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)

Emmanuel M.E. Billia

**KEY WORDS** - Krasny Yar, Krivosheino district, Tomsk region, Tobol’sky horizont.

**ABSTRACT** - Isolated teeth and some other postcranial remains, which have recently been discovered in the Tobol’sky horizont levels (Middle Pleistocene) along the Ob’ river at the village of Krasny Yar, in front of the Sargulin island, in the 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.

**INTRODUCTION**

Recent excavations in the brown quartz-arkose medium-grained Tobol’sky horizont level sands (Siberian stratigraphy = Likhvinsky horizont 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.; 57º 05’ N - 84º 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 metaoph 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.
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.

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.

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.

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

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.
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. trogontherii-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).

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

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.
E.M.E. Billia - Stephanorhinus kirchbergensis from the Ob' river (Siberia)
In the Russian Federation, remains of *S. kirchbergensis* - included in the so-called "Khazarsskaya", 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 (Krivosehino 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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EXPLANATION OF PLATE 3

figs. 1-8 - *Stephanorhinus kirchbergensis* (Jaeger, 1839); Tobol’sk’sky gorizont level (=Middle Pleistocene); Ob’ at Krasny Yar in front of the Sargulinskoy island (Krivosehino 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.
E.M.E. Billia - Stephanorhinus kirchbergensis from the Ob' river (Siberia)

Pl. 3


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