



Emmanuel M.E. Billia
Júlia Zervanová

FURTHER REPORTS OF *STEPHANORHINUS KIRCHBERGENSIS* (JÄGER, 1839) (MAMMALIA, RHINOCEROTIDAE) FROM EURASIA, ADDENDA 5

ULTERIORI SEGNALAZIONI DI *STEPHANORHINUS KIRCHBERGENSIS* (JÄGER, 1839) (MAMMALIA, RHINOCEROTIDAE) IN EURASIA, ADDENDA 5

Riassunto breve - A integrazione di quanto già precedentemente pubblicato (BILLIA 2011a, 2011b, 2014; BILLIA & ZERVANOVÁ 2015, 2017, agevolmente reperibili sul sito www.rhinosourcecenter.com), viene proposto un ulteriore aggiornamento relativo a segnalazioni di ritrovamenti di *Stephanorhinus kirchbergensis* (JÄGER, 1839) sul territorio eurasiatico. Con questa occasione, si propone una mappa aggiornata indicante l'ubicazione approssimativa dei venti siti a *S. kirchbergensis* sul territorio italiano. **Parole chiave:** Rhinocerotidae, *Stephanorhinus kirchbergensis*, Pleistocene, Europa, Asia.

Abstract - An updated report concerning some other *Stephanorhinus kirchbergensis* (JÄGER, 1839) discoveries on Eurasian territory is proposed here as an integration of other previous papers (BILLIA 2011a, 2011b, 2014; BILLIA & ZERVANOVÁ 2015, 2017). The four texts listed above are easily available on the site: www.rhinosourcecenter.com. An updated map showing the approximate geographical location of the *S. kirchbergensis* twenty Italian sites (three Roman unknown suburbs included) is also proposed.

Key words: Rhinocerotidae, *Stephanorhinus kirchbergensis*, Pleistocene, Europe, Asia.

Introduction

This work follows a first one listing the occurrence of *Stephanorhinus kirchbergensis* (JÄGER, 1839) in Eurasia (BILLIA 2011a) and four following updatings (BILLIA 2011b, 2014; BILLIA & ZERVANOVÁ 2015, 2017). It regards an updated integration containing some other data on discoveries of the Pleistocene rhinoceros *S. kirchbergensis* in Eurasia based on further investigation (2017-2022).

The reports come from the following eight countries: The Netherlands, Spain, Italy, The Czech Republic, Poland, The Russian Federation (European area and Asian area), China, and Japan. As to the *S. kirchbergensis* remains, Spain and Japan are cited for the first time in literature.

The paragraph numbers used here in the text correspond to the same used in BILLIA (2011a).

Europe

The Netherlands (BILLIA 2011a: § 1.4, pp. 20-22)

Three remains of *S. kirchbergensis* together with some other ascribed to *Elephas antiquus* FALCONER &

CAUTLEY, 1847 were collected from the Eurogeul (North Sea, off the coast of the Zuid-Holland province) between April and October 2011. The *S. kirchbergensis* remnants consist of a metacarpal III (CM-DM 140-1) (MOL et al. 2012: fig 2, p. 21; fig 3, p. 22) (Fig. 1), a calcaneum (CM-DM 144) (cit: fig 4, p. 23; fig 6, p. 24) (Fig. 2), and a second upper molar fragment (n.n.) (cit: fig. 7, p. 24).



Fig. 1 - *S. kirchbergensis* third metacarpal from Eurogeulgebied Noordzee, Holland (MOL et al. 2012: fig 3, p. 22).
- Terzo Metacarpale di *S. kirchbergensis*, Eurogeulgebied Noordzee, Holland (MOL et al. 2012: fig 3, p. 22).

Both the metacarpal and the calcaneum appear to be of truly remarkable dimensions. Although fragmented, the second molar is perfectly capable of highlighting its most salient features which are irrefutably those of *S. kirchbergensis*.

The authors attempted to provide a dating to both the specimens using ¹⁴C but without success (“Indeed,



Fig. 2 - *S. kirchbergensis* right calcaneum from Eurogeulgebied Noordzee, Holland (MOL et al. 2012: fig 6, p. 24).
 - Calcaneum dx di *S. kirchbergensis*, Eurogeulgebied Noordzee, Holland (MOL et al. 2012: fig 6, p. 24).

collagen could not be extracted from this material in the ¹⁴C laboratory in Groningen using the applicable recipe [LONGIN 1971]. This means that the sample cannot be absolutely dated by the ¹⁴C method”, MOL et al. 2012: p. 22).

Spain

DAURA et al. (2005: 58-60) refer to a *S. kirchbergensis* find at the Cova del Gegant (Sitges, Barcelona, Spain). No other information are available. Very cautiously (!), this could be the first find of this species on the Iberian Peninsula.

Italy (BILLIA 2011a: § 1.7, p. 23)

The exceptionally well-preserved *S. kirchbergensis* skull from Spinadesco (Cremona, N Italy) (PERSICO et al. 2015, p. 57) was already reported in previous addenda by BILLIA & ZERVANOVÁ (2016). Later the dimples contents (peaty material) of the teeth of the skull from Spinadesco were investigated in order to try to formulate hypotheses about the diet adopted by that individual, its habitat, the possible season of its death. Pollen analyses carried out on the sample of plant debris (total weight of about 3.4 g) were performed by Elena M. Burkanova, palinologist of the Laboratory of Mesozoic & Cenozoic Continental Ecosystems, Siberian Palaeontological

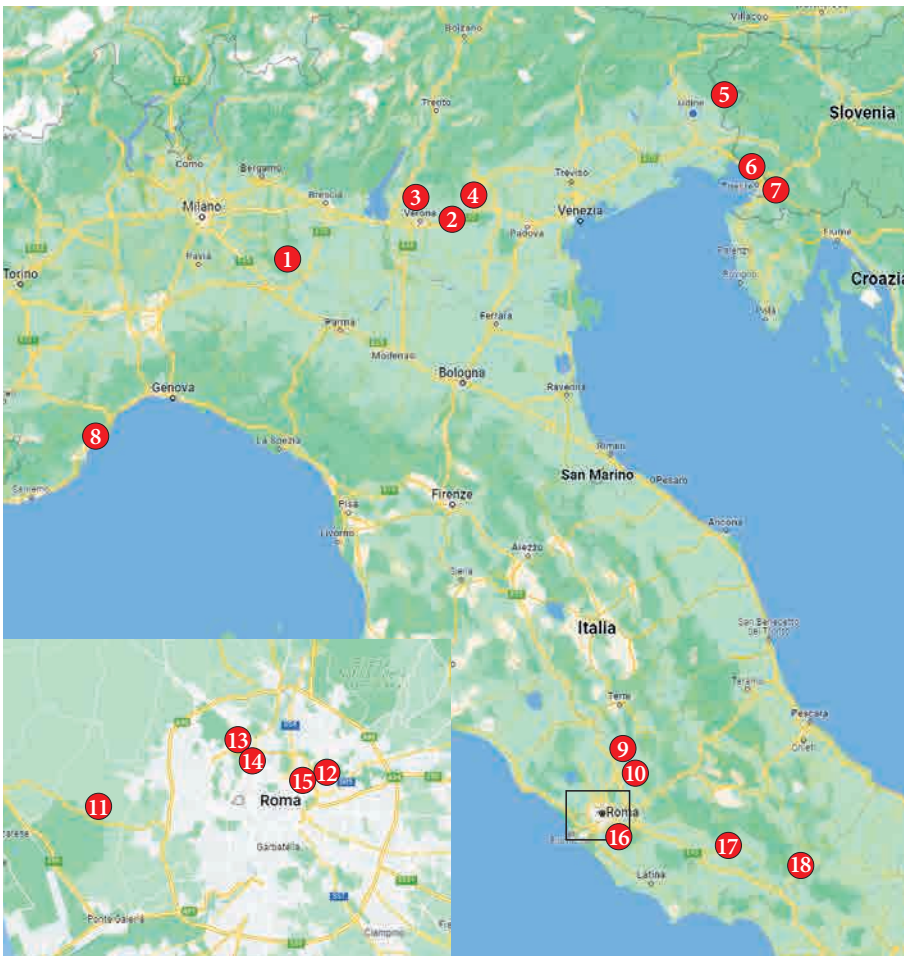


Fig. 3 - An updated map (2022) showing the approximate geographical location of the *Stephanorhinus kirchbergensis* twenty Italian sites (three Roman unknown suburbs included). See the text for details.

- Mappa aggiornata (2022) indicante l'ubicazione dei venti siti a *Stephanorhinus kirchbergensis* sul territorio italiano, inclusi i tre suburbi romani rimasti ignoti. I numeri fanno riferimento a quanto indicato nel testo.

Scientific Center of the Tomsk State University (The Russian Federation). The results in detail are reported in BURKANOVA et al. (2020).

Rhinoceros remains from Melpignano - San Sidero were previously classified as *S. kirchbergensis* by different authors (MIRIGLIANO 1941; CARDINI 1962; BOLOGNA et al. 1994; MUCI 1998; BARBERA et al. 2006). Later, a great amount of the specimens from Cava Nuzzo and Cava Bianco at Melpignano were revised by PETRONIO & PANDOLFI (2008) and PANDOLFI & PETRONIO (2011) who re-assigned them to *S. hemitoechus* FALCONER since those remains show several diagnostic features peculiar of this species.

The authors seize this opportunity for proposing here a map (Fig. 3) showing approximately the geographical location of the whole of *S. kirchbergensis* sites (twenty, three Roman unknown suburbs included) on Italian territory up to today's date which are as follows:

- 1- Spinadesco (Cremona, Lombardia, N Italy) (PERSICO et al. 2015; BURKANOVA et al. 2020)
- 2- Monte Zoppega (= Grotta di San Lorenzo di Soave, Soave, Verona, Veneto, NE Italy) (SCORTEGAGNA 1844; MOLON 1875; FABIANI 1919)
- 3- La Fornace di Sant'Ambrogio di Valpolicella (Verona, Veneto, NE Italy); (BILLIA & PETRONIO 2009)
- 4- Cava Calcàra at Monte di Malo (Vicenza, Veneto, NE Italy) (BILLIA 2011; BILLIA & ZERVANOVÁ 2015, 2016)
- 5- Cava Italcementi (Vernasso, Cividale del Friuli, Udine, Friuli, NE Italy) (PELLARINI 1999; BILLIA & PETRONIO 2009; BILLIA & ZERVANOVÁ 2016)
- 6- Aurisina (Carso Triestino, Trieste, Venezia Giulia, NE Italy); (LEONARDI 1945-47)
- 7- Caverna degli Orsi (San Dorligo della Valle/Dolina, Trieste, Venezia Giulia, NE Italy); (BERTO & RUBINATO 2010)
- 8- Grotta Valdemino (Borgio Verezzi, Savona, Liguria, NW Italy); (SALA 1992)
- 9- Farfa river at Ponte sul Farfa (Roma, Lazio); (BILLIA & PETRONIO 2009)
- 10- Cretone lacustrine basin near Rome (Val Tiberina, Lazio); two outcrops: Fosso Casa Cotta and Marzolino (MARRA et al. 2016)
- 11- Castel di Guido (via Aurelia, Roma, Lazio); (BILLIA & PETRONIO 2009)
- 12- Roma, Aniene river at Monte Sacro (Lazio); (BILLIA & PETRONIO 2009)
- 13- Roma, Tor di Quinto (Lazio); (BILLIA & PETRONIO 2009)
- 14- Roma, Tiber at Ponte Molle (or Ponte Mollo, now called Ponte Milvio, Lazio); (LEONARDI 1947; BILLIA & PETRONIO 2009)
- 15- Roma, Sedia del Diavolo (Lazio); (BILLIA & PETRONIO 2009)
- 16- Roma, three unknown suburbs (Lazio); (BILLIA & PETRONIO 2009)

17- Cava Bernardo & Vincenzo Di Pede (Madonna di Valle Radice, Sora, Frosinone, Lazio); (BILLIA & PETRONIO 2009)

18- Guado San Nicola (left bank of the Volturno river, near Monteroduni, Upper Volturno Valley, Isernia, Molise, Central Italy) (PERETTO et al. 2016).

As to the 7, 8, and 10 (Marzolino site only) sites, the attribution of the remains by the authors is to be intended as *S. cf kirchbergensis*.

The Czech Republic (BILLIA 2011a: § 1.11, p. 24)

According to MUSIL (2018: 6), *S. kirchbergensis* remnants come from layers 11a, 11b, 11c, 11d of the Kůlna Cave (northern part of the Moravian Karst, about 35 km north of Brno) (OPRAVIL 1970) together with remains of *Coelodonta antiquitatis* BLUMENBACH, 1807, *Capra ibex* LINNAEUS, 1758, *Rupicapra rupicapra* LINNAEUS, 1758, *Alces alces* LINNAEUS, 1758, *Cervus elaphus* LINNAEUS, 1758, *Capreolus capreolus* LINNAEUS, 1758, *Saiga tatarica* (LINNAEUS, 1766), *Mammuthus primigenius* (BLUMENBACH, 1799), *Equus taubachensis* FREUDENBERG, 1911, *Canis lupus* LINNAEUS, 1758, *Ursus taubachensis* RODE, 1931, *Castor fiber* LINNAEUS, 1758, *Panthera spelaea* GOLDFUSS 1810, *Crocota crocota spelaea* GOLDFUSS, 1823, *Elephas* sp., Bovidae indet., *Ursus* sp., indeterminate rhino (MUSIL 1970).

Possibly, other *S. kirchbergensis* remains come from layers 9, 9a, 9b (ESR 70-55 ka BP, Micoquian, Eemian interglacial according to VALOCH (1988); 71.3 ka BP according to MUSIL (2018). Accompanying fauna: *Coelodonta antiquitatis*, *Equus (Asinus) hydruntinus* (recte *Equus hydruntinus* REGALIA, 1907), *Alces alces*, *Cervus elaphus*, *Rangifer tarandus* (LINNAEUS, 1758), *Mammuthus primigenius*, *Canis lupus*, *Crocota crocota spelaea*, *Panthera spelaea*, *Ursus ex gr. spelaeus*, *Ursus taubachensis*, *Lepus* sp., Bovidae indet., *Equus* sp. (MUSIL 1970).

Kůlna Cave is noted for its Palaeolithic and Mesolithic material as well as *Homo neanderthalensis* KING, 1864 skeletal remains dated about 50 ka BP.

Poland (BILLIA 2011a: § 1.13, pp. 24-25)

A well-preserved, nearly complete skeleton of *S. kirchbergensis* was recovered – in April 2016 during works along the S3 Polish national road – from an Eemian Interglacial site near Gorzów Wielkopolski (Landsberg an der Warthe, voiv. Lubusz, near the German border, N-W Poland; STEFANIAK et al. 2021). The skeleton was preserved in a succession that had accumulated in a small, shallow kettle palaeolake formed during the Scandinavian ice sheet retreat. The Gorzów deposits belong to at least two limnic cycles: an older one, dating to the Eemian Interglacial (MIS 5e) and an overlying one of Mid-Weichselian (MIS 3) age. The rhinoceros remains were preserved in a gyttja layer of the former unit. The *S. kirchbergensis* skeleton includes the cranium with full



Fig. 4 - *S. kirchbergensis* skull (F-4160) from the Chondon river (Yakutya [Sakha Republic], Russian Federation; KIRILLOVA et al. 2017: fig 2, p. 3); (A) view from above, (B) bottom view.

- *Cranio di S. kirchbergensis (F-4160), fiume Čondon (Yakutya [Repubblica Saha], Federazione Russa; KIRILLOVA et al. 2017: fig 2, p. 3); (A) vista dorsale, (B) vista ventrale.*

dentition and almost 120 postcranial bones. The lumbar and caudal part of the spinal column, as well as the left hind limb and a few minor bones were not preserved. All the bones are exceptionally well-preserved, but the rhinoceros skull suffered diagenetic crushing and damage caused by the roadwork.

Besides the *S. kirchbergensis* skeletal remains the site also yielded an isolated left metacarpal bone of fallow deer, *Dama dama* (LINNAEUS, 1758) (KOTOWSKI et al. 2017; SOBZYK et al. 2020). Later, palaeobotanical analysis very similar to those performed on the contents of the dental dimples of *S. kirchbergensis* from Spinadesco were conducted on the contents found in the dimples of the teeth of *S. kirchbergensis* from Gorzów Wielkopolski as well as on the contents recovered from the dimples of the teeth of the famous *C. antiquitatis* from Starunia (STEFANIAK et al. 2021).

The Russian Federation (European area) (BILLIA 2011a: § 1.17, p. 26)

A *S. cf. kirchbergensis* third upper molar comes from the Verkhnyaya cave (Atysh waterfall, Belaya river basin, Beloretsky district, native reserve territory of the Bashkortostan Republic) (DANUKALOVA et al. 2008). The authors refer the fauna “c” (in which *S. cf. kirchbergensis* is included) to MIS 7-5e.

Fragments of teeth assigned to *S. kirchbergensis* were found in both the Barsuchii Dol and Idrisovskaya caves

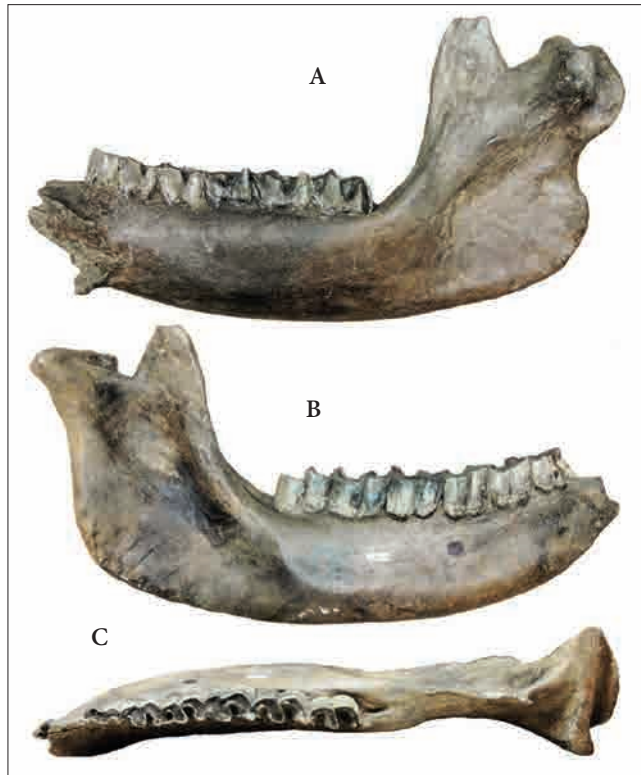


Fig. 5 - *S. kirchbergensis* lower jaw (F-887) from the Chumysh river (Pobeda village, Altay Territory, Russian Federation; KIRILLOVA et al. 2021: fig. 2, p. 561).

- *Mascellare inferiore di S. kirchbergensis (F-887), fiume Čumyš (villaggio di Pobeda, Territorio dell'Altay, Federazione Russa; KIRILLOVA e al. 2021: fig. 2, p. 561).*

(Southern Ural) (KUZMIN et al. 2017) (on the basis of the brief text description the two caves should be located on the border between the Chelyabinsk region and the Republic of Bashkortostan). It is conceivable that the caves could be a shelter against the cold for the rhinoceros. The presumed age for the Barsuchii Dol cave is Eemian interglacial MIS 5e (ca. 130-115 ka BP) (OTVOS 2015) while for Idrisovskaya cave MIS 5e is suggested only.

Asia

The Russian Federation (Asian area) (BILLIA 2011a: § 2.2, p. 26)

A very well-preserved *S. kirchbergensis* skull (the “ChR-Chondon rhinoceros” F-4160, just as in the Russian original text) – preserving the entire maxillary arch intact – coming from the Chondon river (a tributary of the Laptev Sea flowing into N Yakutia) was described by KIRILLOVA et al. (2016, 2017) (KIRILLOVA et al. 2017: fig. 2, p. 3; Fig. 4, already reported in BILLIA & ZERVANOVA 2017). As it almost always happens in these cases, the mandible has unfortunately been lost.

A well-preserved lower jaw of *S. kirchbergensis* (the “AltR-Altai rhinoceros” F-887, just as in the Russian original text) (KIRILLOVA et al. 2021: fig 2, p. 561; Fig.

5) was found on the coastline of the Chumysh river (a right tributary of the Ob') near the Pobeda village (Tselinny district, Altay Territory [Altaysky kray]) in 2005. The incisal part and the diastema are absent. Its roundness is noticeable. The internal canal of the bone contained soil (yellow medium-grained sand with a silty component) from which spores and pollen were isolated. Both samples (F-4160 skull and F-887 hemimandible) are kept in the National Alliance Shidlovsky "Ice Age" collections (pr. Mira, 102-Korpus 1, Moscow) (KIRILLOVA et al. 2021).

According to SHPANSKY & BOESKOROV (2018: fig 6, p. 457) a lower jaw of *S. kirchbergensis* was collected from the Mus Khaya locality on the Yana river (Yakutia, NE Siberia). This jaw was previously designated as a paratype of *Coelodonta jacuticus* Rusanov. This last find of *S. kirchbergensis* in northern Yakutia 'ld represent the northernmost occurrence of this species. In the same article the relationship among *Coelodonta jacuticus* RUSANOV, 1968, *C. antiquitatis pristinus*, RUSANOV, 1968 and *C. antiquitatis humilis* RUSANOV, 1968 are also taken into consideration concluding that "*C. jacuticus*, *C. a. pristinus*, and *C. a. humilis* are invalid taxa which should be regarded as junior synonyms of *C. antiquitatis*".

S. kirchbergensis teeth (together with *C. antiquitatis* remains) come from both the Tetyukhinskaya (44°35' N - 135°36' E) and Sukhaya (43°09' N - 131°28' E) caves in southern Primorye [Primorskij kraj] (southern Coast territory, in front of Japan). Radiocarbon dating and accompanying fauna suggest a MIS range 5÷2. Till to date, these two finds attest the *S. kirchbergensis* Late Pleistocene extreme eastern boundary (KOSINTSEV et al. 2020).

A complex of 39 skeletal (cranial and postcranial) remains yielded from thirteen western as well as eastern Siberian localities were recently recognised as belonging to *S. kirchbergensis* (LOBACHEV et al. 2021). In the LOBACHEV et al. paper - tab. 1, p. 4 - both the 13 localities and the single specimens are listed in detail. In this context, the list is limited to 13 localities:

- 1- Chumysh River between the villages of Martynovo and Kytmanovo (Altay Territory [Altaysky kray]);
- 2- Surroundings of Biysk (Altay Territory [Altaysky kray]);
- 3- Chulym River east of Asino (Tomsk region);
- 4- Ob' River, mouth of the Kindal oxbow (Tomsk region);
- 5- Ob' River at Krasny Yar (Tomsk region);
- 6- Surroundings of Berdsk (Novosibirsk region);
- 7- Ob' River at Krasny Yar, 17 km north of Novosibirsk (Novosibirsk region);
- 8- Ob' River near the Bibiha village (Novosibirsk region);
- 9- Ob' River at Taradanovo (Novosibirsk region);
- 10- Irtysh River near the Krasnoyarka and Utuskun villages (Ust-Ishymsk district, Omsk region);

- 11- Irtysh River in Omsk (Omsk region);
- 12-Kachulka village (Karatuzsk district, Krasnoyarsk Territory [Krasnoyarsky kray]);
- 13- Irkutsk region (unknown locality).

Here too – as in many other cases already known – much of the material collected along watercourses is devoid of stratigraphic data. For their investigation, the authors resorted to the mesowear method (FORTELIUS & SOLOUNIAS 2000) in order to reconstruct the dietary preferences of *S. kirchbergensis* and *Coelodonta antiquitatis* in that part of the Siberian area.

In the "discussion" of their paper, the authors come to interesting conclusions (LOBACHEV et al. 2021: pp. 38-39) about the possible diet, the ecology and the chronological age of *S. kirchbergensis* in that area. On the basis of this study (and the previous ones concerning the distribution of *S. kirchbergensis* in Eurasia) it would seem that *S. kirchbergensis* is rather more distributed in the Siberian area than previous thought.

In SHPANSKY (2016) three of the above mentioned localities (along the Ob' near Kindal [Tomsk oblast'], along the Chulym river, east of Asino [Tomsk oblast'], and the site at the confluence of the Amyl and Kazir rivers near Kachul'ka [Krasnoyarsk oblast']) were also mentioned.

Therefore, at the moment, there are three localities in Yakutya that had given back remains attributed to *S. kirchbergensis*: the two just mentioned located in the far north of Yakutya (Chondon river [KIRILLOVA et al. 2017] and Mus Khaya (Yana river) [SHPANSKY & BOESKOROV 2018]) to which the area of the Vilyui river (mouth of the Tyalychima river) in west-central Yakutya must be added (DUBROVO 1957).

China (BILLIA 2011a: § 2.7, pp. 28-29)

According to TONG et al. (2019, fig 5, p. 627), *S. kirchbergensis* remains were found in the Bailongdong (or Bailong Cave, Yunxi County, NW part of Hubei province) (Fig. 6), a cave site which yielded ancient humans.

The *S. kirchbergensis* remains consist of: a M² (IVPP V 26161.1), a M² (IVPP V 26161.2), a DP¹ (IVPP V 26161.3), a dp₁ (YXM-004), a Mc III (YXM-005), a right talus (IVPP V 26161.4). Among eight human teeth, a couple of stone and bone artifacts as well as 32 other mammal fossil species unearthed during the past four decades such as: *Bos (Bibos) gaurus grangeri* COLBERT & HOOIJER, 1953, *Pseudois nayaur* (HODGSON, 1833) (the "Himalayan blue sheep", the only member of the *Pseudois* genus), *Sus lydekkeri* ZDANSKY, 1928, and diversified deers (*Elaphodus cephalophus* MILNE-EDWARDS, 1872, *Muntiacus* cf. *Muntiacus reevesi* OGILBY, 1839, *Muntiacus muntjak* ZIMMERMANN, 1780, *Cervus grayi* ZDANSKY, 1925 [= *Cervus (Sika) grayi* (ZDANSKY, 1925)], *Rusa unicolor* KERR, 1792). In addition to these already listed species, the following taxa are also included: *Miniopterus schreibersii* Kuhl 1817, *Leopoldamys edwardsi*



Fig. 6 - *S. kirchbergensis* M2 (IVPP V 26161.2) from Bailongdong (Yunxi, Hubei, PRC; TONG et al. 2019: fig 5, p. 627).
- M2 di *S. kirchbergensis* (IVPP V 26161.2), Bailongdong (Yunxi, Hubei, RPC; TONG et al. 2019: fig 5, p. 627).



Fig. 7 - *S. kirchbergensis* M3 (XZSF.6) from Zhangshan (Suqian, Jiangsu prov., PRC; Chen et al. 2020: fig. 2, p. 323).
- M3 di *S. kirchbergensis* (XZSF.6), Zhangshan (Suqian, Jiangsu prov., RPC; Chen et al. 2020: fig. 2, p. 323)

Thomas 1882, *Rhizomys sinensis* J.E. GRAY, 1831 (the “Chinese bamboo rat”), *Hystrix subcristata* SWINEHOE, 1870 (the “Chinese porcupine”), *Canis mosbachensis variabilis* PEI, 1934, *Cuon javanicus antiquus* MATTHEW & GRANGER, 1925 (? or COLBERT & HOOIJER, 1953) (the “Sumatran wild dog”), *Nyctereutes sinensis* PEI, 1934, *Ursus thibetanus* CUVIER 1823, *Ailuropoda baconi* (WOODWARD 1915), *Arctonyx collaris rostratus* MATTHEW & GRANGER, 1923 (the “SE Asian pig-nosed badger”), *Pachycrocuta sinensis* (Owen, 1870), *Catopuma temminckii* (VIGORS & HORSFIELD, 1827) (the “Asian golden cat”), *Neofelis nebulosa* (GRIFFITH, 1821) (the “clouded leopard”), *Panthera tigris* LINNAEUS, 1758, *Panthera pardus* (LINNAEUS, 1758), *Stegodon orientalis* OWEN, 1870, *Dicerorhinus sumatrensis* (FISCHER v. WALDHEIM, 1814), *Megatapirus augustus* MATTHEW & GRANGER, 1923, *Capricornis sumatraensis kanjereus* COLBERT & HOOIJER, 1953, *Homotherium* sp., *Rhinolophus* sp., *Ochotona* sp., and *Bubalus* sp. Monkeys are lacking and porcupines are few: it is unusual for its geographical and chronological positions. Moreover, the general composition agrees well with that of the *Ailuropoda*-*Stegodon* fauna.

Such taxa of Bailongdong fauna as *A. baconi*, *P. sinensis*, *A. c. rostratus*, *P. tigris* and *M. augustus* nearly reached the maximum peak in dimensions of their kinds respectively. Based on the faunal composition and evolutionary levels, the age of Bailongdong fauna should correspond to the Middle Pleistocene which is very close to the Yanjinggou fauna and the fauna of the Nanjing Man site (TONG et al. 2019). The fossil remains on the whole are preserved in the collections of the Cultural Relics Station of Yunxi County and the

Institute of Vertebrate Palaeontology & Palaeoanthropology, Chinese Academy of Sciences.

At Zhangshan (lower Huaihe River Region, SW of Suqian, Jiangsu province, E China; 33°48'12" N - 117°51'50" E) (CHEN XI et al. 2020) - a site casually discovered in 1950's during the Xinyihe River construction project - some *S. kirchbergensis* remains together with other fossil remnants of *Alligator* cf. *sinensis* FAUVEL, 1879, *Palaeoloxodon huaihoensis* QI, 1999, *Equus hemionus* PALLAS, 1774, *Sus lydekkeri* ZDANSKY, 1928, *Sinomegaceros ordosianus* (YOUNG, 1932), *Cervus* (*Sika*) *grayi* (ZDANSKY, 1925), and *Bison priscus* BOJANUS, 1827 were recently unearthed (CHEN XI et al. 2020, fig 2, p. 323; Fig. 7). Proposed age for this faunal complex: early late Pleistocene.

Middle Pleistocene rhinocerotid dental remains coming from the upper strata of the Jinyuan Cave (Luotuo Hill, Dalian, Liaoning Province, NE China) have been ascribed to *Stephanorhinus* cf. *kirchbergensis*. The remains “mainly consist of maxillary and mandible with dentition of juvenile and aged individuals” (SUN BOYANG et al. 2022).

Japan

Back in the past, remains of a fossil rhinoceros (NMNS-PV9600) were recovered in the lower part of the Isa Formation (Middle Pleistocene) (Isa area, Mine City, Yamaguchi Prefecture, W Japan). At that time, those remains were assigned to *Dicerorhinus nipponicus* SHIKAMA et al. 1967. Presently, according to HANDA & PANDOLFI (2016) they must be ascribed to *S. kirchbergensis* considering that they are showing anatomical features very similar to those of *S. kirchbergensis*.

Furthermore, the rhinoceros from the Isa Formation presents characteristics very close to *S. kirchbergensis* from Choukoutien. The authors suggest that *S. kirchbergensis* could have reached the Japanese archipelago during the Middle Pleistocene (before or around 0.43 Ma).

Considerations

On the whole, these latest new data show a good increase in the number of sites that gave back remains of *S. kirchbergensis*. Furthermore, Spain and Japan are mentioned in the literature for the first time.

As in the case of the four previous “Addenda”, this work does not claim to be exhaustive and must in any case be considered as a collection of bibliographic data that enriches the volume of knowledge previously acquired about *S. kirchbergensis*.

Therefore, comments and other considerations are beyond the scope of this paper which is purely informative.

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References

- BARBERA, C., P. RAIA & C. MELORO. 2006. I mammiferi di Melpignano conservati presso il Museo di Paleontologia di Napoli. *Thalassia Salentina* 29: 237-43.
- BERTO, C., & G. RUBINATO. 2010. The Upper Pleistocene mammal record from Caverna degli Orsi (San Dorligo della Valle - Dolina, Trieste, Italy). A faunal complex between Eastern and Western Europe. In *Quaternary Stratigraphy and Paleontology of the Southern Russia. Connections between Europe, Africa, and Asia*. V.V. TRTOV & A.S. TESAKOV cur., 26. Abstracts Int. INQUA-SEQS Conf. 2010, RAS.
- BILLIA, E.M.E. 2011a. Occurrences of *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) in Eurasia. An account. *Acta Palaeontologica Romaniae* 7: 17-40.
- BILLIA, E.M.E. 2011b. Siti paleontologici a “Rinoceronte di Merck”, *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Perissodactyla), in Istria, Quarnero e Dalmazia [with Slovenian & Croatian summ.]. *Atti Centro Ricerche Storiche, Rovigno / Centar za Povijesna Istrazivanja, Rovinj / Središće za Zgodovinska Raziskovanja Rovinj* 41: 9-31.
- BILLIA, E.M.E., 2014. *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) from European Russia - A new, detailed inventory of sites and referred material. *Central European Geology, Acta Geologica Hungarica* 57 (2): 163-92.
- BILLIA, E.M.E., & C. PETRONIO. 2009. Selected records of *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) in Italy. *Bollettino della Società Paleontologica Italiana* 48 (1): 21-32.
- BILLIA, E.M.E., & J. ZERVANOVÁ. 2015. New *Stephanorhinus kirchbergensis* (JÄGER, 1839) (Mammalia, Rhinocerotidae) records in Eurasia - Addenda to a previous work. *Gortania. Geologia, Paleontologia, Paleontologia* 36: 55-68.
- BILLIA, E.M.E., & J. ZERVANOVÁ. 2016. *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) from Vernasso (Udine, NE Italy) and other localities in adjacent areas with reports on Oligo-Mio-Pliocene rhinoceroses. *Gortania. Geologia, Paleontologia, Paleontologia* 37: 65-83.
- BILLIA, E.M.E., & J. ZERVANOVÁ. 2017. Some other occurrences of *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) from Eurasia. Addenda to other previous works. *Gortania. Geologia, Paleontologia, Paleontologia* 38: 77-83.
- BOLOGNA, P., G. DI STEFANO, G. MANZI, C. PETRONIO, R. SARDELLA & E. SQUAZZINI. 1994. Late Pleistocene mammals from the Melpignano (LE) “Ventarole”: preliminary analysis and correlations. *Bollettino della Società Paleontologica Italiana* 33 (2): 265-74.
- BURKANOVA, E.M., E.M.E. BILLIA & D. PERSICO. 2020. *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) from the Po Valley (Lombardia, Northern Italy): possible diet/nutrition and living conditions. *Quaternary International* 554: 164-69 [doi.org/10.1016/j.quaint.2020.07.031].
- CARDINI, L. 1962. Prime determinazioni delle faune dei nuovi giacimenti costieri musteriani del Capo di Leuca. *Quaternaria* 5: 314-5.
- CHEN, X., S. WU, P. WANG, X. WANG & J. CHAO. 2020. A report on the Late Pleistocene vertebrate fossils from the Zhangshan locality, Suqian, Jiangsu Province. *Acta Anthropologica Sinica* 39 (2): 319-31 [doi: 10.16359/j.cnki.cn11-1963/q.2018.0021].
- DANUKALOVA, G., A. YAKOVLEVA, L. ALIMBEKOVA, T. YAKOVLEVA, E. MOROZOVA, A. EREMEEVA & P. KOSINTSEV. 2008. Biostratigraphy of the Upper Pleistocene (Upper Neopleistocene)-Holocene deposits of the Lemeza River valley of the Southern Urals region (Russia). *Quaternary International* 190: 38-57.
- DAURA, J., M. SANZ, M.E. SUBIRÁ, R. QUAM, J.M. FULLOLA & J.L. ARSUAGA. 2005. A Neandertal mandible from the Cova del Gegant (Sitges, Barcelona, Spain). *Journal of Human Evolution* 49: 56-70.
- DUBROVO, I.A. 1957. Ob ostatkakh *Parelephas wüsti* (PAWL.) i *Rhinoceros mercki* JAEGER iz Yakutii [On remains of *Parelephas wüsti* (PAWL.) and *Rhinoceros mercki* JAEGER from Yakutya] [in Russian]. *Byulleten' Komissii po Izuchenyu Chetvertichnogo Perioda* 21: 97-104.
- FABIANI, R. 1919. I mammiferi quaternari della regione Veneta. *Memorie Istituto di Geologia R. Università di Padova* 5: 1-174.
- FORTELIUS, M., & N. SOLOUNIAS. 2000. Functional characterization of ungulate molars using the abrasion-attrition wear gradient: a new method for reconstructing paleodiets. *American Museum Novitates* 3301: 1-36 [doi: 10.1206/0003-0082(2000)301<0001:FCOUMU>2.0.CO;2].
- HANDA, N., & L. PANDOLFI. 2016. Reassessment of the Middle Pleistocene Japanese rhinoceroses (Mammalia, Rhinocerotidae) and paleobiogeographic implications. *Paleontological Research* 20 (3): 247-60 [doi: http://dx.doi.org/10.2517/2015PR034].
- KIRILLOVA, I.V., O.F. CHERNOVA, V.V. KUKARSKIKH, F.K. SHIDLOVSKIY & O.G. ZANINA. 2016. The first finding of a rhinoceros of the genus *Stephanorhinus* in Arctic Asia. *Doklady Akademii Nauk* 471 (6): 746-9 (*Doklady Biological Sciences* 471: 300-3). [doi:10.1134/S0012496616060132].
- KIRILLOVA, I.V., O.F. CHERNOVA, J. v.d. MADE, V.V. KUKARSKIKH, B. SHAPIRO, J. v. d. PLICHT, F.K. SHIDLOVSKIY, P.D.

- HEINTZMAN, T. v. KOLFSCHOTEN & O.G. ZANINA. 2017. Discovery of the skull of *Stephanorhinus kirchbergensis* (JÄGER, 1839) above the Arctic Circle. *Quaternary Research* 2017: 1-14 [doi:10.1017/qua.2017.53].
- KIRILLOVA, I.V., A.O. VERSHININA, E.P. ZAZOVSKAYA, O.G. ZANINA, S. KATLER, P.A. KOSINTSEV, E.G. LAPTEVA, O.F. CHERNOVA & B. SHAPIRO. 2021. K voprosu o vremeni i srede obitanya *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) na Altae i Severo-Vostoke Rossii [On the question of time and environment of *Stephanorhinus kirchbergensis* Jäger 1839 (Mammalia, Rhinocerotidae) on Altai and northeastern Russia] [in Russian, English abstr.]. *Zoologicheskyy Zhurnal* 100 (5): 558-72 [doi: 10.31857/S0044513421050068].
- KOSINTSEV, P.A., S.V. ZYKOV, M.P. TIUNOV, A.V. SHPANSKY, V.V. GASILIN, D.O. GIMRANOV & M.M. DEVYASHIN. 2020. The first find of Merck's rhinoceros (Mammalia, Perissodactyla, Rhinocerotidae, *Stephanorhinus kirchbergensis* Jäger, 1839) remains in the Russian Far East. *Doklady Biological Sciences* 491: 47-9 [doi.org/10.1134/S0012496620010032].
- KOTOWSKI, A., D. NOWAKOWSKI, P. KUROPKA, K. KOŁACZYK, J. BADURA, R.K. BORÓWKA, R. STACHOWICZ-RYBKA, U. RATAJCZAK, A. SHPANSKY, K. URBAŃSKI & K. STEFANI- AK. 2017. Histological analysis and comparison between bones of *Stephanorhinus kirchbergensis* from Gorzów Wielkopolski (Poland), Woolly Rhinoceros *Ceolodonta antiquitatis*, Indian Rhinoceros *Rhinoceros unicornis*, Black Rhinoceros *Diceros bicornis* and White Rhinoceros *Ceratotherium simum*. Preliminary data and Perspectives. In *Quaternary stratigraphy and hominids around Europe: Tautavel (Eastern Pyrenees)*. *Int. conf. INQUA-SEQS 2017*. Vol. abstracts, 58.
- KUZMIN, Y.V., P.A. KOSINTSEV, S.K. VASILIEV, T.V. FADEEVA & G.W.L. HODGINS. 2017. The northernmost and latest occurrence of the fossil porcupine (*Hystrix brachyura vinogradovi* Argyropulo, 1941) in the Altai Mountains in the Late Pleistocene (ca. 32,000 e 41,000 cal BP). *Quaternary Science Reviews* 161: 117-22 [dx.doi.org/10.1016/j.quascirev.2017.02.010].
- LEONARDI, P. 1945-47. Resti fossili di rinoceronti del Museo di Storia Naturale di Trieste. *Atti del Museo Civico di Storia Naturale di Trieste* 16, n. 12: 145-60.
- LEONARDI, P. 1947. Resti fossili inediti di rinoceronti conservati nelle collezioni dell'Istituto Geologico dell'Università di Padova. *Memorie Istituto di Geologia dell'Università di Padova* 15: 1-30.
- LOBACHEV Y.V., A.V. SHPANSKY, A.A. BONDAREV, A.Y. LOBACHEV, S.K. VASILIEV, A.M. KLEMENTEV, I.E. GREBNEV & V.I. SILAEV. 2021. New findings of *Stephanorhinus kirchbergensis* in Siberia. *Palaentologia Electronica* 24 (1), a14: 1-42 [doi.org/10.26879/734].
- LONGIN, R. 1971. New method of collagen extraction for radiocarbon dating. *Nature* 230: 241-2.
- MARRA, F., P. CERULEO, B. JICHA, L. PANDOLFI, C. PETRONIO, L. SALARI, B. GIACCIO, & G. SOTTILI. 2016. Chronostratigraphic constraints on Middle Pleistocene faunal assemblages and Acheulian industries from the Cretone lacustrine basin, central Italy. *Journal of Quaternary Science* 31 (7): 641-58 [doi:10.1002/jqs.2889].
- MIRIGLIANO, G. 1941. Avanzi di vertebrati quaternari di Melpignano (Lecce). *Atti della Regia Accademia di Scienze fisiche e matematiche di Napoli* 2 (4): 2-48.
- MOL, D., K. POST & H.v.d. PLICHT. 2012. Fossielen van bosneushoorn (*Stephanorhinus kirchbergensis*) en bosolifant (*Elephas antiquus*) uit het Eurogeulgebied. *Cranium* 29 (2): 20-5.
- MOLON, F. 1875. Fossili quaternari del Monte Zoppega in S. Lorenzo di S. Bonifacio di Verona. *Atti del Reale Istituto Veneto di Scienze, Lettere ed Arti* s. 5, 1 (2): 1125-47.
- MUCI, M. 1998. La raccolta "Decio de Lorentiis" presso il Museo Civico di Maglie. *I Quaderni del Museo Comunale di Paleontologia di Maglie* 5: 147-66.
- MUSIL, R. 1970. Die Entwicklung der Tiergesellschaft im Laufe der Sedimentation in der Kůlna-Höhle. In *Die Erforschung der Kůlna-Höhle bei Sloup im Mährischen Karst (Tschechoslowa-kei)*, cur. K. VALOCH, J. PELÍŠEK, R. MUSIL, J. KOVANDA & E. OPRAVIL, 8-20. Quartär 20 (1969).
- MUSIL, R. 2018. Phenological analysis of the Last Glacial vertebrates from the territory of Moravia (The Czech Republic). Continuity and change in faunistic communities. *Fossil Imprint* (former Acta Musei Nationalis Pragae), s. B. *Historia Naturalis* 3-4: 199-236.
- OPRAVIL, E. 1970. Die Ergebnisse der Holzkohlenanalyse aus der Kůlna-Höhle. In *Die Erforschung der Kůlna-Höhle bei Sloup im Mährischen Karst (Tschechoslowa-kei)*, cur. K. VALOCH, J. PELÍŠEK, R. MUSIL, J. KOVANDA & E. OPRAVIL, 25-9. Quartär 20 (1969).
- OTVOS, E.G. 2015. The Last Interglacial stage - Definitions and marine highstand, North America and Eurasia. *Quaternary International* 383: 158-73.
- PANDOLFI, L., & C. PETRONIO. 2011. The small-sized rhinoceroses from the Late Pleistocene of Apulia (southern Italy). *Rivista Italiana di Paleontologia e Stratigrafia* 117 (3): 509-20.
- PELLARINI, P. 1999. Note sul rinvenimento di alcuni resti fossili di *Stephanorhinus kirchbergensis* (JAEGER, 1839) provenienti dalla cava di Vernasso (Cividale, Udine). *Gortania. Atti del Museo Friulano di Storia Naturale* 21: 65-8.
- PERETTO, C., M. AZZARELLO, J.J. BAHAIN, N. BOULBES, J.-M. DOLO, E. DOUVILLE, C. FALGUERES, T. GARCIA, G. LEMBO, A.M. MOIGNE, B. MUTTILLO, S. NOMADE, A. PEREIRA, M.A. RUFO, B. SALA, Q. SHAO, U. THUN HOHENSTEIN, U. TESSARI, M.C. TURRINI & G. VACCARO. 2016. The Middle Pleistocene site of Guado San Nicola (Monteroduni, Central Italy) on the Lower/Middle Palaeolithic transition. *Quaternary International* 411: 301-15 [dx.doi.org/10.1016/j.quaint.2015.11.056].
- PERSICO, D., E.M.E. BILLIA, S. RAVARA & B. SALA. 2015. The skull of *Stephanorhinus kirchbergensis* (Jäger, 1839) (Mammalia, Rhinocerotidae) from Spinadesco (Cremona, Lombardia, Northern Italy): morphological analyses and taxonomical remarks. An opportunity for revising the three other skulls from the Po Valley. *Quaternary Science Reviews* 109: 28-37 [doi.org/10.1016/j.quascirev.2014.11.022].
- PETRONIO, C. & L. PANDOLFI. 2008. *Stephanorhinus hemitoechus* (Falconer, 1868) del Pleistocene superiore dell'area di Melpignano-Cursi e S. Sidero (Lecce, Italia). *Geologica Romana* 41: 1-12.
- SALA, B. 1992. I mammiferi del Quaternario italiano. In *I Segni del Tempo. Memoria delle Origini e Icone del Primordiale*, C. TUGNOLI, cur., 209-27. Atti del Corso di Aggiornamento per Personale Docente.
- SCORTEMAGNA, F.O., 1844. Notizie sulle ossa fossili degli animali mammiferi rinvenute sepolte nel Monte Zoppega. *Annali di Scienze del Regno Lombardo-Veneto* V-VI.

- SHIKAMA, T., Y. HASEGAWA & G. OKAFUJI. 1967. On a rhinocerotid skull from Isa, Yamaguchi Prefecture, Japan. *Bulletin of the National Science Museum* 10: 455-62.
- SHPANSKY, A.V. 2016. Novye nakhodki nosoroga Merka (*Stephanorhinus kirchbergensis* Jäger, 1839) (Rhinocerotidae, Mammalia) v Tomskom Priob'e [New finds of Merck's rhinoceros (*Stephanorhinus kirchbergensis* Jäger, 1839) (Rhinocerotidae, Mammalia) in the Tomsk Priob'e region] [in Russian]. *Geosfernye Issledovaniya* 1: 24-39 [doi:10.17223/25421379/1/3]
- SHPANSKY, A.V., & G.G. BOESKOROV. 2018. Northernmost record of the Merck's Rhinoceros *Stephanorhinus kirchbergensis* (Jäger) and taxonomic status of *Coelodonta jacuticus* Russanov (Mammalia, Rhinocerotidae). *Paleontological Journal* 52 (4): 445-462 [doi:10.1134/S003103011804010X].
- SOBCZYK, A., R.K. BORÓWKA, J. BADURA, R. STACHOWICZ-RYBKA, J. v.d. MADE and 18 others. 2020. Geology, stratigraphy and palaeoenvironmental evolution of the *Stephanorhinus kirchbergensis*-bearing Quaternary palaeolake (s) Gorzów Wielkopolski (NW Poland, Central Europe). *Journal of Quaternary Science* 35 (4): 539-58 [doi:10.1002/jqs.3198].
- STEFANIAK, K., R. STACHOWICZ-RYBKA, R.K. BORÓWKA, A. HRYNOWIECKA, A. SOBCZYK, M. MOSKAL-DEL HOYO, A. KOTOWSKI, D. NOWAKOWSKI, M.T. KRAJCARZ, E.M.E. BILLIA, D. PERSICO, E.M. BURKANOVA, S.V. LESHCHINSKIY, E.V. ASPEREN, U. RATAJCZAK, A.V. SHPANSKY, M. LEMPART, B. WACH, M. NISKA, J. v.d. MADE, K. STACHOWICZ, J. LENARCZYK, J. PIĄTEK & O. KOVALCHUK. 2021. Browsers, grazers or mix-feeders? Study of the diet of extinct Pleistocene Eurasian forest rhinoceros *Stephanorhinus kirchbergensis* (Jäger, 1839) and woolly rhinoceros *Coelodonta antiquitatis* (Blumenbach, 1799). *Quaternary International* 605-6: 192-212 [doi.org/10.1016/j.quaint.2020.08.039].
- SUN, B., Y. YAN, C. JIN, X. DAI & Y. WANG. 2022. New material of *Stephanorhinus* (Rhinocerotidae, Mammalia) from Jinyuan Cave, Luotuo Hill in Dalian, Northeast China. *Historical Biology* [doi.org/10.1080/08912963.2022.2130793].
- TONG, H,W, B. ZHANG, X. WU & S. QU. 2019. [Mammalian fossils from the Middle Pleistocene human site of Bailongdong in Yunxi, Hubei] [in Chinese, English abstract]. *Acta Anthropologica Sinica* 38 (4): 1-38 [doi:10.16359/j.cnki.cn11-1963/q.2019.0064].
- VALOCH, K. 1988. Die Erforschung der Kůlna-Höhle 1961-1976. In *Die Erforschung der Kůlna-Höhle 1961-1976*, K. VALOCH cur., 7-199. *Anthropos* 24 (n.s. 16).

Authors' addresses - Indirizzi degli Autori:

- Emmanuel M.E. BILLIA
independent researcher, c/o Museo Friulano di Storia Naturale
via Sabbadini 22-32, I - 33100 UDINE
e-mail: e.billia@yandex.ru, aproton@gmail.com
- Júlia ZERVANOVÁ
Drobného 16/9, SK - 84101 BRATISLAVA
e-mail: lia20lia@gmail.com

