



New records of *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) from the Middle Pleistocene levels of the Ob' river at Krasny Yar (Krivosheino district, Tomsk region, South-East of Western Siberia)

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KEY WORDS - Krasny Yar, Krivosheino district, Tomsk region, Tobol'sky gorizont.

ABSTRACT - Isolated teeth and some other postcranial remains, which have recently been discovered in the Tobol'sky gorizont levels (Middle Pleistocene) along the Ob' river at the village of Krasny Yar, in front of the Sargulin island (Krivosheino district, Tomsk region, South-East of Western Siberia), must be attributed to *Stephanorhinus kirchbergensis* (Jäger, 1839), better known in Russia as "nosorog Merka".

S. kirchbergensis - unlike other Plio-Pleistocene rhinoceroses - seems to be rare on Russian territory (as well as in the rest of the Eurasian area), being reported from a limited number of localities only. This is the case of one of the very few records of this species from Siberia, and a second one from the Tomsk region.

The co-occurrence of *S. kirchbergensis* with other taxa, such as *Mammuthus ex gr. trogontherii-chosaricus*, *Bison priscus*, *Equus ex gr. mosbachensis-germanicus* would suggest, in the Krasny Yar area, a palaeoenvironmental landscape dominated by extensive grasslands and sparse trees.

RIASSUNTO - [Nuovi ritrovamenti di *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) dai livelli medio-pleistocenici lungo il fiume Ob' a Krasny Yar (distretto di Krivosheino, regione di Tomsk, sud-est della Siberia occidentale)] - Da livelli medio-pleistocenici (Tobol'sky gorizont, nella stratigrafia siberio-occidentale; OIS 11), affiorati recentemente lungo il fiume Ob', di fronte all'isola di Sargulin e a ridosso del villaggio di Krasny Yar (distretto di Krivosheino, regione di Tomsk, sud-est della Siberia occidentale), provengono alcuni resti fossili da attribuire a *Stephanorhinus kirchbergensis* (Jäger, 1839), molto più conosciuto in Russia - e in tutti i territori dell'ex Unione Sovietica - come "nosorog Merka" (rinoceronte di Merck).

Oltre a sette elementi dentari (tanto superiori che inferiori), sono venuti alla luce anche quattro elementi dello scheletro postcraniale (un terzo metacarpale, una rotula, un astragalo e un calcagno, il ritrovamento dei quali è tutt'altro che frequente), presentanti caratteri sia morfologici che biometrici che meritano una certa considerazione.

Stando almeno alle evidenze fossili, *S. kirchbergensis*, al contrario di altre specie di rinoceronti plio-pleistocenici che sono relativamente frequenti sul territorio russo - come, del resto, su tutto quello eurasiatico - sembrerebbe essere alquanto raro nella Federazione Russa. Il caso qui rappresentato costituisce uno dei pochissimi su tutto il territorio russo, uno dei soli sei in Siberia e il secondo nella regione di Tomsk.

La compresenza, nello stesso livello, di *S. kirchbergensis* e di altri taxa come *Mammuthus ex gr. trogontherii-chosaricus*, *Bison priscus*, *Equus ex gr. mosbachensis-germanicus* potrebbe costituire indizio di un paleoambiente caratterizzato da ampi spazi aperti scarsamente alberati.

INTRODUCTION

Recent excavations in the brown quartz-arkose medium-grained Tobol'sky gorizont level sands (Siberian stratigraphy = Likhvinsky gorizont in the Eastern-European stratigraphy; OIS 11), outcropping along the right bank of the Ob' at the Krasny Yar village, in front of the Sargulin island (about 50 m a.s.l.; 57° 05' N - 84° 30' E; Krivosheino district, Tomsk region, Southeast Western Siberia), about 110 km north of Tomsk (Fig. 1) - formerly described by Shpansky (2005, 2006) - unearthed seven isolated rhinoceros teeth and four other postcranial rhinoceros remains together with other faunal skeletal rests, found in the lower part of the deposit, and referred to *Mammuthus ex gr. trogontherii-chosaricus*, *Bison priscus* Bojanus, 1827, and *Equus ex gr. mosbachensis-germanicus*.

MATERIAL

The seven isolated teeth and the four other skeletal remains recovered are preserved in the collections of the "Venedikt A. Kakhlov" Palaeontological Museum of the Tomsk State University in Tomsk.

Odontological material

1) PM TGU 5/1251. Large-sized and brachyodont second upper molar (Pl. 1, figs. 1-2), rather damaged in the mesio-lingual portion; the metaloph appears remarkably bulbous. A thin film of coronal cement cover almost all the surface of the crown, whereas the interior valley shows some traces of it only; where the cement is absent, the enamel appears rather smooth and opaque. Only one stylus is present in the interior valley.

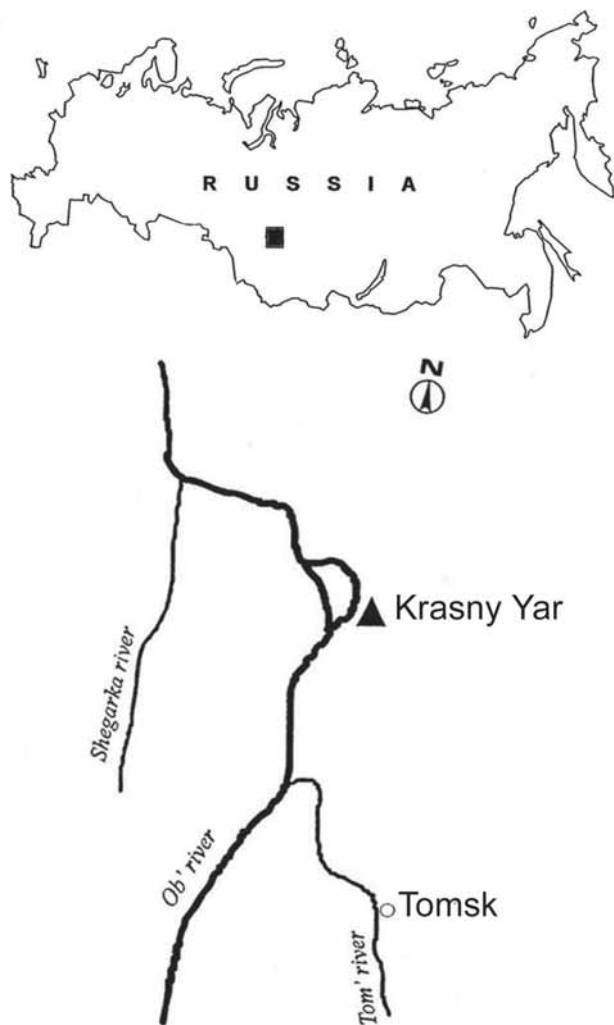


Fig. 1 - Index maps of the Tomsk region and geographical localization of the Krasny Yar village in the same area.

2) PM TGU 5/3495. Large-sized and brachyodont first upper molar (Pl. 1, figs. 3-4), rather damaged at the parastyle, at the protoloph, and at the metaloph. Both the protoloph and the metaloph appear remarkably bulbous; the enamel is rather smooth and demi-opaque; some sub-vertical lines are present on the vestibular side. The *cingula* are absent, as well as both the *anticrochet* and the *crista*; roots are still present.

SPECIMEN	BL	LL	MW	DW
II upper molar 5/1251	=	63.2	=	=
I upper molar 5/3495	61.2	48.1	76.2	62.7
IV upper premolar 5/2878	46.1	41.2	64.5	40.4
III lower molar 5/3328	63.2	57.8	34.1	37.3
II lower molar 5/1067	=	60.6	41.2	42.4
I lower molar 5/1087	>54	=	36.5	38.7
IV upper dec. molar 5/2883	61.2	=	=	44.1

Tab. 1 - Dimensions (in mm) of the *S. kirchbergensis* seven teeth from Krasny Yar (Tomsk region, Southeast Western Siberia). BL = buccal length; LL = lingual length; MW = mesial width; DW = distal width.

3) PM TGU 5/2878. Well-preserved, large-sized and rather hypsodont fourth upper premolar (Pl. 1, figs. 5-6); bright, rough enamel, uniformly spread on all the surface of the crown; the interior valley appears narrow; the protoloph and metaloph are bulbous (particularly the first one); mesial and lingual *cingula* are also present; even if damaged, roots are still present.

4) PM TGU 5/3328. Well-preserved, uncommonly large-sized, very brachyodont third lower molar (Pl. 2, figs. 1-2) showing both the mesial and the distal valleys drastically reduced; the enamel is demi-smooth and semi-bright; the coronal cement is absent; a distal *cingulum* is also present; the roots are damaged.

5) PM TGU 5/1067. Very well-preserved, large-sized, and remarkably brachyodont second lower molar (Pl. 2, figs. 3-4); both the mesial and the distal valleys are drastically reduced; the enamel is smooth and semi-bright; the coronal cement is absent; mesial and distal *cingula* are also present; the roots are still present.

6) PM TGU 5/1087. Large-sized, very brachyodont first lower molar (Pl. 2, figs. 5-6) slightly damaged in its mesial and distal portions; both the mesial and the distal valleys are drastically reduced. The dimensions are very close to those of the molar 5/1067; as on 5/1067, the enamel is smooth and semi-bright, the coronal cement is absent; roots still present.

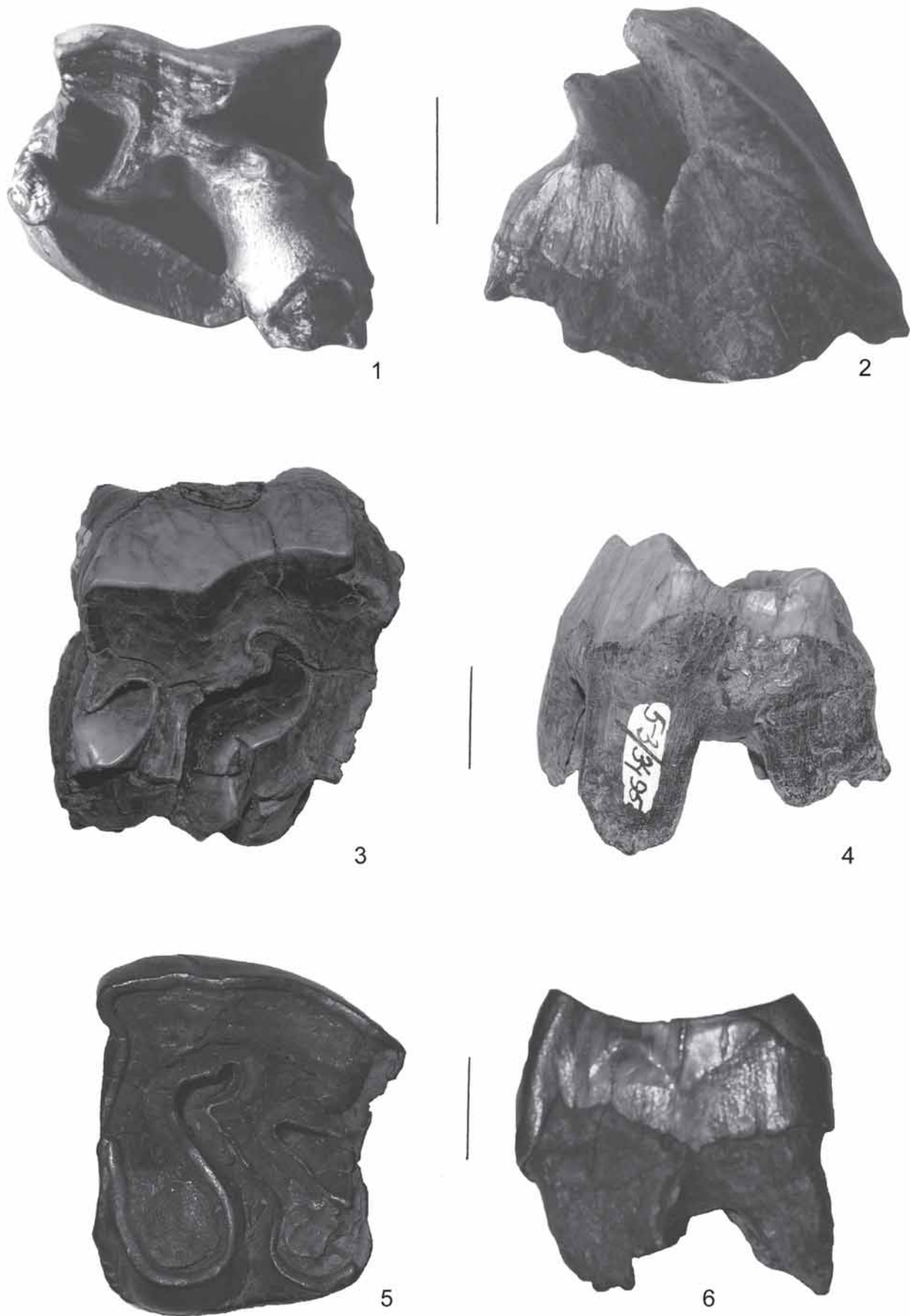
7) PM TGU 5/2883. Large-sized, very brachyodont fourth upper deciduous molar (not figured) damaged in its lingual portions; semi-opaque, rough enamel, uniformly spread on all the surface of the crown; the metacone is remarkably bulbous; even if seriously damaged, the protocone allows to have an inkling of a remarkable bulbosity. A distal *cingulum* is also present.

Measurements of the seven teeth are given in Tab. 1.

EXPLANATION OF PLATE 1

- figs. 1-6 - *Stephanorhinus kirchbergensis* (Jäger, 1839); Tobol'sky gorizont level (=Middle Pleistocene); Ob' at Krasny Yar in front of the Sargulin island (Krivosheino district, region, Southeast Western Siberia).
1-2 - second upper molar, (1) occlusal-lingual view and (2) distal view;
3-4 - first upper molar, (3) occlusal view and (4) vestibular view;
5-6 - fourth upper premolar, (5) occlusal view and (6) vestibular view.

Scale bar = 2 cm.



maximum length (in sagittal plane)	229
ant.-post. diameter of the proximal epiphysis	56.4
transv. diameter of the proximal epiphysis	62.2
ant.-post. diameter of the distal epiphysis	55.6
transv. diameter of the distal epiphysis	80.1
transv. diameter of the distal joint	64.3
min. transv. diameter of the diaphysis	61.5

Tab. 2 - Dimensions (in mm) of the *S. kirchbergensis* third metacarpal (PM TGU 5/2723) from Karsny Yar (Tomsk region, Southeast Western Siberia).

Postcranial material

1) PM TGU 5/2723. Uncommonly well-preserved, remarkably large-sized, rather slender third metacarpal (Pl. 3, figs. 1-2). In *norma proximalis*, the proximal articular surface appears, proportionally, more stretched dorso-palmarly than latero-medially. In *norma cranialis*, the bone shows *ex-abrupto*, distally, a progressive enlargement followed by a drastic contraction immediately before the distal articular surface, therefore the width of the distal epiphysis by comparison with the width of the distal articulation is remarkably wider. In *norma lateralis* (and/or *medialis*), the diaphysis appears narrow and flat through all its extension. In *norma caudalis*, on touch, it is flat and almost smooth, only the mean *crista* shows, distally, a slight relief.

Measurements of the third metacarpal are given in Tab. 2.

2-4) PM TGU 5/3040 - PM TGU 5/740 - PM TGU 5/3205. Three, on the whole, well-preserved skeletal bones, respectively *patella*, *astragalus* (*os tarsi tibiale*), and *calcaneum* (*os tarsi fibulare*). The three remains show exceptional dimensions and a remarkable massive character.

The *patella* (PM TGU 5/3040; Pl. 3, figs. 3-4), damaged in its *apex*, is much wide (119 mm) latero-medially and very thick (68 mm) dorso-plantarly.

The uncommonly well-preserved *astragalus* (PM TGU 5/740; Pl. 3, figs. 5-6) is very much enlarged (113 mm) latero-medially and rather thick (62 mm) dorso-plantarly; the trochlea is also very broad (92 mm).

The very well preserved *calcaneum* (PM TGU 5/3205; Pl. 3-figs. 7, 8) - exceptionally large - dorsally appears latero-medially very much enlarged (104 mm), very high (>126 mm), and stretched caudally; the summital tuberosity and the *sustentaculum tali* are considerably massive.

By comparison, the taphonomic features of the skeletal remains are the same of those of the odontological elements.

RESULTS

Teeth

The bulbous metacone, the remarkable brachyodonty, and the undulation of the ectolophs of 5/1251, 5/2883, and 5/3495, the hypsodonty and the bulbous protocone and metacone of 5/2878, the much reduced valleys and the remarkable brachyodonty of 5/1067, 5/1087, and 5/3328 are morphological traits suggestive of *Stephanorhinus kirchbergensis* (Jäger, 1839), the Pleistocene "tandem-horned" Eurasian interglacial rhinoceros, better known in Russia - and in all the former Soviet Union - as "nosorog Merka" (literally, Merck's rhinoceros). The seven isolated teeth attest to the occurrence of at least three individuals.

Postcranial remains

The previous enumerated morphological characteristics of the third metacarpal are peculiar of *S. kirchbergensis*.

On the basis of the morphological characters, of the exceptional dimensions, and of the remarkable massive character of the *patella*, of the *astragalus*, and of the *calcaneum* these skeletal remains may confidently be attributed to *S. kirchbergensis*.

The *patella* apart - at least as far as the Pleistocene rhinoceroses is concerned - in *S. kirchbergensis*, third metacarpals, *astragali*, and *calcanea* would seem significant skeletal parts presenting some morphological and biometrical features different from the other rhinoceros species.

DISCUSSION

The presence of *S. kirchbergensis*, *Mammuthus* ex gr. *trogotherii-chosaricus*, *Bison priscus* Boj., and *Equus* ex gr. *mosbachensis-germanicus* might be a clew that widespread grasslands and sparse trees existed in the Krasny Yar area.

The rarity of *S. kirchbergensis* - despite of its being widely spread in the vast Eurasian landmass - has been witnessed in Russia (Billia, 2005a, 2008, in press), as well as on European territory (Billia, 2005b).

EXPLANATION OF PLATE 2

- figs. 1-6 - *Stephanorhinus kirchbergensis* (Jäger, 1839); Tobol'sky gorizont level (= Middle Pleistocene); Ob' at Krasny Yar in front of the Sargulin island (Krivosheino district, region, Southeast Western Siberia);
 1-2 - third lower molar, (1) occlusal view and (2) vestibular view;
 3-4 - second lower molar, (3) occlusal view and (4) vestibular view;
 5-6 - first lower molar, (5) occlusal view and (6) vestibular view.

Scale bar = 2 cm.



In the Russian Federation, remains of *S. kirchbergensis* - included in the so-called "Khazarskaya", Tiraspol'skaya", and "Tatarskaya" Faunas - are recorded, at least, from other nine localities: four of them are located in the Russian-European area (Belyaeva, 1935; Gromova, 1935; Strizheva, 1991), other two in the Eastern-Siberian area (Chersky, 1874; Brandt, 1877; Dubrovo, 1957). As to the territories included in Western Siberia, other *S. kirchbergensis* come from the environs of Krasny Yar (Krivosheino district, Tomsk region; Alekseeva E.V., 1980) and from two other localities in the Kemerovo region (Billia, 2008, in press).

In literature, some other localities that would yield remains ascribed to *S. kirchbergensis* are also mentioned (Belyaeva, 1935, 1939; Gromova, 1935; Salov, 1957), but unfortunately - at least at present - the material is untraceable (Billia, in press).

Unfortunately, both cranial and postcranial easily datable rests are, *de facto*, everywhere very few.

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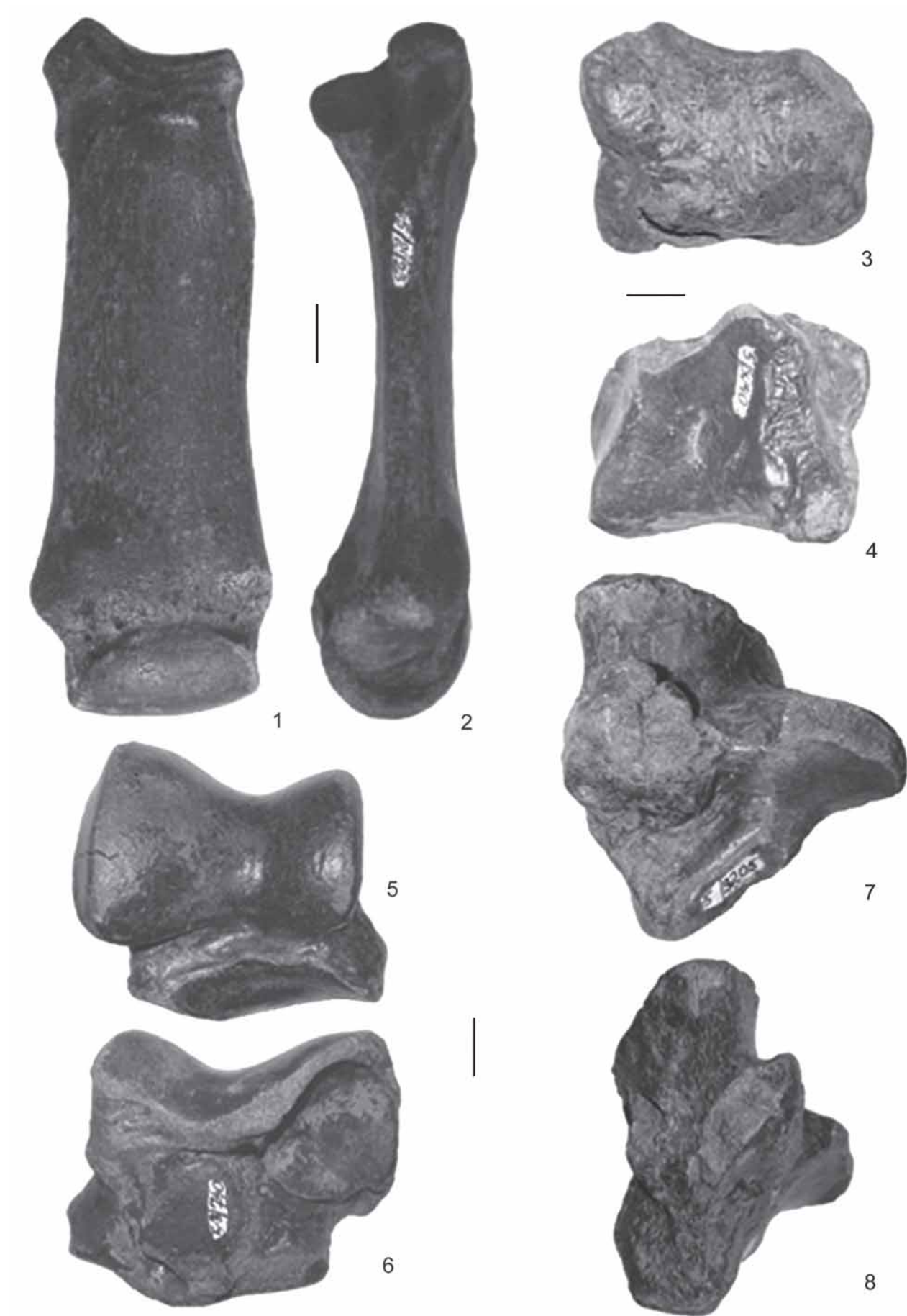
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EXPLANATION OF PLATE 3

- figs. 1-8 - *Stephanorhinus kirchbergensis* (Jäger, 1839); Tobol'sky gorizont level (=Middle Pleistocene); Ob' at Krasny Yar in front of the Sargulin island (Krivosheino district, region, Southeast Western Siberia);
- 1-2 - third metacarpal, (1) cranial view and (2) lateral view;
- 3-4 - patella, (3) cranial view and (4) articular view;
- 5-6 - astragalus, (5) dorsal view and (6) plantar view;
- 7-8 - calcaneum (7) dorsal view and (8) lateral view.

Scale bar = 2 cm.



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