth brachyodont, wearing rather uniformly. P ₃ and P ₄ wide. Anterochet well-developed in P ₃ -M ₃ . Crista almost indistinct. Crochet rather faint. Protocone strongly constricted. Outer folds faint.	Cheek-teeth hypselodont, wearing very unequally. P ₃ and P ₄ very wide. Anterochet well-developed in P ₃ -M ₃ . Crista more or less distinct in P ₃ -P ₄ , almost indistinct in M ₁ -M ₂ . Crochet very strong. Protocone strongly constricted. Outer folds faint.	Cheek-teeth hypselodont, wearing very unequally. P ₃ and P ₄ . Anterochet well-developed in P ₃ -M ₃ . Crista almost indistinct. Crochet rather strong. Protocone strongly constricted. Outer folds faint.	Cheek-teeth markedly hypselodont, wearing very unequally. P ₃ and P ₄ very wide. Anterochet well-developed in P ₃ -M ₃ . Crista faint or almost indistinct. Crochet very strong. Protocone strongly constricted. Outer folds faint.
Internal cingulum of known P ₄ interrupted at inner side of protocone, forming a prominent tubercle at entrance of prefossette. Upper molars almost free of internal cingulum.	Internal cingulum of referred P ₃ and P ₄ interrupted at inner side of both protocone and hypocone, forming a prominent tubercle at entrance of prefossette. Rudiment of internal cingulum of M ₁ -M ₃ forming a prominent tubercle at entrance of prefossette.	? Upper molars almost free of internal cingulum.	Internal cingulum of P ₃ -P ₄ well-developed, interrupted at inner side of protocone. M ₁ -M ₃ almost free of internal cingulum.	Internal cingulum of P ₂ interrupted at inner side of hypocone; that of P ₃ and P ₄ interrupted at inner side of both protocone and hypocone. M ₁ -M ₃ with rudimentary internal cingulum at entrance of prefossette.	Internal cingulum of P ₂ -P ₄ well-developed; ? interruption. M ₁ -M ₃ almost free of internal cingulum.	Internal cingulum of P ₂ -P ₄ well-developed; ? interruption. M ₁ -M ₃ almost free of internal cingulum.

Now, the fauna of the Hiramaki Formation is compared with that of the more allied standard horizons of Europe as follows.

Hiramaki.	European Upper Aquitanian.	European Burdigalian.	European Vindobonian.
<i>Anchitherium hypohippoides.</i>	—	<i>Anchitherium aurelianense.</i>	<i>A. aurelianense.</i>
<i>Palæotapirus yagii.</i>	<i>Protapirus douvillei.</i>	<i>Palæotapirus helveticus.</i>	—
<i>Teleoceras pugnator.</i>	<i>T. aginensis</i> & <i>aquitanicus.</i>	<i>T. aurelianense</i>	<i>T. brachypus</i> & var. <i>eurydactylus.</i>
Sciurid sp.	<i>Sciurus chalaniati</i> & <i>feignouxi.</i>	—	<i>Sciurus sansaniensis.</i>
<i>Amphitragulus minoënsis.</i>	<i>A. elegans,</i> &c.	<i>A. scheuchzeri,</i> &c.	<i>Palæomeryx kaupi,</i> &c.
<i>Trilophodon</i> of <i>angustidens</i> -type.	—	<i>Trilophodon angustidens.</i>	<i>T. angustidens.</i>

As already pointed out, *Anchitherium hypohippoides* is slightly more progressive than the Burdigalian stage of *A. aurelianense* in the higher protocone and hypocone of the known upper cheek-tooth. *Palæotapirus yagii* is more archetypal than *P. helveticus* in the general plan of structure of the premolars and more progressive than the same in the size of the teeth; and evidently more progressive than *Protapirus*. *Teleoceras pugnator* is very near to *T. aurelianensis* of the European Burdigalian, but not so near to either *T. aginensis* and *aquitanicus* of the European Upper Aquitanian or *T. brachypus* and var. *eurydactylus* of the European Vindobonian. *Amphitragulus minoënsis* is more progressive than any known European *Amphitragulus* in size; and more archetypal than *Palæomeryx* in the presence of P₁. *Trilophodon angustidens* is absent in the Upper Aquitanian but present in the Burdigalian and Vindobonian of Europe. As a whole, the faunal stage of the Hiramaki Formation, viz., the *Anchitherium*-zone of Mino, is more progressive than that of the European Upper Aquitanian, almost homotaxial with that of the European Burdigalian and more archetypal than that of the European Vindobonian.

Again, the fauna of the Hiramaki Formation is compared with that of the more allied Mammalian horizons of India as follows.

Hiramaki.	Gaj of India.	Lower Manchhar of India.	Lower Chinji of India.
<i>Anchitherium hypohippoides.</i>	—	—	—
<i>Palæotapirus yagii.</i>	—	—	—
<i>Teleoceras pugnator.</i>	<i>T. fatehjangensis</i> & <i>blanfordi.</i>	<i>T. blanfordi</i> var.	<i>T. blanfordi</i> var.
Sciurid sp.	—	—	—
<i>Amphitragulus minoënsis.</i>	<i>Propalæomeryx exigua.</i>	<i>P. aff. exigua.</i>	<i>P. sivalensis.</i>
<i>Trilophodon</i> of <i>angustidens</i> -type.	<i>Hemimastodon crepusculi</i> & <i>Trilophodon aff. pandionis.</i>	<i>T. angustidens</i> var. <i>palæindicus,</i> <i>T. pandionis</i> & <i>falconeri.</i>	<i>T. angustidens</i> var. <i>chinjensis,</i> <i>T. falconeri</i> & <i>macrognathus.</i>

Such genera as *Anchitherium*, *Palæotapirus* and *Amphitragulus* are not recorded from the Indian horizons. A comparison of *Amphitragulus minoënsis* with *Propalæomeryx* is yet problematical. *Teleoceras pugnator* is not so close to either *T. fatehjangensis* or *T. blanfordi* as the same is to *T. aurelianense*;

and it is not clear whether *T. pugnator* or *T. blanfordi* is the more archetypal or the more progressive, though *T. pugnator* may be more progressive than *T. fatehjangensis*. A comparison of *Trilophodon* of *angustidens*-type of the Hiramaki Formation with the Indian Trilophodonts belongs to a matter of future studies. Thus, it is a very difficult problem to correlate the Hiramaki Formation with one of the Indian horizons directly from the stand-point of palæontology. The palæontological evidences for the presumed correlations between the Hiramaki Formation and any one of the Gaj, Lower Manchhar and Lower Chinji are of almost equal value. On the other hand, the Hiramaki Formation appears more or less to resemble the Gaj in the stratigraphical succession and from the stand-point of the theory of periodical crustal movements. The stratigraphical succession of the Tertiary of the Province of Mino, in comparison with that of Jōban (Provinces of Hitachi and Iwaki) Coal-field as well as of Burma and India, is shown diagrammatically as follows (p. 86).

According to PILGRIM¹⁾, the Gaj (Upper Nari) corresponds to Upper Aquitanian or Lower Burdigalian, the Lower Murree to Burdigalian-Helvetian, the Upper Murree to Helvetian-Tortonian and the Lower Siwaliks to Tortonian to Sarmatian; and among the Lower Siwaliks, the Lower Manchhar to Tortonian, the Lower Chinji to Tortonian-Sarmatian and the Upper Chinji to Sarmatian. So far as the Gaj fauna is concerned, this fauna appears to the present writer to be richer in Burdigalian characteristics and poorer in Aquitanian characteristics than it had been at first considered by PILGRIM. Moreover, it may be necessary to keep in mind the general rule, that a Mammalian fauna of a land of lower latitude is richer in archetypal forms than that which is contemporaneous in a land of higher latitude. The Gaj fauna may be either mostly Burdigalian and partly Aquitanian or entirely Burdigalian.

The Hiramaki fauna may be, as already stated, Burdigalian, viz., Lower Miocene. The Tsukiyoshi Formation, which yields the characteristic Molluscan fossil *Vicarya*, may be Middle-Lower Miocene, as is judged from its relative position to the Hiramaki and Togari Formations. The lower part, which corresponds to the *Desmostylus*-zone proper, of the Togari Formation may be, as formerly stated by the present writer, Middle Miocene of North American standard, which is correlated by certain American writers with the stages of Sansan (Helvetian) and La Grive-Saint-Alban (Tortonian).

The fact that, the Hiramaki fauna and the European Burdigalian fauna are near each other, and neither of them are found near any fauna of the Gaj and Lower Siwaliks of India, may indicate the presence of distinct faunal regions such as Palæarctic and Indo-African Regions even in those ancient periods.

Suggestion as to the Phylogeny and Migration of the Hiramaki Species and their Allies.

The present writer³⁾ has already suggested the probability that, certain Asiatic Lower Miocene forms such as are represented by the Hiramaki species might have migrated into North American Middle Miocene. Additional material such as is reported in the present paper simply emphasizes the same view.

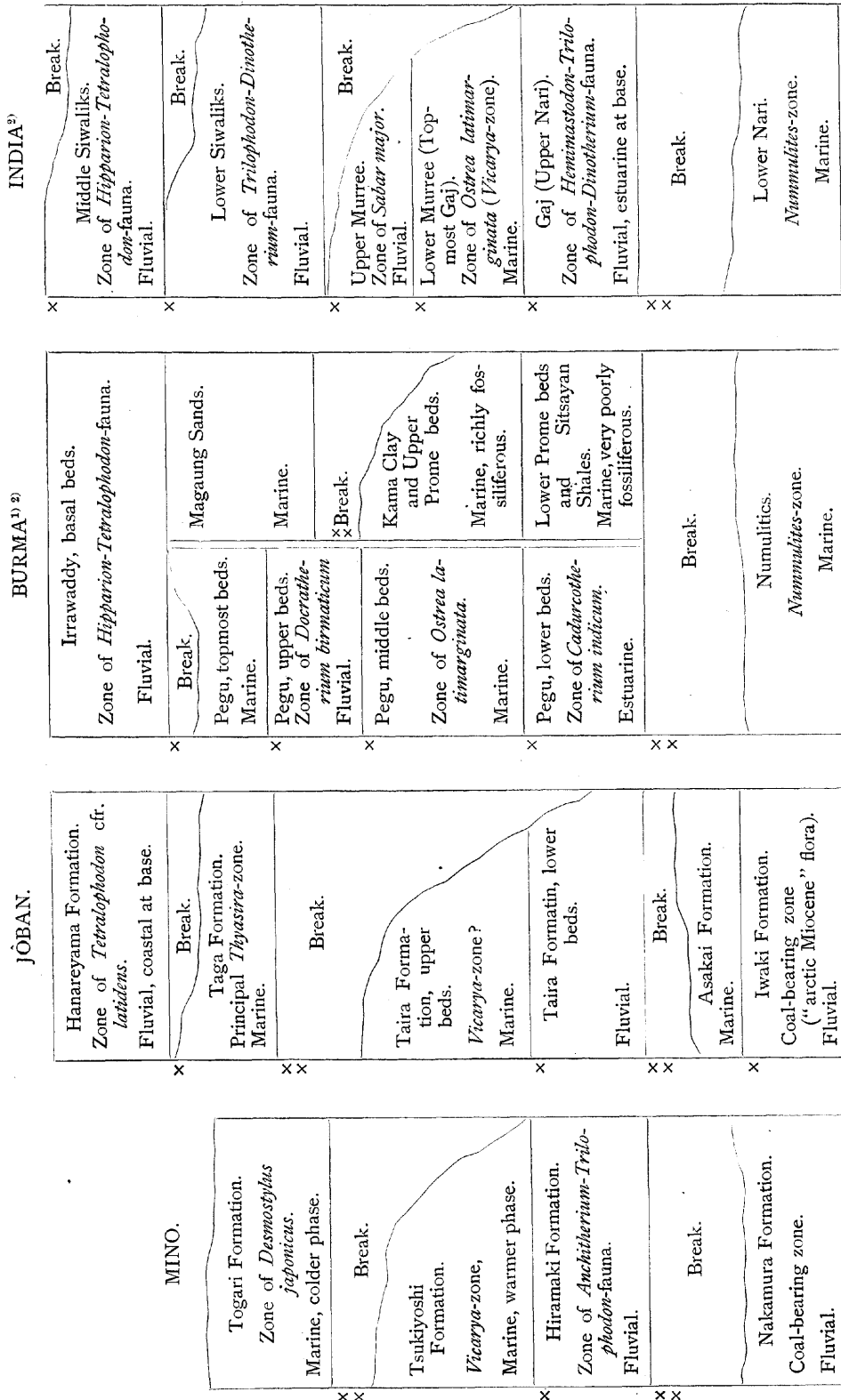
SCHLOSSER⁴⁾ has recorded a very large species, *Anchitherium zitteli*, from the *Hipparion*-fauna of China, and stated the view that, his species might have been descended from *A. aurelianense* of the European Burdigalian and Vindobonian. Subsequently, his species has been referred to *Hypohippus* by OSBORN and MATTHEW, who maintain the view that, American *Hypohippus* is a derivant from *Anchitherium* of the Old World. As far as the characteristics observed in the scanty specimens are concerned, the Hiramaki

1) Loc. cit.

2) See this journal, Vol. III., 1918, p. 73.

3) Loc. cit.

4) Die fossilen Säugethiere Chinas; Abh. k. bayer. Akad. Wiss., II. Cl., Bd. XII., 1903.



Periods of crustal movement are indicated by x x.

1) STUART: Geological prospects of oil in Western Pegu and Kama; Rec. Geol. Surv. India, Vol. XXXVIII, 1910.—The recorelation of the Pegu System in Burma; *ibid.*
 2) PILGRIM: Preliminary note on a revised classification of the Tertiary fresh-water deposits of India; *loc. cit.*, Vol. XI, 1910.—The correlation of the Siwaliks with Mammal horizons of Europe; *loc. cit.*, Vol. XLIII, 1913.

Anchitherium appears to be more *Hypohippus*-like than the European *Anchitherium*; because, firstly, the absence of the internal basal cingulum from the upper cheek-tooth is common to both the Hiramaki species and *Hypohippus* (except *H. equinum*), in contrast to the European species; and, secondly, the Hiramaki species is apparently less brachyodont than the Burdigalian stage of the European species. This fact answers well to what palæozoogeographically may be expected. It is probable, that the majority of *Hypohippus* descended from the Hiramaki species or its unknown allies, rather than from the European species. Then, *A. aurelianense* might be a member of a collateral branch of the *Anchitherium-Hypohippus* phylum, while the Hiramaki species might be approximately a member of the main stem of the same.

A. aurelianense reminds one of *Miohippus* of the North American Upper Oligocene (*Protoceras*-zone) in the presence of the well-developed internal basal cingulum to the upper cheek-teeth, while the Hiramaki species reminds one of *Kalobatippus* of the same North American zone in the absence of the internal basal cingulum of the upper cheek-teeth. Moreover, at least the Burdigalian stage of *A. aurelianense* is slightly more archetypal than the Hiramaki species in the slightly more brachyodonty as already stated. These facts correspond well to the hypothesis of the centre of evolution and dispersal, which has been developed by OSBORN and MATTHEW.

In Asia, only two fossil species of Tapirids, viz., *Tapirus sinensis* of the Chinese Older Pleistocene and *T. pandanicus* of the Javan Older Pleistocene, have been hitherto known, besides existing *T. (Rhinchoerus) indicus*. As the gap of time between *Palæotapirus yagii* of the Hiramaki Formation and these Pleistocene species is very great, the phylogenical relationships between them cannot be stated with any probability. One fact is evident that, an archetypal Tapirid was present in the age of the *Anchitherium*-fauna of Eastern Asia, quite as well as in that of Europe.

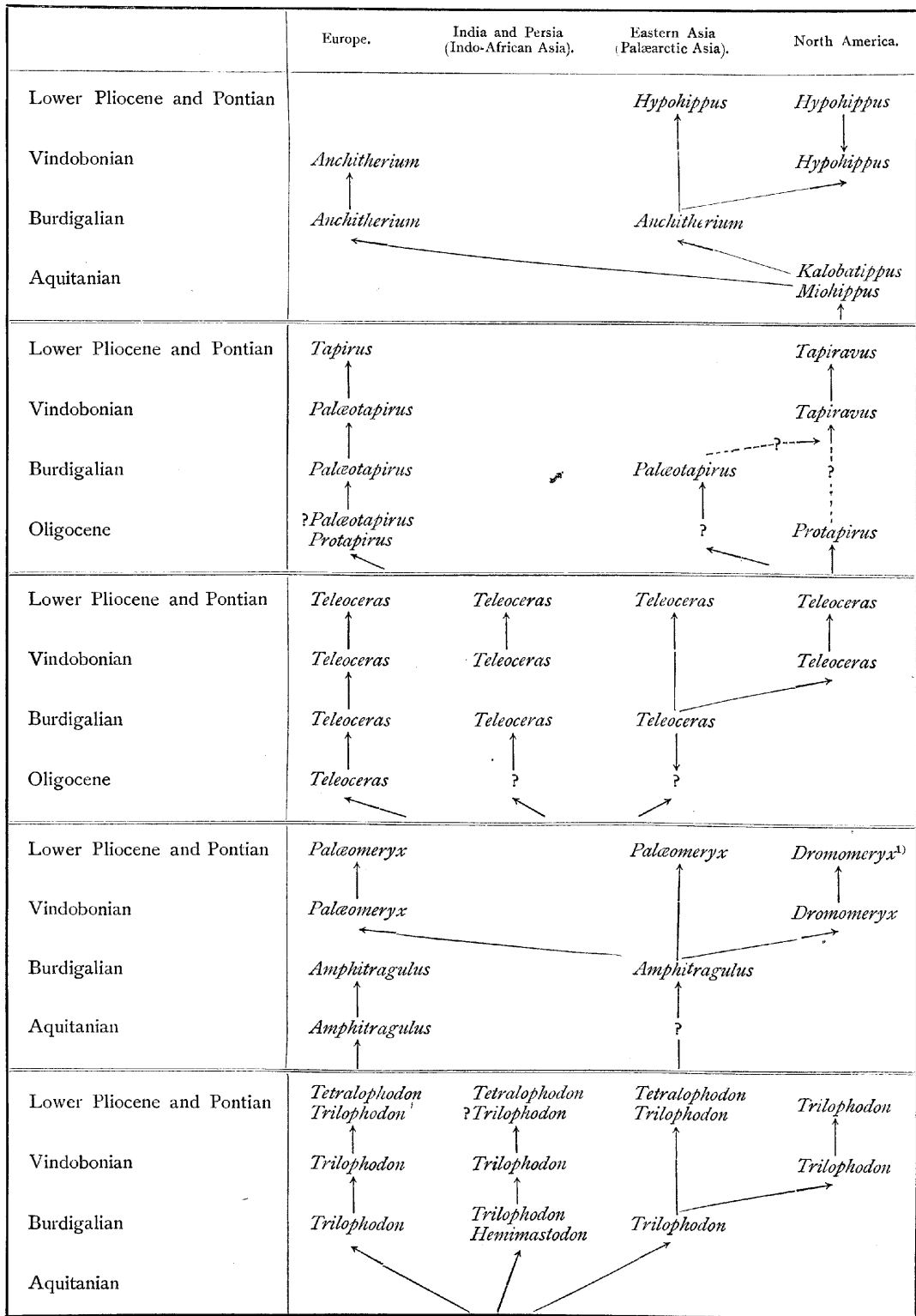
American "*Protapirus*" appears to differ from the *Protapirus-Palæotapirus-Tapirus* series of the Old World in the incompleteness of the hypolophid of the lower cheek-teeth. Then, there may be the two possibilities, that American "*Protapirus*" was actually ancestral to the American Miocene and later Tapirids, or that the same was not actually ancestral to any American Miocene and later Tapirids, the latter being derivants from new immigrants from the Old World in the Miocene Age. Which of the two possibilities may be the truth, cannot yet be determined, owing to our very imperfect knowledge as to "*Tapiravus*" *rarus* and its allies of the North American Middle to Upper Miocene. If the latter be the case, it may be possible, that "*Tapiravus*" was a descendant of the Hiramaki species or its unknown allies.

As already stated, *Teleoceras pugnator* of the Hiramaki Formation, *T. medicornutus* of the American Middle Miocene and *T. fossiger* of the American Upper Miocene or Lower Pliocene form together a fair series in the dental characteristics. It may, of course, be probable, that they are in an intimate relation phylogenically. Thus, the American species of *Teleoceras* might be descended from the Hiramaki species or its unknown allies.

Rhinoceros habereri reported by SCHLOSSER¹⁾ from the *Hipparion*-fauna of China has been referred to *Teleoceras* by OSBORN and MATTHEW. This species appears to be in an evolutionary stage almost similar to that of *T. fossiger*, and is evidently more progressive than *T. pugnator*. It is also probable, that this species may be a descendant of the Hiramaki species or its unknown allies.

To summarize, the descent and migration of the more important Hiramaki Mammals and their allies may be shown diagrammatically as follows.

1) Loc. cit.



1) "American *Palaemeryx*."

Above all, the Hiramaki fauna appears to afford very brilliant illustrations to the migration theory between the Old and New World, quite as expected by OSBORN and MATTHEW.

Revisions of Some Asiatic Fossil Rhinocerotids.

"*Aceratherium blanfordi* var. *hipparionum*" KOKEN¹⁾ is a distinct species of genuine *Aceratherium*, hence is to be called *Aceratherium hipparionum* (KOKEN).

This Rhinocerotid has been established by KOKEN as a variety of "*Aceratherium blanfordi* LYDEK-
KER. SCHLOSSER and the present writer have reported additional materials of this form. OSBORN has referred Indian "*Aceratherium blanfordi* to *Teleoceras*; and this statement has been accepted by PILGRIM. SCHLOSSER maintained the view that, "*Aceratherium blanfordi* var. *hipparionum*" of China is a genuine *Aceratherium* but not a *Teleoceras*. As a result of the present revision, the present writer came to the conclusion that, OSBORN and SCHLOSSER were correct, each respectively in his way.

If one compare the upper premolars and molars of Indian "*Aceratherium blanfordi* (LYDEK-
KER: Pal. India, Ser. X., Vol. III., Pt. I., 1884; Pl. I., figs. 1 & 2;—PILGRIM: Pal. India, New Ser., Vol. IV., No. 2, 1912, Pl. VII., figs. 4, 5 & 7), with those of the Chinese form (KOKEN: Pal. Abh., III., 1885, Pl. V., fig. 9;—SCHLOSSER: Abh. K. Bayer. Akad. Wiss., II. Cl., XXII, 1903, Pl. VI., figs. 1-5, 16-18), one may clearly recognize the following differences between them.

(1) P³ and P⁴ of the Indian species are each much smaller than those of the Chinese form; and especially, the inner half of the former is much shorter than that of the latter.

(2) The antecrochet of P³ and P⁴ of the Indian species is rather well differentiated from the protoloph, while that of the Chinese form is almost indistinct.

(3) The crista and crochet of P³ and P⁴ of the Indian species are feebler than those of the Chinese form.

(4) The basal cingula of P³ and P⁴ of the Indian species are not very strong and are discontinuous, while those of the Chinese form are extremely strong and continuous.

(5) In the Indian species, both P³ and P⁴ have a very prominent tubercle at the entrance of the prefossette, while in the Chinese form, only P⁴ has such a tubercle.

(6) M² of the Indian species is much shorter than that of the Chinese form; and the former is distinctly wider than long, while the latter is longer than wide, when the tooth is not very strongly worn.

(7) In the Indian species, the protoloph and metaloph of M² are rather closely set, the prefossette between them being narrow, while in the Chinese form, the protoloph and metaloph are widely separated from each other, the prefossette being widely open.

(8) In the Indian species, the metaloph of M² is long and reaches the line tangential to the inner side of both the protocones of M² and M³, while in the Chinese form, it is short and does not reach the same line.

(9) The protocone of M¹—M³ of the Indian species is strongly constricted, while that of the Chinese form is not.

(10) The antecrochet of M¹—M³ is much stronger in the Indian species than in the Chinese form.

(11) M¹—M³ of the Indian species are almost free of crista, while those of the Chinese form have a distinct crista.

(12) The crochet of M¹—M³ of the Indian species is not very strong, while that of the Chinese form is extremely strong.

1) As to the literature on this form, see this journal vol. III., 1915, p. 10.

(13) M^2 of the Indian species is almost free of posterior basal cingulum, while M^1 — M^3 of the Chinese form have a well-developed posterior cingulum.

(14) M^1 — M^3 of the Indian species have a prominent tubercle at the entrance of the prefossette, while in the Chinese form, only M^1 and M^2 have such tubercle, which is fainter, and M^3 has no such a tubercle.

As a whole, the differences between the Indian species and the Chinese form are very profound; and it is almost evident, that these two forms cannot be referred to one and the same species or even to one and the same genus. So far as the relative size of the upper cheek-teeth is concerned, the Indian species corresponds well to genuine *Teleoceras* and the Chinese form to genuine *Aceratherium*.

Typical *T. blanfordi* and its Indian varieties range from the Galz (Aquitanian-Burdigalian or Burdigalian) to the Lower Chinji (Sarmatian); while typical *Aceratherium hipparionum* and its close allies range from the *Hipparion*-fauna (Pontian and Lower Pliocene) to a certain phase (ca. Upper Pliocene) of the *Stegodon*-fauna. Thus, it is also indicated geologically that the Indian and the Chinese forms are quite distinct from each other.

Recognizing the Chinese form in question as a member of genuine *Aceratherium*, the geographical and geological distribution of *Aceratherium* and its allies may be tabulated as follows.

	Europe.	India and Persia (Indo-African Asia).	Northern and Eastern Asia (Palæartic Asia.)	North America.
Pleistocene			<i>Elasmotherium</i>	
Upper Pliocene			<i>Aceratherium</i>	
Lower Pliocene and Pontian	<i>Aceratherium</i>	<i>Aceratherium</i>	<i>Aceratherium</i>	<i>Peraceras Aphelops</i> , pars
Vindobonian	<i>Aceratherium</i>	<i>Aceratherium</i>		<i>Peraceras Aphelops</i> , pars
Burdigalian	<i>Aceratherium</i>	<i>Aceratherium</i>	?	?
Aquitanian	<i>Aceratherium</i>	?		

Revision of the Nomenclature of Some Indian Fossil Rhinocerotids.

Finally, the present writer wishes to state his opinion as to the nomenclature of some Indian fossil Rhinocerotids. LYDEKKER, at first, recognized and established many species and varieties in the Indian Fossil Rhinocerotids; but in his later statements, he abandoned some of his species and varieties. Recently, PILGRIM has again recognized and established many species. But, certain ones of PILGRIM's "new species" are evidently pre-occupied by certain ones of LYDEKKER's species and varieties formerly abandoned by LYDEKKER himself. According to the law of priority, LYDEKKER's specific and varietal names are to be revived to replace PILGRIM's new specific names in such a case. From this principle, some of PILGRIM's species are to be revised as follows.

LYDEKKER.	LYDEKKER.	PILGRIM.	Revised.
<i>Aceratherium blanfordi</i> var. <i>majus</i> ¹⁾ , n. sp. & var	<i>Rhinoceros blanfordi</i> ⁴⁾ , pars	<i>Teleoceras blanfordi</i>	<i>T. blanfordi</i> (LYD.)
<i>Aceratherium blanfordi</i> var. <i>minus</i> ¹⁾ , n. sp. & var.	<i>Rhinoceros blanfordi</i> ⁴⁾ , pars	<i>Diceratherium naricum</i> ⁵⁾ , n. sp.	<i>D. minus</i> (LYD.)
<i>Rhinoceros planidens</i> ²⁾ , n. sp.	<i>Aceratherium perimense</i> ³⁾ , pars <i>Rhinoceros perimensis</i> ⁴⁾ , pars	<i>Aceratherium lydekkeri</i> ⁶⁾ , n. sp.	<i>A. planidens</i> (LYD.)
<i>Rhinoceros iravadicus</i> ²⁾ , n. sp.	<i>Aceratherium perimense</i> ³⁾ , pars <i>Rhinoceros perimensis</i> ⁴⁾ , pars	<i>Aceratherium lydekkeri</i> , pars	<i>A. planidens</i> (LYD.) or <i>iravadicus</i> (LYD.)
<i>Rhinoceros sivalensis</i> var. <i>gajensis</i> ³⁾ , n. var.	<i>Rhinoceros perimensis</i> ⁴⁾ , pars	<i>Aceratherium gajense</i> ⁶⁾ , n.sp.	<i>A. gajense</i> (LYD.)
<i>Rhinoceros sivalensis</i> var. <i>medius</i>	<i>Rhinoceros perimensis</i> ⁴⁾ , pars	<i>Aceratherium gajense</i> var. <i>intermedium</i>	<i>A. gajense</i> var. <i>intermedium</i> (LYD.)

1) Additional Siwalik Perissodactyla and Proboscidea; Pal. Indica, Ser. X., Vol. III., Pt. 1, 1884.

2) Molar teeth and other remains of Mammalia; Pal. Indica, Ser. X., Vol. I. Pt. 2, 1876.

3) Siwalik Rhinocerotidae; Pal. Indica, Ser. X., Vol. II., Pt. 1, 1881.

4) Brit. Mus., Cat. Foss. Mam., Pt. III., 1886.

5) Notices of new Mammalian genera and species from the Tertiaries of India; Rec. Geol. Surv. India, Vol. XI., 1910.

6) The Vertebrate fauna of the Gaj Series; Pal. Indica, N. Ser., Vol. IV., No. 2, 1912.

Plate XIII. (I).

- Fig. 1. *Anchitherium hypohippoides*. Type-specimen. Right P³, viewed from below.
Fig. 2. Ditto, viewed from inner side.
Fig. 3. Type-specimen. Left P⁴, viewed from above.
Fig. 4. Ditto, viewed from inner side.
Fig. 5. Ditto, viewed from outer side.
Fig. 6. *Palaeotapirus yagii*. Type-specimen. Right mandibular ramus with P₂—M₂ *in situ*, viewed from outer side.
Fig. 7. Ditto, viewed from above.
Fig. 8. Ditto, viewed from inner side.
Fig. 9. Type-specimen. Right M₃, viewed from outer side.
Fig. 10. Ditto, viewed from above.
Fig. 11. Ditto, viewed from inner side.
Fig. 12. Sciurid sp. indet. Right upper I, viewed from outer side; and transverse section.
All figures natural size.



1



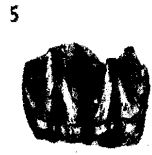
2



3



4



5



6



9



7



10



8



11

12

Plate XIV. (II.).

Teleoceras pugnator. Type-specimen. Palate with P²—M³ of both sides *in situ*, viewed from below $\frac{2}{3}$.

