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Interorbital constriction	0·32	0·37
Nasal bones	0·45	0·40
Anterior palatine foramina . .	0·23	0·20
Upper molar series	0·25	0·22
Lower jaw, from condyles to tip of incisors	0·80	0·78

This species may be readily distinguished from *A. decumana*, *annulata*, and *spiculum* by the comparative shortness of its hind feet, from *A. acontium* and its allies by the cranial characters already mentioned, and from *A. saltatrix**, a species which I only know from the original description, wherein no measurements are given, by the fact that in that species the usual white tip to the tail is absent, the tail ending in a wholly black tuft.

III.—*Supposed new Species of Horse from Central Asia.*

By M. POLIAKOF.

[We are indebted to Mr. E. Delmar Morgan, already well known for his having rendered the travels in Mongolia of the celebrated Russian explorer, Colonel Prejevalsky, accessible to English readers, for the following translation of the description and account by the Russian naturalist Poliakov, in the 'Izvestia,' or 'Proceedings of the Imperial Russian Geographical Society' for January last (1881, pp. 1–20, pls. i. & ii.), of a new species of horse presented by Prejevalsky to the Museum of the Imperial Academy of Sciences of St. Petersburg.]

Prejevalsky's Horse (Equus Przewalskii, n. sp.).

For a very long time zoologists included among the representatives of the solid-hoofed family of the Ungulate order of Mammals only one genus, the *Equus* of the present day. In 1824, the English zoologist Gray formed a subdivision of the whole group, under the new generic designation *Asinus*. He characterized the genus *Equus* as follows:—"Tail wholly covered with hair, no dorsal stripe, warts on fore and hind legs;" or "Cauda undique setosa, linea dorsali nulla, verrucis brachiorum pedumque distinctis." The genus *Asinus* he distinguished in the following way:—"Tail furnished with hair only at extremity; dorsal stripe present; warts on fore, but not on hind legs;" or "Cauda apice setosa, linea dorsali distincta ornatus, verrucis brachiorum distinctis, pedum nullis."

* *Dipus saltator*, Eversm. Bull. Soc. Nat. Mosc. xxi. p. 188, pl. i. (1848).

The only living representative of the former of these two genera was, in Gray's opinion, our domestic horse, *Equus caballus*. To the latter he referred the djiggetai (*Asinus hemionus*, Pall.), the common ass (*Asinus vulgaris*), the quagga (*Asinus quagga*, Gmel.), Burchell's ass (*Asinus Burchellii*, Gray), and, lastly, the zebra (*Asinus zebra*, Linn.). (See Gray's Revision of the Family Equidæ, in Zool. Journ. vol. i. 1825, p. 241).

In this article, I propose describing a new and existing representative of the family of undivided-hoofed mammals. It appears to be in some respects intermediate between our domestic horse and the wild ass; but a very important external distinction places it properly in the genus *Equus*, and not among the asses. This peculiarity in the new species I am about to describe consists in its having four warts or callosities, one on each front and hind leg; whilst every member of the asinine group has only two, on the inside of each fore leg, the hind legs being invariably free from them. The warts on the hind legs of the domestic horse, as well as of the species I am describing, are on the inside of the hock, a little below the joint.

From the following description, it will be evident that the new species closely resembles the domestic horse, both in shape of skull and in many other particulars, as, for instance, in the form of the hoof, absence of dorsal stripe, &c. A new wild representative indigenous to the plains and deserts of Central Asia has therefore been added to the family of Equidæ, hitherto said to consist only of one genus, a representative, moreover, hitherto untamed by man; and in order to admit this new species, the classification of solid-hoofed mammals must undergo a change. Assuming the warts to be the most important generic distinction, the genera *Equus* and *Asinus* must henceforward be distinguished as follows.

Genus i. EQUUS.

Verrucis brachiorum pedumque distinctis, artubus crassis; ungulis latis rotundatis; cauda undique vel in dimidio posteriore setosa.

1. *Equus caballus*, Linn.

Cauda undique setosa, juba pendula vel suberecta, capronis (*i. e.* jubæ partibus in frontem devexis [*Anglice* "forelock"]) longis; loro dorsali plerumque distincto.

2. *Equus Przewalskii*, n. sp.

Caudæ dimidio posteriore setoso; juba brevi, erecta; capronis et loro dorsali nullis.

Ann. & Mag. N. Hist. Ser. 5. Vol. viii.

Genus ii. ASINUS.

Verrucis brachiorum distinctis, pedum nullis ; artubus gracilioribus ; ungulis contractis, subcylindraceis ; cauda apice setosa.

Without recapitulating here the various species of ass comprised in the genus, let me say that all other distinguishing marks mentioned by Gray are only of relative importance. Thus, he lays stress on the dorsal stripe, saying of the horse "*linea dorsali nulla*," and of the ass "*linea dorsali distincta*;" whereas Isidore Geoffroy de St.-Hilaire remarked that this was of no real importance, because many horses have a streak along the back, and, on the other hand, not a few asses are without it (*vide* "Sur le genre Cheval et spécialement sur l'Hémione," *extrait des Nouvelles Annales du Musée d'Hist. Natur.* vol. iv. p. 1). He, too, observed, that the distinction "*cauda apice setosa*" properly only applies to the djiggetai,—the ass, and particularly the zebra, besides other striped species of the solid-hoofed animals, having tails furnished with hair so as to form a regular gradation from the tail of the horse to that of the djiggetai. The tail of my horse must be regarded as intermediate between the horse and the ass; it is, however, so well furnished with hair at the extremity and is so bushy, thick, and bristly at the root, as to differ from most asses; and I am inclined to attach weight to the characteristic "*cauda apice setosa*" as distinguishing the asinine genus from the equine. Upon the whole, therefore, I dissent from Isidore Geoffroy de St.-Hilaire, in so far as he rejects Gray's division of the solid-hoofed mammals into two genera. My horse has the mane of an ass, and resembles it further in having no forelock. Besides the above-mentioned distinguishing marks, asses differ from horses in having more slender legs and narrower hoofs. And as regards warts, these occur on the fore legs of all asses, and have the appearance of smooth hairless patches; whilst with horses they take the shape of horny excrescences, particularly on the hocks. Taking also into consideration the skull as another distinguishing feature between the ass and the horse, although it may be only in the size of its several parts, Gray's division of the solid-hoofed animals must, I think, be upheld.

The materials I have availed myself of in comparing this new species of horse with others are:—the stuffed specimens, in the Zoological Museum of the Academy of Sciences, of Burchell's horse and zebra; a domestic ass; two kiangs (*Asinus kiang*) brought by Prejevalsky from Northern Tibet; four stuffed kulans (*Asinus onager*, Pall.), two from General Poltoratzky's collection in Eastern Dzungaria, and two from the

Aralo-Caspian steppes obtained by General Perofsky; and one stuffed and two unstuffed skins of the djiggetai (*Asinus hemionus*, Pall.) from Southern Dauria or the northern confines of the Gobi steppe, from M. Radde's collection. The last-mentioned specimens are typical, having served Pallas for his description. The kulan (*Asinus onager*) was described by Pallas in his 'Zoographia Rosso-Asiatica,' p. 263, and called by him *Equus asinus* β . *onager*. He considered it most closely allied to the domestic ass, an opinion accepted by many other naturalists, including Gray, but one which I regard as wholly erroneous—the kulan, or *A. β . onager* of Pallas, having no external resemblance to the domestic ass, and being more readily confounded with the djiggetai, its closest congener and nearest geographical neighbour. But without ample materials I could not enter upon a complete analysis of the wild asses of Asia; suffice it therefore to say, that in the following remarks I shall refer to the djiggetai under the name of *Asinus hemionus*, and the kulan under that of *A. onager*.

In describing my new species I shall chiefly dwell on external marks, only examining the head in a general way for the sake of comparison with the domestic horse and the asses. The dentition, specially valuable in examining fossil remains of horses, has been purposely omitted, the materials for a comparative study of this branch of the subject being limited to Owen's description of the Cave of Bruniquel and its organic remains, in Phil. Trans. of Royal Soc. vol. clix. (1869), and the article on American fossil horses in the same volume. An examination of the tooth-system would be interesting also on the basis of Rüttimeyer's researches ("Beiträge zur Kenntniss der fossilen Pferde," in the 'Verhandlungen der naturforschenden Gesellschaft in Basel,' vol. iii. 1863, and the continuation of this work published in the 'Abhandlungen der schweizerischen paläontologischen Gesellschaft,' vol. iii. 1875); but this important subject deserves to be considered in a separate article.

The hunting expedition sent by M. Tihonof from the post Zaisan to the sand deserts of Central Asia, in quest of wild camels, obtained another interesting animal hitherto unknown to science. This was a new species of the equine race, identical with the "Surtakeh" of the Kirghiz, if we may judge from Dr. Brehm's information, collected from the Kirghiz inhabiting the tracts where the wild camel is known to exist ('Zoologische Garten,' 1876, p. 340). One single specimen was shot by these native hunters; and its skin was preserved and sent as a gift to Prejevalsky, who happened to be then at Zaisan. He presented it to the Zoological Museum of the

Academy of Sciences, under the designation "tarpan." After the donor I have named this species of horse *Equus Przewalskii*; but, though more nearly akin to the domesticated horse than to any variety of wild ass existing in Asia, it is distinct from the "tarpan" or wild horse of travellers and explorers of the last century. Indeed the information regarding the tarpan collected by Rytchkof, Gmelin, Georgi, and Pallas is of so contradictory and confusing a nature that many zoologists have decided that the so-called wild horses, or "tarpan," were not, strictly speaking, wild, but tamed horses which had resumed their wild state on recovering their liberty (Wagner in Schreber, 'Die Säugethiere,' pt. vi. pp. 20-29, 1835). A similar opinion was expressed by M. Bogdanof at a meeting of the Society of Naturalists of St. Petersburg; and Pallas was disposed to take the same view (Reise durch versch. Prov. des Russ. Reichs, iii. p. 346) when he assumed the feral horses, or "tarpan" in Tartar-Kirghiz dialect, roaming over the steppes of the Yaik and the Don as well as on that of Baraba, to have originated from domesticated horses owned by Kirghiz, Kalmuks, or other wandering tribes, and to have become wild. In his 'Zoographia Rosso-Asiatica,' vol. i. p. 260, however, Pallas does not speak of the tarpans (*Equus equiferus*) in the same way, but merely states that there had been an intermixture, wild stallions having covered domesticated mares separated from the herd. Ecker, in a recently published work ('Das europäische Wildpferd und dessen Beziehungen zum domesticirten Pferd,' Globus xxxiv. Braunschweig, 1878), accepts the tarpan as the true typical representative of the wild horse, resembling in every particular the animal which, in his opinion, was indigenous at a period of remote antiquity in various parts of Europe, and became subject to man in prehistoric times, probably in the stone period. Ecker finds a striking resemblance between the tarpan and the wild horse of the Caves of Solutré [near Mâcon], particularly in regard to size of body, head, &c. (See also "Le Cheval sauvage de l'Europe et ses rapports avec le Cheval domestique, d'après M. Ecker," by M. Viguier, 'Revue Scientifique de la France et de l'Etranger,' no. xl. 5 Avril 1879, pp. 940-943.) Unfortunately we have no reliable information on this legendary tarpan since the end of last century, not a single traveller either in Siberia or Russia having communicated any information concerning it during the present century; and the testimony of the above-mentioned explorers is merely conjectural. In any case, the animal I have named *Equus Przewalskii* cannot be the tarpan as described by Rytchkof, Gmelin, Pallas, and others. Rytchkof describes the tarpan as equal in

size to an average horse, but rounder in shape, colour dun or bluish, other shades exceptional, with larger head than the Kirghiz horse (Topography of Orenburg, pt. i. p. 290, St. Petersburg, 1762).

Gmelin remarks that the largest of the wild horses is scarcely to be compared for size with the smallest of domesticated breeds; the head is very large in proportion to the rest of the body; the ears are pointed, and either of the same size as those of the domesticated animal, or long and pendulous like those of the ass; the eyes are fiery, the mane very short and curly, the tail in some instances thick, in others scanty, and always shorter than in the domestic animal; the colour is invariably that of the mouse, with an ashy shade underneath the belly, whilst the legs, from the knee downwards, are black; the coat is long and thick, more like fur to the touch than horse-hair ('Reise durch Russland in den Jahren 1768 und 1769,' vol. i. p. 44).

According to Pallas, the following was the appearance of the tarpan:—"Plerique sunt colore griseo-fusco vel pallido, juba, loro dorsi, caudaque fuscis, rostro albedo, circa os nigricante. Sed immiscentur variorum colorum equæ domesticis gregibus per feros admissarios abactæ vel allicitæ. Statura sunt minore domesticis, capite majore, pedibus procerioribus, auriculis paulo majoribus, apice summo falcitim subreflexis. Frons iis supra oculos convexior, cum vortice inter oculos; ungulæ contractæ, subcylindraceæ. Juba ab intervallo oculorum ad scapulas, minus proluxa, suberecta. Vellus hyeme hirtum, laxius in dorso subundulatum. Cauda parum proluxa." (Zoographia R.-As. i. p. 260.)

From these descriptions of the tarpan or wild horse by Gmelin and Pallas, it is evident they were unacquainted with *Equus Przewalskii*; and Rytchkof had perhaps only accidentally heard of it when he mentioned a horse of dun colour (*lutescens*). As to tarpans of blue (*cærulescens*) and other colours mentioned by Rytchkof, they were such as had probably resumed a feral state in the same way as those described by Gmelin and Pallas. If it could be proved that *Equus Przewalskii* had ever been indigenous further west, and if when crossed with the domestic breed, unlike all the asinine tribe, it produced a fruitful progeny, some secrets in the history of our domestic horse might be brought to light—a conjecture partly confirmed by Rytchkof himself when he refers to the dun-coloured tarpans in the neighbourhood of Yaik in company with blue and other coloured tarpans.

It also gathers consistency from the testimony of Pallas as to the habit of tarpan stallions, although in this instance not

of pure breed, to entice mares away from domestic herds; and if from this intermixture of blood were born descendants, these may have shown marks characteristic also of *Equus Przewalskii*. To these may be referred the characteristic of the mixed breed noticed by Gmelin, viz. "legs from knee to hoof black." The converse might also occur: stallions from half-wild troops owned by the nomads of Asia might entice mares from the wild herds; and a peculiar mixture of colour and breed would result from this union. It may be considered very probable that *Equus Przewalskii* would give parentage to a fruitful progeny when intermingled with the domestic animal; and perhaps the wild herd of parti-coloured tarpans was the result of this cross-breeding. On the other hand, it is also probable that the domestic horse, varying in colour, size, and shape, is the descendant of a variety of wild, now extinct breeds. That *Equus Przewalskii* may have been indigenous further to the west, not only on the Yaik or Ural of the present day, but even beyond, in North-eastern Europe, is highly probable, judging from the history of its companions in the steppes of Central Asia.

The saigak in the Diluvial epoch was met with at the Carpathians, where its bones have been discovered, together with stone implements, in caves (Albin Kohn and Dr. C. Mehlis, 'Materialien zur Vorgeschichte des Menschen im östlichen Europa,' Jena, 1879, p. 41). Remnants of the skull of a saigak have also been found in the Volga valley near Sarepta. Not longer ago than the end of last century the saigak was very numerous in West Siberia; and Pallas mentions having seen herds of this antelope on the Irtysh below Semipalatinsk, where it is now never met with and has been completely forgotten. It is even rare at the present day in the environs of Lake Balkash, where not long since it was as numerous as the kulan, large herds of this last-named animal having in Rytchkof's time roamed near the Yaik. In my last excursion to Balkash, during several days passed in its solitudes I did not observe a kulan, and only saw the tracks of one imprinted on the saline soil. These animals exist still in large numbers in the little-inhabited steppes of Eastern Dzungaria and Western Mongolia. A similar fate has probably befallen *Equus Przewalskii*, whose habitat has now been discovered to be the same as that of the saigak, the kulan, and wild camel. If this horse was indigenous at any time further to the west and became closely allied to the troops of domesticated horses owned by the nomads, it would of course be the object of the keenest pursuit, and would the sooner disappear from its earlier habitat. But there exist herds in

more remote parts of Asia called *wild* by Col. Prejevalsky. "Wild horses, called by the Mongols *dzerlik-adu*, are rare in Western Tsaidam, but more numerous near Lob-nor. They are generally in large herds, very shy, and when frightened continue their flight for days, not returning to the same place for a year or two. Their colour is uniformly bay, with black tails and long manes hanging down to the ground. They are never hunted, owing to the difficulties of the chase" (Prejevalsky's 'Mongolia,' English ed. vol. ii. p. 170).

Our specimen of *Equus Przewalskii* is about three years of age; in size it is no bigger than the kulan and djiggetai; its head is nearly of the same length as that of those animals, but lower, and better shaped near the end of the muzzle and nasal bones, with shorter ears than those of the wild ass. Its size is decidedly small in proportion to its head. In shape it takes after the horse; its legs are relatively thick for the size of its body, its hoofs rounder and broader, and its tail better furnished with hair, than in the case of the wild ass. Its colour is dun, with a yellowish tinge on the back, becoming lighter towards the flanks, and almost white under the belly. Its hair is long and wavy, brick-red on the head and nasal bones, of the same colour but longer on the cheeks and about the lower jaw. The extremity of the nose is covered with almost white hairs, a remarkable contrast to the brick-red on the upper part of the head. A short upright [hogged] mane extends from between the ears to the withers, of a dark brown colour, with long yellowish hairs on the margins. It has no stripe of the same colour as the mane along the back, as all Asiatic asses and dun horses have, and a hardly perceptible one along the pelvis. The upper half of the tail is of the same colour as the back; it is longer, thicker at the root, and more bushy than that of any kind of ass; halfway down the tail yellowish hairs are mixed with the brown; and the extremity is dark brown or nearly black. The fore legs are brown near the hoofs and on the knees; and oblique indistinct bars of brown hair extend down the legs. The prevailing colour of the lower parts of the fore legs is brown, a peculiarity never known to occur with wild asses, these having only a narrow barely distinguishable brown margin round the upper rim of the hoof. Dark hairs also occur on the hind legs about the hoofs and much higher.

Thus in external appearance as well as in colour *Equus Przewalskii* is distinct from all wild asses indigenous in the same and neighbouring tracts. Moorcroft's *Asinus kiang* from Tibet differs from it in colour. Of two specimens brought by Prejevalsky from Northern Tibet, the colour of one

on the upper parts of the body and flanks was a reddish brown; the other was partly of an ash-grey, with white hair on the belly, the end of the muzzle, and chest, contrasting with the reddish brown of the upper parts. The fore legs, too, had a reddish tinge about them, whilst the hind legs were light grey, and the tips of the ears inside and outside black. *Equus Przewalskii*, on the other hand, has a barely visible brown patch on the outer side of each ear.

The skull of *Equus Przewalskii* is also distinct from that of all the asinine group, while it closely resembles that of the horse. It is about the same length, but wider at the cheek-bones than kulan, djiggetai, zebra, Burchell's or the common ass; besides this, the brain-cavity is greater, the bones of the face are longer, and the skull is less prominent about the nasal bones than these and all other kinds of wild asses. The section of the cranium measured from the orifice at the back to the frontal hollow on the margin of the ethmoid bone is the greatest. Here, again, *Equus Przewalskii* surpasses all Asiatic as well as African asses, two specimens of a djiggetai and kulan (old ones) excepted.

[The remarks immediately following and the table to which they refer have been omitted, as being too detailed and elaborate to interest any body but specialists.]

The hoofs have also more of the equine than the asinine character about them, as will be seen by comparing the measurements in the annexed Table, given in millimetres.

	<i>Equus Przewalskii</i> .	<i>Asinus kiang</i> , Moorecroft.			<i>Asinus onager</i> , Pall.					<i>Asinus hemionus</i> , Pall.		
		Northern Tibet (Prejevalsky).		Altyn-tagh (Prejevalsky).	Dzungaria (Thibonof).	Dzungaria (Poltoratzky).		Kirghiz Steppe (Count Perofsky).		Dauria (Radde).		
Width of hoofs on fore legs	92	75	73	79	84	95	77	72	83	97	73	82
Length of hoofs on fore legs	110	125	123	125	115	117	110	104	108	108	116	110
Width of hoofs on hind legs	77	75	65	70	73	74	69	..	75	90	77	79
Length of hoofs on hind legs	108	130	117	114	104	102	110	..	104	102	104	109

Of all wild asses, only in two specimens, one an old kulan and the second an evidently old djiggetai, are the hoofs of the fore feet as wide as or wider than in *Equus Przewalskii*; and these may be accounted for by the fact that, in the case of one (the djiggetai) at all events, the hoofs were broken. In all other specimens (kiangs, kulan, and djiggetai) the hoofs are narrower, and in the case of the kiang longer, than in our specimen (a young one).

Thus in Central Asia, besides the kiang (distinguished by the colour of its hair and long narrow hoofs, forming a separate species), besides the kulan and djiggetai (if not distinct species, at all events geographical varieties), there exists another representative of the solid-hoofed family—a whole mass of evidence distinguishing it from the wild asses we have mentioned, and at the same time characterizing the domestic horse. Supposing the upper part of the tail of our new species were more hairy, we should see a small domestic horse of dun colour and low stature; for its comparatively large head would not be striking or extraordinary compared with varieties of domesticated breeds often seen. And if it were possible to prove that culture influenced the growth of the tail, that this became more hairy and the mane longer under altered conditions of life, I would affirm that *Equus Przewalskii* was indeed the animal whose ancestors were reclaimed by man in the stone period, the so-called domestic horse of our day. For the present, however, this cannot be asserted, because other species having affinity with it, belonging either to geographical varieties or distinct kinds, indigenous in other countries under different physico-geographical and climatic conditions, might even more closely resemble the domestic horse in colour and size, although differing from it in hair, and might in this state have become subject to man.

That animals like *Equus Przewalskii* may present different forms and geographical varieties is to be assumed, judging from the instance afforded by the wild ass. Contrary to Dr. Georgi's views ("Etudes zoologiques sur les Hémionides et quelques autres espèces chevalines," in Ann. Sci. nat., Zoologie, 5^e série, xii. 1869, pp. 5–48), including in one species all kinds of the wild ass throughout the vast continent of Asia, from Southern Dauria, across the Gobi, to the Aralo-Caspian plains on the one side, and the highlands of Tibet and the Himalayas to Persia and Syria on the other, I am convinced that many distinct species exist, and a large number of more or less constant geographical varieties. The kiang, for instance, I consider an independent species; the djiggetai and kulan from the Aralo-Caspian plains differ partly in colour and partly in

their hoofs from one another; and most probably the Syrian wild ass (*Equus hemippus*) will be found to vary considerably from the djiggetai. Of all the wild asses of Central Asia, the kiang is most like the domestic ass, owing to the length of its ears and the ash-colour of the upper parts of its body, whilst it differs from it in being bigger and having no transverse dark stripes on the shoulder-blades. The congeners of *Equus Przewalskii*, occupying an enormous extent of territory in Europe and Asia, as we are led to infer from their fossil remains, may have been still more varied and multiform; and the first to be tamed were probably those on the outskirts of the great barren steppes, inhabiting well-watered and hilly tracts near one or other of those land-locked water-basins, the earliest abodes of primæval man. In such regions in Siberia, in the spurs and valleys of the Altai and Sayan ranges, in Dauria, even in more northern and central parts of Siberia, fossil remains of the stone period have been discovered by me and other explorers, whilst the outlying mountains of the Tian-Shan and Pamirs will doubtless afford many more. The primæval horse indigenous in these localities may have been more easily brought under subjection than its fellows in the steppes, and may have presented some such relationship to our *Equus Przewalskii* as exists between the kiang and the djiggetai and kulan. Afterwards descending with man from the more favoured hilly region, they may have together entered the plains, where human activity appears to have been of a more recent date, probably the bronze and iron period. But, however this may have been, *Equus Przewalskii* is the sole wild species having close affinity with the horse (our domesticated *Equus caballus*).

Having pointed out the peculiarities which distinguish our horse from all wild asses, and amongst others the generic distinction, I must nevertheless distinguish it from the domesticated animal for reasons already mentioned, viz. its erect mane, absence of forelock, and tail only partly furnished with hair. Whilst possessing all the internal characteristics of the horse, externally *Equus Przewalskii*, were it not for the warts on the hocks, occupies an intermediate place between the wild ass of Asia and *Equus caballus*. Indeed, admitting that domestic horses are to be found with similar peculiarities, and even recognizing in the dun horse a descendant of the same stock as *Equus Przewalskii*, I hold nevertheless that the domestic horse of the present day is not merely the result of culture, but is an intermixture of various breeds inhabiting several parts of the Old World.