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CERCETĂRI INTERDISCIPLINARE – МЕЖДИСЦИПЛИНАРНЫЕ ИССЛЕДОВАНИЯ – INTERDISCIPLINARY SURVEYS

Roman Croitor

A revision of Gervais' archaeozoological collection from the Middle and Late Paleolithic site of Tournal Cave, France

Keywords: Late Pleistocene, *Cervus tournalii*, *Rangifer tarandus*, *Equus ferus*, taxonomy, morphology, historical collection.
Cuvinte cheie: Pleistocenul superior, *Cervus tournalii*, *Rangifer tarandus*, *Equus ferus*, taxonomie, morfologie, colecție istorică.
Ключевые слова: верхний плейстоцен, *Cervus tournalii*, *Rangifer tarandus*, *Equus ferus*, таксономия, морфология, историческая коллекция.

Roman Croitor

A revision of Gervais' archaeozoological collection from the Middle and Late Paleolithic site of Tournal Cave, France

The old archaeozoological collection from the Tournal Cave (originally reported as Bize Cave) was donated to the National Museum of Natural History from Paris in 1869 by the French palaeontologist Paul Gervais. The small osteological collection contains the remains of reindeer (including the holotype of *Capreolus tournalii*) and horses. The detailed morphological and biometric study revealed a great similarity between the reindeer from the Tournal Cave and the ancient forest reindeer from the Palaeolithic site Duruitoarea Veche and layer 3 of Brânzeni-1 (Republic of Moldova). The conspicuously flattened antler confirms the assumption that the reindeer from Geivaș collection is rather a forest form. The horse is characterized by moderately long protocone in the upper cheek teeth and the comparatively small anterior second phalanx, showing a certain resemblance to the horse from Botai (Kazakhstan). This similarity with the Holocene form of horse from Kazakhstan suggests a similar evolutionary response to rather dry and warm environmental conditions.

Roman Croitor

O revizuire a colecției arheozoologice a lui Gervais provenită din situl atribuit paleoliticului mediu și superior din Peștera Tournal (Franța)

Vechea colecție arheozoologică din Peștera Tournal (introdusă inițial în literatura de specialitate ca Peștera Bize) a fost donată Muzeului Național de Istorie Naturală din Paris în 1869 de paleontologul francez Paul Gervais. Mica colecție osteologică conține resturi de reni (inclusiv holotipul *Capreolus tournalii*) și cai. Studiul morfologic și biometric detaliat a relevat o mare asemănare între renii din Peștera Tournal și renii arhaici identificați în situl paleolitic de la Duruitoarea Veche și stratul 3 de la Brânzeni-1 (Republica Moldova). Cornul destul de turtit confirmă ideea că renii din colecția lui Gervais sunt cel mai probabil o specie de pădure. Calul se caracterizează printr-un protocon moderat lung al dinților superiori și o a doua falangă anterioară relativ mică, arătând o anumită asemănare cu calul din Botai (Kazakhstan). Această similitudine cu forma holocenă a calului din Kazakhstan sugerează o evoluție similară în condiții de mediu destul de aride și calde.

Роман Кройтор

Переописание археозоологической коллекции Жерве из средне- и верхнепалеолитического памятника пещеры Турнал (Франция)

Историческая археозоологическая коллекция из пещеры Турнал (первоначально была опубликована как пещера Биз) была подарена Национальному музею естественной истории из Парижа в 1869 году французским палеонтологом Полем Жерве. Небольшая остеологическая коллекция содержит скелетные останки северных оленей (в том числе голотип *Capreolus tournalii*) и лошадей. Детальное морфологическое и биометрическое исследование выявило сходство между оленями из пещеры Турнал и древними лесными оленями из палеолитического памятника Дуруитоареа Веке и слоя 3 Брынзень-1 (Республика Молдова). Заметно сплюснутый рог из описываемой коллекции подтверждает предположение о том, что северный олень из пещеры Турнал скорее всего является лесной формой. Для лошади из пещеры Турнал характерен умеренно длинный протокон верхних щечных зубов и сравнительно небольшая передняя вторая фаланга, что дает определенное сходство с лошадью из Ботая (Казakhstan). Это сходство с голоценовой формой лошади из Казахстана предполагает сходную эволюционную реакцию на довольно сухие и теплые условия окружающей среды.

Introduction

The Tournal Cave (originally described as the Bize Cave: M. De Serres) [De Serres 1829] situated near Bize-Minervois (Aude, Southern France) is a famous Middle and Upper Paleolithic multilayered site that has yielded a rich archaeological and archaeozoological material from Mousterian, Aurignacian, and Magdalenian layers [Tavoso 1987; Patou-Mathis 1994; Magniez 2009]. The faunal remains discovered in the Tournal Cave come from four cultural horizons that in their turn consist of several layers: the Mousterian unit (37 000 ± 8000 years BP; 33 600 ± 1200 years BP; uncalibrated), the Aurignacian unit (>29 000 years BP; uncalibrated), and the Magdalenian unit (14 200 ± 400 years BP; 12 500 ± 200 years BP; uncalibrated) [Tavoso 1987; Patou-Mathis 1994; Magniez 2009]. Reindeer and horses are the dominant faunal elements in all horizons of the Tournal Cave, however, the horse remains are more abundant in the Mousterian horizon, while reindeer is more common in the Magdalenian horizon [Patou-Mathis 1994; Magniez 2009]. The Tournal Cave fauna also contains *Cervus elaphus*, *Alces alces*, *Megaloceros giganteus*, large bovids (*Bison priscus*, *Bos primigenius*), mountain goats (*Capra caucasica praepyrenai-ca*, *Capra pyrenaica*) and cave carnivores (*Ursus spelaeus*, *Crocota crocota spelaea*) [Gervais, Brinckman 1865; Patou-Mathis 1994; Magniez 2009]. The osteological remains from the Tournal Cave include also human remains, including a phalanx of *Homo neanderthaliensis* of the Mousterian age and an incisor and fragment of mandible from the Magdalenian unit ascribed to *Homo sapiens* [Bertrand 1999].

A small historical archaeozoological collection from the Tournal (Bize) Cave is stored in the National Museum of Natural History, Paris. The record No. 125 in the Museum Catalogue provides the following information about this collection:

“Bois de Renne de la Caverne de Bize (Herault). Type du *Cervus tounalii* Marcel de Serres. Don de M.P. Gervais. Placé à la Galerie des

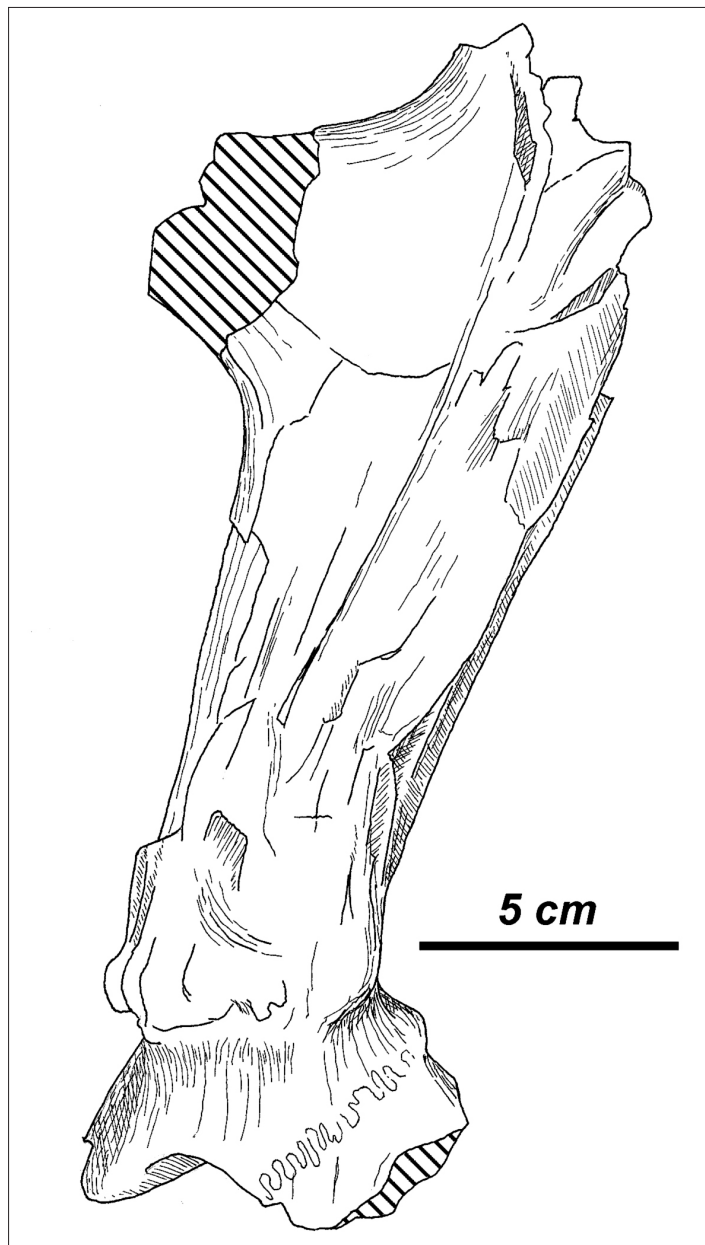


Fig. 1. The fragment of the right antler with a pedicle and a part of the frontal bone of *Rangifer tarandus* ssp. from the Tournal Cave (the holotype of *Capreolus tounalii* de Serres, 1829).

Ossements fossiles le 19 avril 1869”.

Besides the holotype of *Capreolus tounalii*, the collection also includes two juvenile antlers of reindeer, a fragment of the mandible and a talus of reindeer, several isolated cheek teeth of reindeer and horse, and a second anterior phalanx of a horse.

The history of this collection starts with the publication of M. De Serres [De Serres 1829, p. ixv]

Measurements	mm
Height of antler ramification above the burr	180
Anteroposterior diameter of pedicle	51.0
Lateromedial diameter of the pedicle	43.4
Anteroposterior diameter of antler base	48.1
Lateromedial diameter of antler base	45.2
Anteroposterior diameter of antler below ramification	65.0
Lateromedial diameter of antler below ramification	37.0

Tab. 1. Measurements of the antler fragment with a part of the frontal bone of *Rangifer tarandus* (the holotype of *Capreolus tournalii*) from the Tournal (Bize) Cave.

who reported from the cave of Bize three species: *Capreolus tournalii*, *Capreolus leufroyi*, and *Cervus reboulii*. The type specimens of *Capreolus leufroyi* and *Cervus reboulii* remain unidentified. According to M. De Serres [De Serres 1829], *Capreolus tournalii* is distinguished by its remarkable large body size and the high position of antler ramification above the burr. According to P. Gervais and J. Brinckman [Gervais, Brinckman 1865], all species established by M. De Serres [De Serres 1829] show an obvious similarity to reindeer *Rangifer tarandus*. Since then, the species names introduced by M. De Serres [De Serres 1829] were abandoned. It is impossible to assert from which exactly layer the material in question comes from. Nonetheless, the ancient collection from the Tournal Cave represents a historical interest and importance for the taxonomy of the Late Pleistocene reindeer from Western Europe. The present paper aims to provide the morphological and biometric description of the historical collection from the Tournal Cave studied by M. De Serres [De Serres 1829] and P. Gervais and J. Brinckman [Gervais, Brinckman 1865].

P ⁴		M ¹		M ²	
L	D	L	D	L	D
14.5	16.5	20.4	16.7	21.2	18.5
		19.8	19.4	22.6	
		21.0	17.5		

Tab. 2. Measurements of upper cheek teeth of *Rangifer tarandus* from the Tournal Cave. The crown length (L) is a maximum mesiodistal measurement; the crown breadth (D) is a maximum linguobuccal measurement at the crown base (mm).



Fig. 2. The fragment of left hemimandible of *Rangifer tarandus* ssp. from the Tournal Cave: A, occlusion view; B, medial view.

Systematic description

Rangifer tarandus (Linnaeus, 1758)

Synonymy:

1829 – *Capreolus tournalii* [sp. nov.]: De Serres, p. ixv.

1829 – *Capreolus leufroyi* [sp. nov.]: De Serres, p. ixv.

1829 – *Cervus reboulii* [sp. nov.]: De Serres, p. ixv.

The holotype of *Capreolus tournalii* is a proximal fragment of the right antler with a pedicle and a part of the frontal bone (fig. 1; tab. 1). The antler belongs to a large male reindeer individual. The specimen is deformed and generally poorly preserved. The antler burr is partially damaged. The pedicle is robust and very short. The cross-sections of the pedicle and the basal part of the

P ₂		P ₃		P ₄		M ₁		M ₂		M ₃	
L	D	L	D	L	D	L	D	L	D	L	D
11.0	7.2	16.5	11.4	17.5	11.9	19.8	10.8	22.0	12.0	24.4	10.0
						21.6	11.0	20.8	11.8	25.5	11.4
								22.0	12.2		

Tab. 3. Measurements of lower cheek teeth of *Rangifer tarandus* from the Tournal Cave (mm).

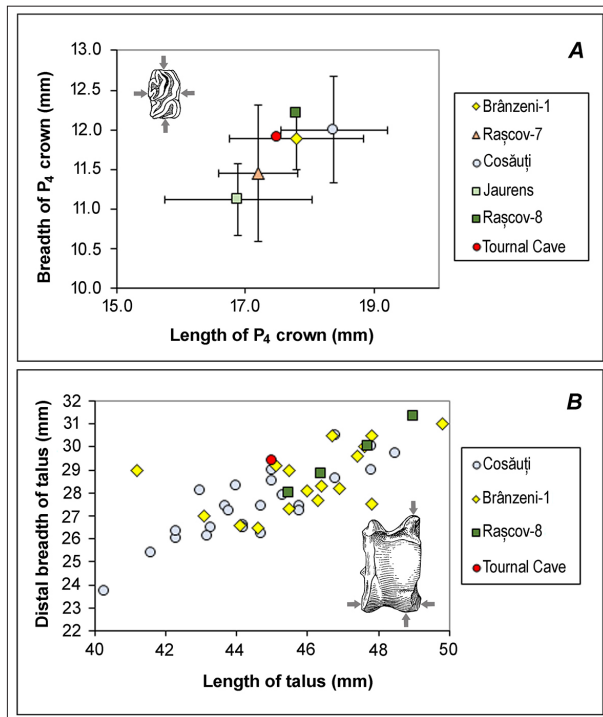


Fig. 3. Measurements of the reindeer remains from the Tournal Cave compared to *Rangifer tarandus* from various Paleolithic sites: A, lower fourth premolars (P4); B, tali. The grey arrows show the measurements involved in the comparison. The data from Cosăuți, Rașcov-7, Rașcov-8, and Brânzeni-1 are adapted from Croitor (2010); the data from Jaurens are adapted from Valli and Guérin (2000).

antler are regularly circular. The first ramification is situated very high above the burr. The specific basal tine is not developed. The antler becomes compressed lateromedially in the area of ramification. The first antler tine is flattened. The antler surface is smooth and is not sculptured with tubercles characteristic of *Capreolus*.

Most cheek teeth are isolated (tab. 2; 3). The length of the complete series of lower premolars of the left mandible fragment (fig. 2) amounts to 44.0 mm. The premolar series is slightly larger than that of modern *R. tarandus tarandus* (L P2-P4 = 39.7 mm and 36.4 mm; the Natural History Museum

of London), and smaller than the premolar series of *R. tarandus constantini* from the Late Pleistocene of Cosăuți (L P2-P4 = 47.0 mm; 47.6 mm; the Institute of Zoology, Chișinău) and Rașcov-8 (47.7 mm). The size of the premolar series from the Tournal Cave is very close to the measurements of the large forest form of reindeer from the Late Pleistocene of Duruitoarea Veche (45.4 mm) and Brânzeni-1 (45.7 mm; all above-mentioned sites are situated on the territory of the Republic of Moldova). The measurements of the upper fourth premolar from the Tournal Cave also are close to the sample from Brânzeni-1 and is significantly larger than the sample from Jaurens, France (29 300-32 630 years BP) [Valli, Guérin 2000], which is roughly coeval with Brânzeni-1 (fig. 3, A; tab. 3).

The postcranial skeleton is presented by a single right talus (fig. 3, B; fig. 4). The talus from the Tournal Cave is characterized by such minor



Fig. 4. The talus of *Rangifer tarandus* ssp. from the Tournal Cave.

Measurements	P ²	P ³	P ⁴	M ¹	M ²
Tournal Cave					
L	41.8	31.8	31.0	27.0	26.4
D	27.8	30.4	29.1	28.3	28.7
L pr	10.3	11.4	15.0	13.5	13.9
L pr %	24.6	35.8	48.4	50.0	52.7
Duruitiarea Veche					
L	36.5	30.2	30.0	25.2	26.8
D	24.9	28.3	28.5	28.0	27.3
L pr	9.7	13.0	13.7	14.3	15.0
L pr %	26.6	43.0	45.7	56.7	56.0

Tab. 4. Measurements of upper cheek teeth (mm) and the relative length of protocone (pr %) of *Equus ferus* from the Tournal Cave (South France) compared to *Equus ferus* from Duruitoarea Veche (Moldova).

peculiarities as the general robustness if compared to the Moldavian Late Pleistocene reindeer – however, the specimen from the Tournal Cave still falls within the variation range of the Moldavian samples – and the poorly developed medial bulge at collum tali. Nonetheless, those minor morphological peculiarities do not allow to refer the specimen in question to another artiodactyl known from the Late Pleistocene of Europe. The talus from the Tournal Cave is characterized by the following measurements: the maximum height, 45.0 mm; the distal breadth, 29.4 mm; the distal anteroposterior measurement, 22.8 mm. The measurements of talus correspond to the largest individuals (males) from Cosăuți and smaller individuals (females) from Duruitoarea Veche (fig. 3, B). Taking into account the size of dentition, one can assume that the talus from the Tournal Cave belongs to a female of a relatively large form of reindeer.

Equus ferus Boddaert, 1785

The upper cheek teeth of the horse from the Tournal Cave are characterized by relatively long protocone with a straight or slightly concave lingual wall (fig. 5). One can say that the protocone in the Tournal Cave horse is moderately long (tab. 4), relatively longer than in European tarpan *E. ferus ferus*, but somewhat shorter than in *E. przewalskii*. Generally, the relative length of protocone in the horse from the Tournal Cave falls within the range of variation of *E. ferus latipes* from Kyyk-Koba (Crimea) described by V. Gromova [Gromova 1949]. *Equus ferus uralensis* from the Late Pleistocene and Early Holocene of the Urals and North Caspian area [Kuz'mina 1997] stands closer to the horse from the Tournal Cave in this respect (fig. 6, A). The horse from Duruitoarea Veche (stored in the Institute of Zoology, Chișinău) is generally characterized by relatively longer protocone, show-

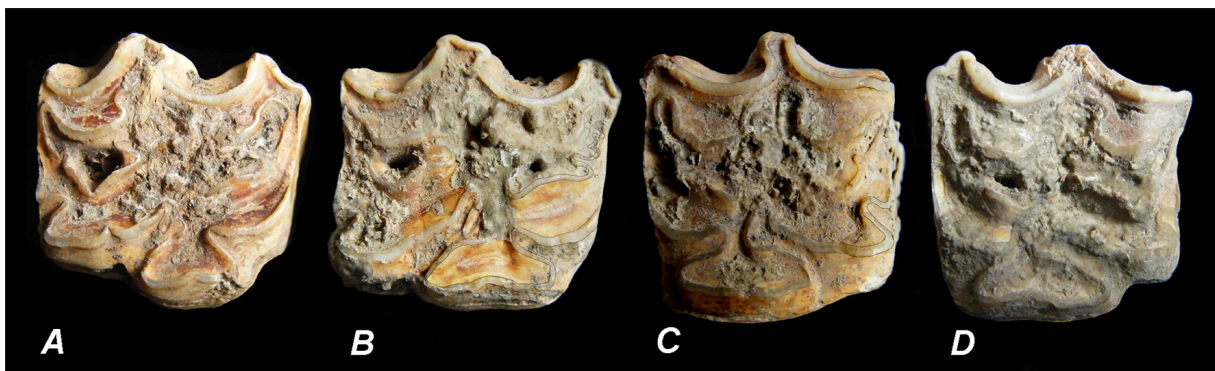


Fig. 5. The upper cheek teeth of *Equus ferus* ssp. from the Tournal Cave: A, the right third premolar (P3); B, the right fourth premolar (P4); C, the left first molar (M1); D, the left second molar (M2).

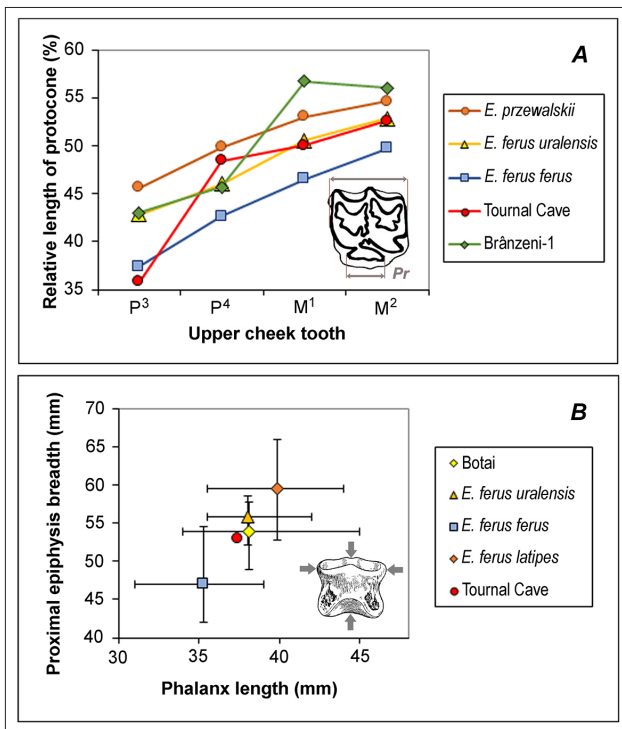


Fig. 6. Morphological features of the horse from the Tournal Cave compared to fossil and modern equid species, subspecies and forms: A, relative length of protocone (L protocone / L tooth crown); B, length and proximal breadth of the second phalanx (the samples involved in the comparison are represented by the mean value and the absolute range of variation). The grey arrows show the measurements involved in the comparison. The data on *Equus ferus uralensis*, *E. ferus ferus*, *E. ferus latipes*, *E. przewalskii*, and the horse from Botai (Kazakhstan) are adapted from I. Kuz'mina (1997).

ing a greater similarity with modern *E. przewalskii*. The short protocone on the upper fourth premolar of the specimen from Duruitoarea Veche is a result of the advanced degree of wear of this tooth.

The second phalanx from Gervais' collection is characterized by a relatively broad distal epiphysis that, according to I. Kuz'mina [Kuz'mina 1997], is a characteristic feature of anterior limb phalanges (fig. 7, tab. 4). The specimen from the Tournal Cave is quite small if compared to the sample of *E. ferus uralensis* and corresponds to the smallest specimens of the Urals horse (fig. 6, B). The phalanx from the Tournal Cave is significantly smaller than the phalanges of *E. caballus latipes* from Eastern Europe and stay outside of the variation range of this East European Late Pleistocene horse. The phalanges of the horse from Botai (Kazakhstan) are closest in size and proportions to the specimen from the Tournal Cave.

Discussion and conclusions

According to the present study, the reindeer from the Gervais' collection is a rather large form similar to large forest reindeer from the Late Pleistocene of Moldova. The large flattened antler (the holotype of *Capreolus tournalii*) confirms the assumption that the reindeer remains from the Tournal Cave belong to a forest reindeer. According to observations of E. Alekseeva [Alekseeva 1980], relatively short and flattened antlers are characteristic of forest reindeer subspecies. The adaptation of the reindeer from the Gervais' collection to forest environments may suggest that the whole sample from the Tournal Cave comes from the older Mousterian or Aurignacian units. The missing situated close to the burr basal tine in the antler from the Tournal Cave is a common for reindeer feature. The basal tine in reindeer is asymmetric and normally only one antler bears

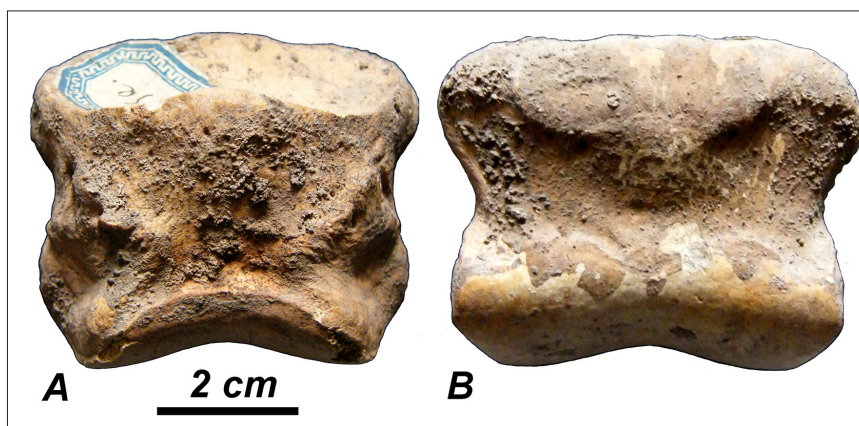


Fig. 7. The anterior second phalanx of *Equus ferus* ssp. from the Tournal Cave: A, dorsal view; B, plantar view.

Measurements	mm
Maximum length	44.0
Lateral length	32.7
Medial length	37.4
Breadth of proximal epiphysis	53.0
Depth of proximal epiphysis	32.7
Breadth of diaphysis	45.0
Breadth of distal epiphysis	49.2
Depth of distal epiphysis	26.8

Tab. 5. Measurements of the second anterior phalanx of *Equus ferus* from the Tournal Cave.

the fully grown basal tine, while the basal tine on the counterpart antler remains vestigial or is completely missing.

The horse from Tournal cave was reported as *E. cf. germanicus* [Boulbes, Van Asperen 2019] and is characterized by robust metapodials that, accordingly, reflects an assumed adaptation to rather humid environments. This morphological peculiarity approaches the horse material studied by Boulbes and Van Asperen [Boulbes, Van Asperen 2019] to *E. ferus latipes* described by V. Gromova [Gromova 1949] from the Late Pleistocene of Eastern Europe.

However, according to V. Gromova [Gromova 1949], the robustness of limbs is not expressed in the first and second phalanx proportions. It is necessary to mention that the number of the samples studied by V. Gromova [Gromova 1949] was quite limited, therefore the possibilities of the comparative study were rather restricted. *Equus ferus uralensis* is characterized as a rather gracile form with thin and long metapodials [Kuz'mina 1997]. Nonetheless, the single specimen from the Tournal Cave does not allow making any reliable conclusion on the morphological similarity with *E. ferus uralensis*. The horse from Botai (Kazakhstan) is the closest in size and phalanx proportions to the horse from the Tournal Cave. Possibly, this morphological affinity should be regarded as parallelism reflecting morphological adjustment to rather similar comparatively dry and mild environmental conditions.

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