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PALAEOTRAGUS IN THE TUNG GUR FORMATION OF MONGOLIA[1]

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INTRODUCTION

Among the fossils discovered by the Central Asiatic Expedition of 1930, of The American Museum of Natural History, are a fragmentary skull and several palates and mandibles that would seem to belong to a new species of *Palaeotragus*. All of these specimens came from the "Wolf Camp Quarry," about thirty-five miles southeast of Iren Dabasu on the Kalgan–Urga trail. They were found in the Tung Gur formation of Upper Miocene age.

The purpose of the present paper is to describe the above-mentioned fossils, to compare them with other giraffids and to point out the significance of their presence in the Tung Gur formation of Mongolia.

The author is indebted to Dr. Walter Granger, palaeontologist of the Central Asiatic Expeditions, for permission to study the material described in this paper. Mr. C. N. Astori prepared the illustrations.

DESCRIPTION AND DISCUSSION

Palaeotragus tungurensis, new species

TYPE.—Amer. Mus. No. 26582, a partial skull with right P^2–M^3.

PARATYPES.—Amer. Mus. Nos. 26583, associated right and left mandibular rami with complete lower dentition; 26584, portion of maxilla with right P^3–M^3; 26585, associated palate and left mandibular ramus with worn dentitions; 26586, palate with right and left P^2–M^2 and associated left mandibular ramus with P_{2-4}; 26587, portion of maxilla with left DM^{2-4}, M^{1-2}; 26588, portion of maxilla with left DM^{2-4}, M^1, also right mandibular ramus with DM_{2-4}, M_1; 26589, right mandibular ramus with DM_{2-4}, M_1; 26590, right mandibular ramus with DM_{2-4}, M_1; 26591, right mandibular ramus with P_4–M_3; 26592, left mandibular ramus with P_2–M_3; 26593, left mandibular ramus with M_{1-3}.

HORIZON.—Tung Gur formation of Upper Miocene age.

LOCALITY.—All of the above listed specimens came from the "Wolf Camp Quarry," about five miles southwest of Gur Tung Khara Usu, Inner Mongolia.

DIAGNOSIS.—A large palaeotragine with a broad skull and a deep maxilla. Upper molars quadrate and hypsodont, with strong parastyle and mesostyle, and

[1] Publications of the Asiatic Expeditions of the American Museum of Natural History, Contribution No. 134.

with a strong ridge on the ectoloph of the paracone. Ectoloph of metacone concave and smooth. Internal crescents simple, with a slight projection on the posterior portion of the metaconule crescent. Median internal pillar either absent or but slightly developed.

Upper premolars robust and expanded laterally. External surface marked by a median vertical ridge and by very strong anterior and posterior folds, especially in P^{2-3}. A single internal crescent with an inner process projecting into the fossa.

Mandible long, with a convex lower border, but with a relatively short canine—premolar diastema. Incisors of medium size. Lower cheek teeth hypsodont. Ex-

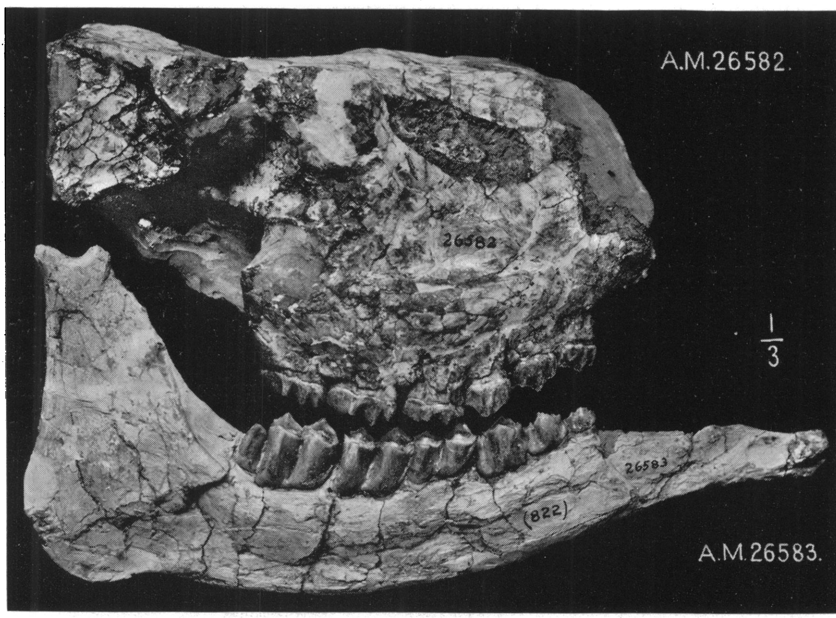

Fig. 1.—*Palaeotragus tungurensis,* new species. Type maxilla, Amer. Mus. No. 26582 and paratype mandible, Amer. Mus. No. 26583. Lateral views, right side. One-third natural size.

ternal crescents of lower molars rather flat, and no median pillar between protoconid and hypoconid. Lingual surfaces of metaconid and entoconid relatively flat. Metastylid weakly developed. Talonid of third molar relatively small.

Lower premolars relatively small. Third premolar lacking internal wall, so that its pattern is similar to the pattern of P_3 in *Giraffokeryx*.

In all of the teeth the rugosity of the enamel is very fine.

Description of the Upper and Lower Dentitions

The salient features of this new *Palaeotragus* are given in the above diagnosis. A full discussion will now be presented, comparisons will be made between this Mongolian *Palaeotragus* and other Eurasiatic species, and at the same time other genera of Palaeotraginae will be considered for comparative purposes.

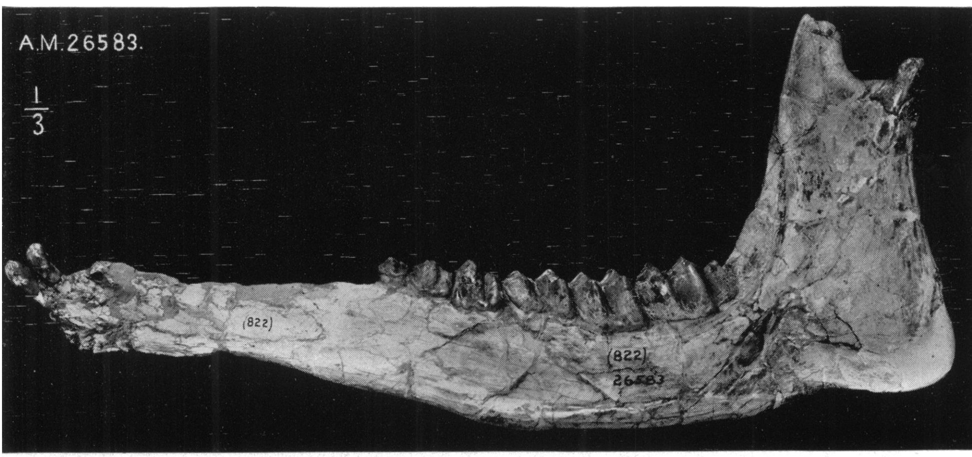

Fig. 2.—*Palaeotragus tungurensis*, new species. Paratype, Amer. Mus. No. 26583, left mandibular ramus. External lateral view. One-third natural size.

Palaeotragus tungurensis is a large species, closely comparable in size to *Palaeotragus coelophrys* (Rodler and Weithofer), described by Bohlin from the *Hipparion* beds of North China. The type skull (Amer. Mus. No. 26582, that of a hornless female) although rather incomplete, would indicate that this new species had relatively broad, flat frontals, in which respect it is again comparable to some of the North China forms. As in other palaeotragines, there is a large preorbital vacuity—a common ruminant character—and the maxilla is deep. Nothing else can be said about this skull, except that the optic foramen is visible, located within the vestibule leading to the common foramen lacerum anterius—foramen rotundum opening.

The upper cheek teeth are at once characterized by their hypsodonty and by the very fine rugosity of the enamel. Here again the species now under consideration is similar to the North China palaeotragines, especially to *Palaeotragus coelophrys.* The upper molars are similar to the corresponding teeth in other species of *Palaeotragus;* that is, the parastyle and mesostyle are very prominent, there is a strong vertical fold on the ectoloph of the paracone, but the same surface in the metacone is smooth and concave, while the protocone and metaconule are crescentic. These crescents are simple, except for the fact that there is a

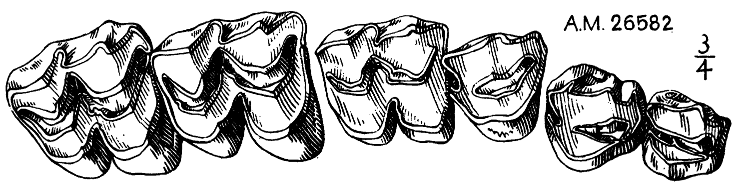

Fig. 3.—*Palaeotragus tungurensis,* new species. Type, Amer. Mus. No. 26582, right P^2–M^3. Crown view, three-fourths natural size.

very slight projection extending from the posterior wing of the metaconule crescent into the posterior fossette. Median internal pillars between the protocone and metaconule are either absent or, when present, very small. There are well-defined anterior cingula on the molars, and sometimes small internal cingula are present.

It is in the upper premolars that tangible differences between the upper cheek teeth of *Palaeotragus tungurensis* and other species are evident. Each upper premolar in the form under consideration consists of a single internal crescent, from the posterior portion of which a small projection extends into the fossette, and an ectoloph characterized by a strong median vertical ridge and extraordinarily well-developed anterior and posterior styles or folds. This last-mentioned character of the strong anterior and posterior folds would seem to be more or less definitive for *Palaeotragus tungurensis.* A considerable amount of variation is shown in these folds, in the several specimens at hand; consequently they shouldn't be given too much weight as specifically characteristic features. Nevertheless, these "premolar folds," if so they may be called, are developed to a degree in the new Mongolian species beyond that observed in most of the other species of the genus *Palaeotragus.*

In the type specimen the last upper premolar is similar to the corresponding tooth in other species of *Palaeotragus*, but in the second and third premolars the posterior styles are folded around so that they reach forward to the median vertical ridge of the ectoloph. The anterior styles of these two teeth are very strong. In one of the paratypes (Amer. Mus. No. 26584) there is a rather well-developed posterior fold on the

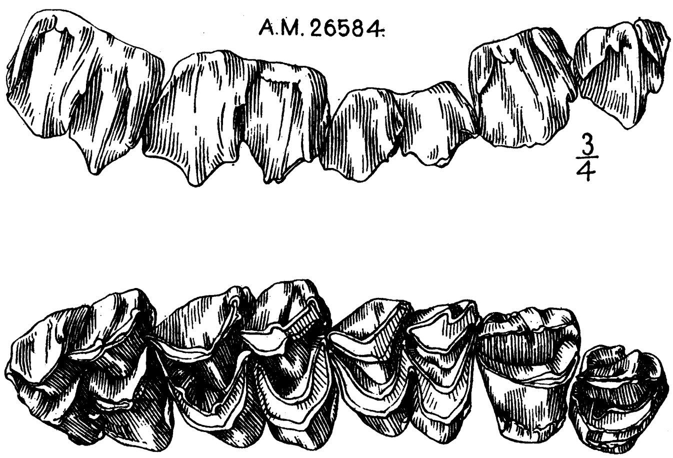

Fig. 4.—*Palaeotragus tungurensis*, new species. Paratype, Amer. Mus. No. 26584, right P^3–M^3. External lateral view above, crown view below. Three-fourths natural size.

last upper premolar, while in this same specimen and in another one (Amer. Mus. No. 26586) the anterior and posterior folds of the anterior premolars are unusually well developed. The character of these folded styles may be seen by examining the illustration (Fig. 4) of Amer. Mus. No. 26584. Bohlin has figured an upper second premolar of *Palaeotragus quadricornis* in which the anterior and posterior external styles are folded somewhat as in the teeth of the Mongolian species.

The paratype mandible (Amer. Mus. No. 26583) is an almost complete specimen. It is characterized by the relative shortness of its canine-premolar diastema, which is shorter than the combined length of the lower cheek teeth. In *Palaeotragus microdon*, as figured by Bohlin, the diastema is considerably longer than the lower cheek teeth. In *Sa-*

motherium the canine-premolar diastema is about equal in length to the length of the lower cheek teeth, while in *Okapia* the diastema is somewhat longer than the length of the cheek teeth. Thus it would seem that *Palaeotragus tungurensis* has a primitively short canine-premolar diastema, and moreover it would seem that the diastema in the Mongolian species is relatively shorter than in any other species of *Palaeotragus* or than in any other genus of the Palaeotraginae. Of course it might be argued that the diastema in *Palaeotragus tungurensis* has been secondarily shortened, but this seems very unlikely in view of the comparatively early geologic age (that is, early in the phylogenetic history of the Giraffidae) of the Mongolian species.

The mandibular condyle is perhaps slightly less elevated above the alveolar border than is the case in *Palaeotragus microdon* or *Samotherium* or *Okapia*. In this respect it is likely that *Palaeotragus tungurensis* is more closely comparable to *Giraffokeryx* than to other members of the Palaeotraginae. The differences are, however, slight.

The coronoid notch in this new Mongolian species is rather broad and the coronoid process is slender. The mandibular condyle, transversely concave, is relatively narrow as might be expected in this early giraffid. The lower border of the mandible is curved, more so than in *Palaeotragus microdon* and *Giraffokeryx*, less so than in *Okapia*, and about the same as in *Samotherium*. The angle of the mandible is produced somewhat posteriorly.

The jaw now being discussed is characterized not only by the shortness of its diastema, as mentioned above, but also by the brevity of its symphysis. This feature, like the short diastema, would seem to be a primitive heritage character in the present species, and it is in distinct contrast to the elongated symphyses of the more advanced giraffids. Even *Palaeotragus microdon* would seem to have a longer symphysis than the Mongolian form.

The lower incisors are of medium size, being closely comparable not only in size but also by virtue of their elongate character to the *Palaeotragus* incisors from North China figured by Bohlin. These elongated incisors in *Palaeotragus tungurensis* again illustrate the retention of a primitive character, for in the more advanced giraffids the incisors become enlarged and spatulate as in *Giraffa*, or they are reduced in size as in *Okapia*. Unfortunately there is no canine preserved in *Palaeotragus tungurensis*.

As in the case of the upper teeth, the lower cheek teeth are very hypsodont, with finely rugose enamel. The lower molars are relatively narrow in comparison to their length, a character that may be explained by the rather flat outer crescents, the protoconid and hypoconid. The metaconid and entoconid are oblique to the median axis of the tooth, and their internal surfaces are flattened. The metastylid is weakly developed and there is no external pillar between the protoconid and hypoconid. The hypoconulid of the third molar is relatively small, so that in the worn tooth it forms a single oval pillar rather than a U-shaped loop.

The lower premolars are proportionately small, that is, their combined length is less than the length of the first two molars. The second lower premolar consists of a simple outer wall with two posterior and one

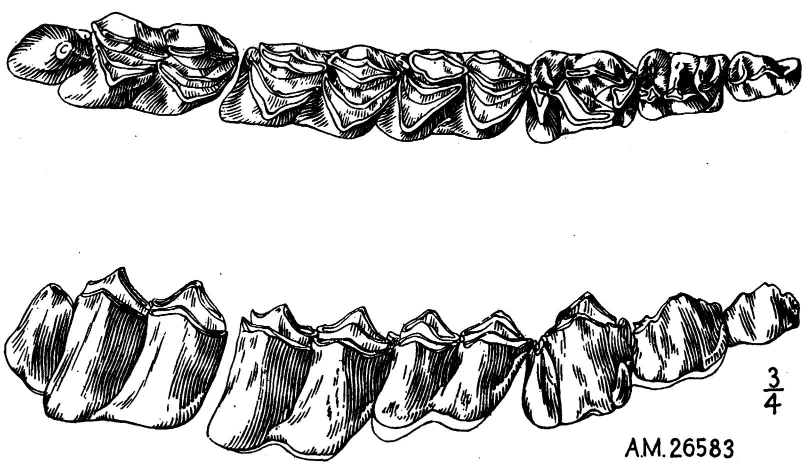

Fig. 5.—*Palaeotragus tungurensis*, new species. Paratype, Amer. Mus. No. 26583, right P_2–M_3. Crown view above, external lateral view below. Three-fourths natural size.

median pillar or ridge projecting inwardly. The third premolar is an elaboration of this same plan; in it there are two anterior, one median and two posterior pillars that project in from the outer wall. This tooth in *Palaeotragus tungurensis* is like the corresponding tooth in *Giraffokeryx* and in *Achtiaria expectans* (= *Palaeotragus expectans*), described by Borissiak, rather than like the third premolars in other species of *Palaeotragus*. In the North China *Palaeotragus*, for instance, the third lower premolar is a replica of the fourth lower premolar, because it consists of an outer anterior crescent and an opposite inner oblique wall, followed by an outer posterior half crescent and another opposite inner oblique wall. We might think of the posterior two premolars in the North China *Palaeotragus* as progressing toward molarization (in fact the anterior moieties of each of these teeth are molariform) while the corresponding teeth in *Palaeotragus tungurensis* are still in a more primitive stage of development, and might be considered as retaining a "cervid" pattern.

The last lower premolar of *Palaeotragus tungurensis* is a very difficult tooth to describe. In some ways it is more or less like the typical *Palaeotragus* fourth premolar, in others it shows certain characters that are exemplified in the last premolar of *Cervus*. To put it briefly, there is an anterior outer crescent, interrupted in its front portion by a deep sulcus. Internal to this there is an antero-posterior (not oblique) wall. Posteriorly there is an internal oblique wall that is in line with the posterior wing of the antero-external crescent, and external to this there is a sort of transverse pillar.

The accompanying diagram (Fig. 7) demonstrates in a much more lucid way than words can tell the premolar patterns in *Palaeotragus tungurensis* and in other members of the Palaeotraginae.

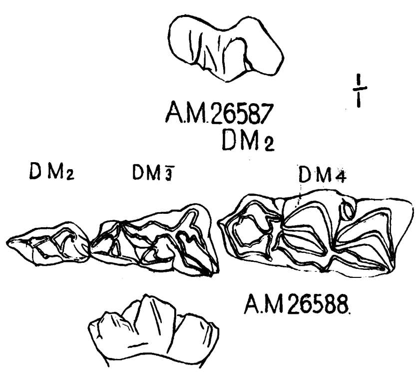

Fig. 6.—*Palaeotragus tungurensis*, new species. Above: paratype, Amer. Mus. No. 26587, left DM^2, external lateral view. Below: paratype, Amer. Mus. No. 26588, right DM_{2-4}, crown views, and internal lateral view of DM_3. All natural size.

The milk dentition of *Palaeotragus tungurensis* may be studied in some of the paratype specimens. The upper and lower deciduous cheek teeth will now be described in detail.

The second upper deciduous molar is essentially a replica of the second permanent premolar, except that it is much narrower in proportion to its length. Bohlin has demonstrated that in the fossil Palaeotraginae there is a constant, well-developed postero-external cingulum on DM^2 (or, as it is often written, DP^2), a character that is also found in the Giraffinae, while in *Okapia* and in the Sivatheriinae this cingulum is absent. The cingulum is large and prominent in the DM^2 of *Palaeotragus tungurensis*, being comparable in its development to the corresponding cingulum in the North China *Palaeotragus*. The third upper deciduous molar is molariform in its posterior part, that is it has a strong mesostyle, a slight vertical expansion on the ectoloph and an internal crescent, while in its anterior portion the ectoloph is strongly expanded anteriorly and medially, and there is an inner wall that, when worn, joins the posterior internal crescent. The fourth upper deciduous molar is quite similar to the first upper permanent molar, so it need not be described here.

The second and third inferior deciduous molars are essentially replicas of the second and third permanent premolars, except that they are somewhat narrower in proportion to their length than are the permanent teeth. In DM_3 the internal pillars or projections terminate in internal walls, thus closing the lingual side of the tooth. The fourth lower milk molar, as in other artiodactyls, consists of three pairs of molariform cusps, in this case, of course, in the form of inner walls and outer crescents. There is a well-developed external pillar between the two posterior crescents.

Measurements of the various specimens of *Palaeotragus tungurensis* are given in the accompanying table.

VARIATIONS IN *Palaeotragus tungurensis*

The specimens representative of *Palaeotragus tungurensis* show a certain amount of individual variation, not only as regards their comparative sizes, but also in the development of tooth structures. As to size, there would seem to be a variation of about twenty per cent in linear dimensions in this species. Thus in the upper molars, there is a range of variation (or dispersion) between the highest and lowest values for the combined length of these teeth of twenty two per cent, using the mean combined length as a basis of one hundred per cent. Similarly, in the lower molars the range of variation is twenty per cent, and in the lower milk molars the variation amounts to eighteen per cent. Of course these values might be changed somewhat if there were more specimens in the series.

The variable characters in the species under discussion are all of a minor importance. They may be briefly discussed here. As was shown in a preceding paragraph, the external cingula of the upper premolars may vary considerably in their development. An internal median pillar may be either present in the third upper molar, as in No. 26584, or absent as in most of the other specimens. This would seem to be the

Measurements of *Palaeotragus tungurensis*

Palate and Upper Teeth

Permanent Dentition		A. M. 26582, type	A. M. 26584	A. M. 26585	A. M. 26586
Height of skull above M^3		110 mm.			
Width of palate, M^1				68 mm.	
P^2	length	17			19 mm.
	width	17			18.5
P^3	length	19	17 mm.	16	18
	width	18	19	17	21
	height		17		
P^4	length	19	19	16	19
	width	21	24	19	24
	height		21		
M^1	length	23	27	20	24
	width	23	26	23	28
M^2	length	28	31	26	29
	width	29	29	25	29
	height		26		
M^3	length	27	29	23	
	width	28	28	24	
	height		25		
P^{2-4}	length	56			57
M^{1-3}	length	77	81	65	

Deciduous Dentition		A. M. 26587	A. M. 26588
DM^2	length	16 mm.	18 mm.
	width	13	13
	height		14*
DM^3	length	21	
	width	18.5	
DM^4	length	21	22
	width	21	20
	height		15*
M^1	length	27.5	24
	width	25	22
	height		19.5
DM^{2-4}	length	58	

* Restored Height.

Mandible and Lower Teeth

Permanent Dentition		A. M. 26583	A. M. 26585	A. M. 26586	A. M. 26591	A. M. 26592	A. M. 26593
Length of mandible, condyle–symphysis		357 mm.					
C–P_2 diastema		106					
Depth of ramus, M_3		40	48 mm.		51 mm.	59 mm.	54 mm.
I_2	width	10					
	height	17					
I_3	width	8.5					
	height	17					
P_2	length	13		14 mm.		12	
	width	8.5		8.5			
P_3	length	18	15	16		15	
	width	12.5	11	11.5			
P_4	length	19	18	20		22	
	width	15	13			19	
	height	20					
M_1	length	25	18		24	23	
	width	16			19	20	
M_2	length	27	24		25	29	25
	width	18	16		20	23	19
M_3	length	37	31		39	40	37
	width	17	15		21	21	17
	height	23					
P_{2-4}	length	49		51		50	
M_{1-3}	length	90	73		90	91	

Deciduous Dentition		A. M. 26588	A. M. 26589	A. M. 26590
Depth of ramus, DM_4			35 mm.	27.5 mm.
DM_2	length	10 mm.	14.5	12.5
	width	6	6.5	5.5
	height		8	7
DM_3	length	17	18	15
	width	9.5	10.5	8.5
	height			9*
DM_4	length	24	30	24
	width	12	15	12
	height		14*	13*
M_1	length	25	28	23
	width	15	16	15
	height	21	21	
DM_{2-4}	length	51	62	52

* Restored Height.

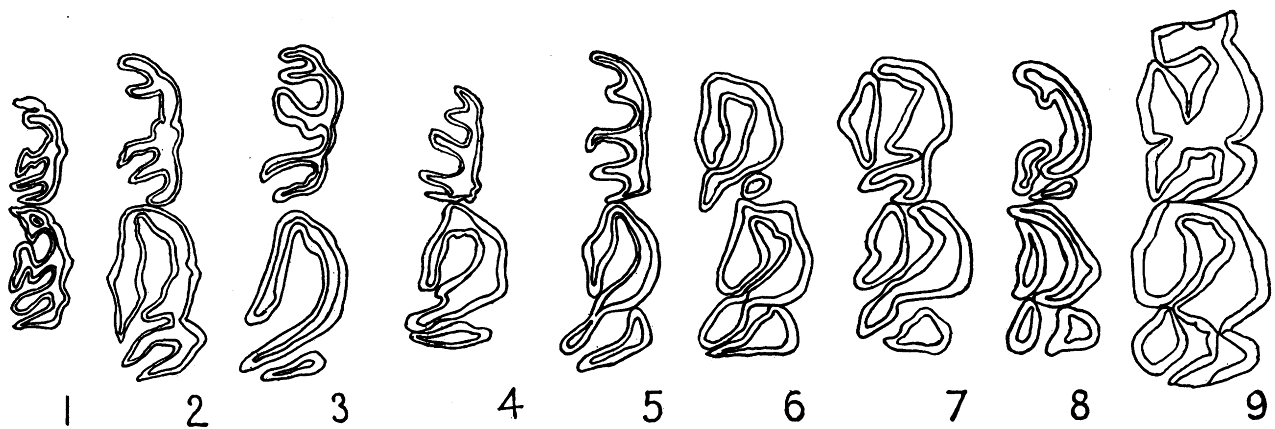

Fig. 7.—Enamel patterns of right P_{3-4} in various giraffids and in a cervid.

1. *Cervus unicolor*. 2. *Giraffokeryx punjabiensis*. 3. *Palaeotragus expectans*. 4. *Palaeotragus tungurensis* (A. M. 26583). 5. *Palaeotragus quadricornis*. 6. *Palaeotragus microdon*. 7. *Palaeotragus coelophrys*. 8. *Okapia johnstoni*. 9. *Giraffa camelopardalis*.
3. Adapted from Borissiak, 1914. 5, 6, 7. Adapted from Bohlin, 1927. All natural size.

only upper molar in which there is a median pillar, when one is present. Likewise, there may or may not be a small internal cingulum in this tooth. In the lower molars there may or may not be external pillars; they are well developed in No. 26585. There would seem to be a certain amount of variation in the heaviness or robustness of the mandibular ramus. In No. 26583 it is rather thin and slender, while in No. 26592 it is very heavy. As to the milk dentition, the external cingulum of the second upper milk molar, cited by Bohlin as being particularly characteristic of the Palaeotraginae, may show considerable size variation, while in the fourth lower milk molar the external pillars may be either large or small.

Comparisons with Other Members of the Palaeotraginae

Palaeotragus tungurensis has already been compared in detail with other palaeotragines, in the preceding pages of this paper. It may be useful, however, to recapitulate the various points whereby this giraffid either resembles or differs from other genera and species of the Palaeotraginae.

As to size, this is a comparatively large form, being closely comparable in this respect to *Palaeotragus coelophrys* from North China. The Mongolian species resembles the North China species in certain other characters also, particularly by reason of the hypsodont cheek teeth with finely rugose enamel, and by the rather long lower incisors. There are unusually strong external folds in the upper premolars, especially P^2 and P^3, of *Palaeotragus tungurensis*, whereby this species would seem to resemble *Palaeotragus quadricornis* more than any other species of the genus. An external cingulum is well developed on the second upper deciduous molar, as in other genera of the Palaeotraginae. (*Okapia*, placed by many authors in this subfamily, lacks the fold.) The enamel patterns of the lower premolars in *Palaeotragus tungurensis* are similar to the patterns in *Giraffokeryx* and in *Palaeotragus expectans* as regards P_3, rather than to those of other species of *Palaeotragus*. Another character that is quite distinctive of *Palaeotragus tungurensis* is the short diastema of the mandible; it is relatively shorter than in the North China *Palaeotragus* or than in *Okapia*, and it may be compared with the rather short diastema of *Samotherium*. In both *Palaeotragus tungurensis* and *Samotherium* the canine-premolar diastema is shorter than the combined premolar-molar length, while in other palaeotragines it is longer than the premolar-molar length. Another point that might be mentioned as characteristic of *Palaeotragus tungurensis* is the relatively small lower premolars.

CONCLUSIONS

Affinities of *Palaeotragus tungurensis*

It would seem as if the new species described in this paper is perhaps more closely related to the several species of *Palaeotragus* from North China, and in certain respects to *Palaeotragus expectans* from Sebastopol, than to any other forms. Common characters between the Mongolian and China species are to be found in the large size, the hypsodont cheek teeth with finely rugose enamel, the strong folds in the upper premolars and the rather long lower incisors. In the pattern of the lower premolars and the short mandibular diastema we may see in *Palaeotragus tungurensis* primitive characters that cause it to resemble on the one hand *Giraffokeryx* and *Palaeotragus expectans*, and on the other *Samotherium*.

Should the Mongolian form be referred to another genus of the *Palaeotraginae*, or should a new genus be created for it? The answer to this question is, that in the preponderance of its characters it resembles not only the generic type, *Palaeotragus rouenii*, but also (and more particularly) the North China species; so there seems to be no need for considering it as belonging to any genus other than *Palaeotragus*.

When the material described above as *Palaeotragus tungurensis* was first examined, there arose the question as to whether it might be representative of a large cervid rather than of a giraffid. The pattern of the lower premolars, the short diastema and the long lower incisors are all characters that would indicate a possible cervid relationship. There are, however, many true giraffid characters in these specimens, characters that indicate a real relationship with *Palaeotragus*. These are the lack of a vertical fold on the ectoloph of the metacone, the structure of the upper premolars, the flattened lingual surfaces of the lower molars and the large size. This last character is of real significance, because in Upper Miocene or Lower Pliocene times the cervids had not yet attained the large size characteristic of some of the Pleistocene and recent forms. The cervid-like characters of *Palaeotragus tungurensis*, likewise are true giraffid characters, to be found in other types of Palaeotraginae. As has been shown in some preceding paragraphs, the finely rugose enamel and the long lower incisors are to be seen in the North China *Palaeotragus*, the premolar pattern is found in *Giraffokeryx* and in *Palaeotragus expectans*, while the short diastema occurs in *Samotherium*.

The Bearing of *Palaeotragus tungurensis* on the Correlation of the Tung Gur Formation

The presence of *Palaeotragus* in the Tung Gur formation of Mongolia doesn't offer any additional conclusive evidence for placing these beds either in the Miocene or in the Pliocene periods. The Tung Gur formation was tentatively regarded as of Pliocene age by Spock (1929, 1930) on the basis of its stratigraphic relationships. Osborn, in 1929 and 1932 placed the Tung Gur in the Pliocene because of the proboscideans, *Platybelodon* and *Serridentinus*, that were found in these beds. Subsequently it was regarded as of Upper Miocene age because it contains a *Listriodon* comparable to *Listriodon splendens* (Colbert, 1934), because a beaver, *Amblycastor tungurensis*, similar to North American forms of Lower Snake Creek age occurs here (Stirton, 1934), and because *Anchitherium* is present but *Hipparion* is not, while the antelopes, *Oioceros grangeri* and *Oioceros noverca*, would seem to be more primitive than related Pontian forms (Pilgrim, 1934). None of the above associations offers really definite proof as to the age of the Tung Gur formation. *Platybelodon* might be either an Upper Miocene or a Lower Pliocene proboscidean. *Listriodon*, although a typical Middle and Upper Miocene suid, persists on into the Pliocene in India, and the same is true of *Anchitherium* in North China. *Oioceros* is a genus extending from the Miocene into the Pliocene. It is conceivable, too, that *Amblycastor*, although of Miocene affinities, might have persisted into the Pliocene in Asia. Perhaps the fact that *Hipparion* is absent from the Tung Gur formation is the strongest argument against placing these beds in the Pliocene.

Palaeotragus tungurensis might be considered either as of Miocene or as of Pliocene age, or to be more specific, it may be either of Sarmatian (or Tortonian) or of Pontian affinities. It closely resembles the North China *Palaeotragus*, which is found in the *Hipparion* beds, and then again it has many affinities (especially in the primitive lower premolars) with *Palaeotragus expectans*, described by Borissiak from the Sarmatian of Sebastopol.

Thus the age of the Tung Gur formation is still left as a somewhat debatable question. Since *Hipparion* is not present in this formation (its absence would seem to be real and not due to the vagaries of collecting), since the antelopes are more primitive than their Pontian relatives, since the rodents (including those recently described by A. E. Wood) are of Miocene affinities, since a rhinoceros (now being studied) is also of Miocene affinities and since some undescribed carnivores would seem to be more primitive than the Pontian forms, there are strong logical justifications for regarding the Tung Gur formation as of Upper Miocene age.

A list of the Tung Gur fauna, as known from *described* forms is presented below.

PISCES
- *Rhineastes grangeri* Hussakof

REPTILIA
- *Testudo* cf. *shensiensis* Wiman
- *Ocadia*(?) *perplexa* Gilmore
- *Trionyx sculptus* Gilmore

AVES
- *Eogrus* sp. Wetmore

MAMMALIA
- *Amblycastor tungurensis* Stirton
- *Protalactaga tunggurensis* Wood
- *Prosiphneus lupinus* Wood
- *Platybelodon grangeri* Osborn
- *Serridentinus gobiensis* Osborn
- *Macrotherium brevirostris* Colbert
- *Macrotherium* sp. Colbert
- *Listriodon mongoliensis* Colbert
- *Stephanocemas thomsoni* Colbert
- *Stephanocemas triacuminatus* Colbert
- *Dicrocerus grangeri* Colbert
- *Dicrocerus* sp. Colbert
- *Palaeotragus tungurensis* Colbert
- *Oioceras* (?) *grangeri* Pilgrim
- *Oioceras* (?) *noverca* Pilgrim

SUPPLEMENTARY NOTE

Some isolated foot bones, particularly a calcaneum, an astragalus, a cuboid-navicular and the distal portion of a metatarsal, discovered in the Tung Gur formation at a locality about ten miles west of Gur Tung Khara Usu, may be referable to *Palaeotragus*. Since they were not associated with the dentitions described in the foregoing pages of this paper, and since their assignment to the genus *Palaeotragus* is at best very doubtful, it would seem advisable not to include them in this description.

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