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The woolly rhinoceros from Seweckenberge near Quedlinburg (Germany)

Kolfschoten, M. van; Hesse, A.; Gaudzinski-Windheuser, S.; Jöris, O.

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THE WOOLLY RHINOCEROS FROM SEWECKENBERGE NEAR QUEDLINBURG (GERMANY)

Abstract

The locality Seweckenberge (near Quedlinburg) yielded, during the quarrying of gypsum, a large amount of Pleistocene fossils; remains that inspired Otto von Guericke in 1678 to reconstruct the famous *Magdeburger Einhorn* (i. e., “Magdeburg Unicorn”) or *Guericke-Einhorn*. For his reconstruction he made use of skeletal parts of recent as well as fossil, Pleistocene material collected in 1663 at the locality Seweckenberge. The Pleistocene faunal assemblage is rather diverse and includes different species of the so-called Mammoth Steppe biome. One of these species is the Woolly rhinoceros. A skull fragment of a juvenile individual with an age of ca. 1.5 years, described in this paper, is stored in the collection of the *Museum für Naturkunde und Vorgeschichte Dessau* (Museum of Natural History and Prehistory Dessau) in Dessau-Roßlau.

Keywords

Guericke-Einhorn, mammoth steppe biome, Woolly rhinoceros, *Coelodonta antiquitatis*

INTRODUCTION

The locality Seweckenberge (Saxony-Anhalt, Germany) plays an important role in the history of the Unicorn myth; the legend of an animal that is nowadays often depicted as a horse with a large, pointed, spiralling horn projecting from its forehead, and in some cases with a goat’s beard and cloven hooves. The legend goes far back in time and is geographically widespread; it originates most probably from India or south-east Asia inspired by the appearance of the Indian One-horned Rhinoceros (*Rhinoceros unicornis*) but also (fossils of) the Woolly rhinoceros (*Coelodonta antiquitatis*), the Woolly mammoth (*Mammuthus primigenius*) and the Aurochs (*Bos primigenius*) could have been a source of inspiration (Gröning and Brauckmann, 2011). However, the fossil Siberian Unicorn (*Elasmotherium sibiricum*) should not be excluded as base for the unicorn legend. Recent investigations indicated that the very large, Eurasian rhinoceros existed to at least 39,000 years ago, living at the same time as modern humans (Kosintsev et al., 2019; Kuitens et al., 2019).

There have been several attempts to reconstruct the mythical unicorn. Well known is the *Magdeburger Einhorn* (i. e., “Magdeburg Unicorn”) or *Guericke-Einhorn* reconstruction undertaken in 1678 by the German inventor and scientist Otto von Guericke (Fig. 1), and among others mayor of the city of Magdeburg. Guericke’s reconstruction got lost but fortunately, there are drawings of the creature he made: the oldest picture is published in 1714 by Valentini (see Oekentorp, 1994); well known is the drawing published by Leibniz (1749) (Fig. 1: b). These drawings form the base for 3D models of the “*Guericke-Einhorn*” (Fig. 2), for example the one that is on display in the *Museum für Naturkunde* (i. e., Natural History Museum) in Magdeburg (Germany) or the Otto von Guericke’s unicorn skeleton, exhibited near the Zoo in Osnabrück (Germany).

The drawings, although not very detailed, show that Otto von Guericke made use of skeletal parts of recent as well as fossil animals for his reconstruction of the unicorn. The horn is most probably the “tusk” from a narwhale (*Monodon monoceros*), a medium-sized whale that lives in the Arctic waters around Greenland,

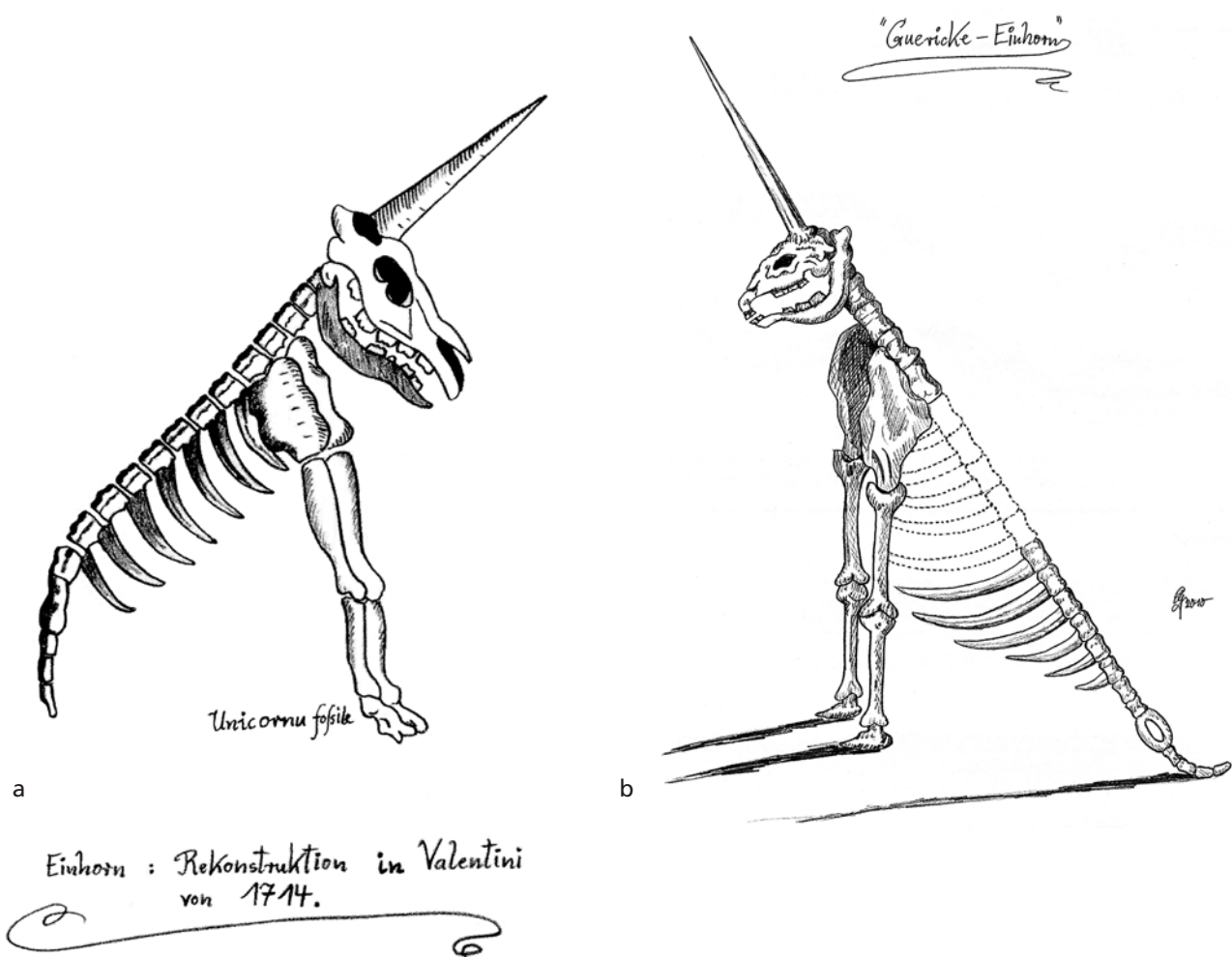


Fig. 1 Drawings of the *Guericke-Einhorn*. **a** after Valentini (1714) (redrawn by Elke Gröning after Oekentorp, 1994); **b** after Leibniz (1749) (redrawn by Elke Gröning). – (Drawings from Gröning and Brauckmann, 2011).

Canada, and Russia. The left upper canine of the narwhale males form a spirally twisted, long tusk with a length up to more than 3 m. The skull of the unicorn looks like a fossil skull of a Woolly rhinoceros and the shoulder blades and the bones of the two front legs are from the extinct Woolly mammoth. The original species of the other unicorn bones is/are unclear. The fossil material Otto von Guericke used for his reconstruction is Pleistocene in age and was collected at the locality Seweckenberge near Quedlinburg (Gröning and Brauckmann, 2011).

SEWECKENBERGE / SEWECKEN HILLS

The Seweckenberge (i. e., Sewecken Hills; 51° 47' N; 11° 8' E) are located in the eastern foreland of the Harz mountains ca. 4 km east-south-east of the city of Quedlinburg. The hills are a part of the Quedlinburg Anticline and are formed by the erosion-resistant beds of the mid-Triassic Muschelkalk series. The Middle Muschelkalk consists mainly of dolomitic marl and cellular limestone with embedded gypsum rocks formed by the evaporation of salt-water. Due to the weathering and dissolution of the Muschelkalk, karst



Fig. 2 3D model of the *Guericke-Einhorn* on display at the *Museum für Naturkunde* (Natural History Museum) in Magdeburg (Germany). – (Photo: Michael Buchwitz, *Museum für Naturkunde Magdeburg*).

phenomena such as sinkholes, pipes and dolines developed. These karst features formed traps where, in particular, Pleistocene animals accumulated. Quarries were made in the Muschelkalk layers to mine the valuable, extremely pure gypsum (Selenite) and in these quarries the dolines and other karst features, rich in Pleistocene fossils, got exposed. Flint artefacts and human remains indicate human presence at the site (Wüst, 1906).

Taxa	Common name	Taxonomic classification used by Nehring (1904)
AMPHIBIA		
<i>Rana</i> sp.	frog	<i>Rana</i> sp.
AVES		
<i>Hirundo rustica</i>	barn swallow	<i>Hirundo rustica</i> L. (<i>H. fossilis</i> Giebel)
<i>Anser</i> sp.	waterfowl	<i>Anser</i> sp.
<i>Anas</i> sp.	dabbling ducks	<i>Anas</i> sp. (<i>A. bochas</i> L.?)
<i>Anas crecca</i>	Eurasian teal	<i>Anas crecca</i> L.
<i>Lagopus</i> sp.	ptarmigan	<i>Lagopus</i> sp. (<i>Lagop. albus</i> Keys. U. Blas.?)
MAMMALIA		
Rodentia		
<i>Hystrix</i> sp.	porcupine	<i>Hystrix</i> sp. (<i>hisutirostris</i> Brdt?)
<i>Spermophilus rufescens</i>	russet ground squirrel	<i>Spermophilus rufescens</i> Keys. U. Blas.
<i>Cricetus cricetus</i>	hamster	<i>Cricetus vulgaris</i> Lesk
<i>Dicrostonyx torquatus</i>	Arctic lemming	<i>Myodus (Cuniculus) torquatus</i> Pall.
<i>Lemmus lemmus</i>	Norway lemming	<i>Myodes obensis</i> Pall. (<i>M. lemmus</i> Hensel)
<i>Microtus gregalis</i>	narrow-headed vole	<i>Arvicola (Microtus) gregalis</i> Pall.
<i>Alactaga major</i>	great jerboa	<i>Alactaga saliens fossilis</i> Nhrhg.
Lagomorpha		
<i>Ochotona</i> sp.	pika	<i>Lagomys</i> sp. (<i>pusillus</i> Pall.?)
<i>Lepus</i> sp.	hare	<i>Lepus</i> sp. (<i>timidus</i> ant.?)
Carnivora		
<i>Canis aureus</i>	golden jackal	<i>Canis aureus</i> L. Var.
<i>Vulpes lagopus</i>	Arctic fox	<i>Canis (Vulpes) lagopus</i> L.
<i>Vulpes vulpes</i>	red fox	<i>Canis vulpes</i> L. (<i>Vulpes vulgaris</i>)
<i>Mustela eversmanii</i>	steppe polecat	<i>Foetorius Eversmanni</i> Lesson
<i>Ursus</i> sp.	bear	<i>Ursus</i> sp.
<i>Crocuta crocuta spelaea</i>	cave hyena	<i>Hyaena spelaea</i> Blumenb. (<i>H. crocuta foss.</i>)
Perissodactyla		
<i>Coelodonta antiquitatis</i>	woolly rhinoceros	<i>Rhinoceros tichorhinus</i> Cuv.
<i>Equus</i> sp.	horse	<i>Equus caballus ferus</i> Pall.
Artiodactyla		
<i>Megaloceros giganteus</i>	giant deer	<i>Cervus euryceros</i> Pohl.
<i>Rangifer tarandus</i>	reindeer	<i>Cervus tarandus</i> L.
<i>Bison</i> sp.	bison	<i>Bison</i> sp. (<i>priscus</i> ?)

Tab. 1 Fauna list of the fossil vertebrate assemblage described by Nehring (1904) collected by Dr. Lampe (Quedlinburg) in 1903-1904 from a doline exposed in one of the quarries in the Sevecken Hills.

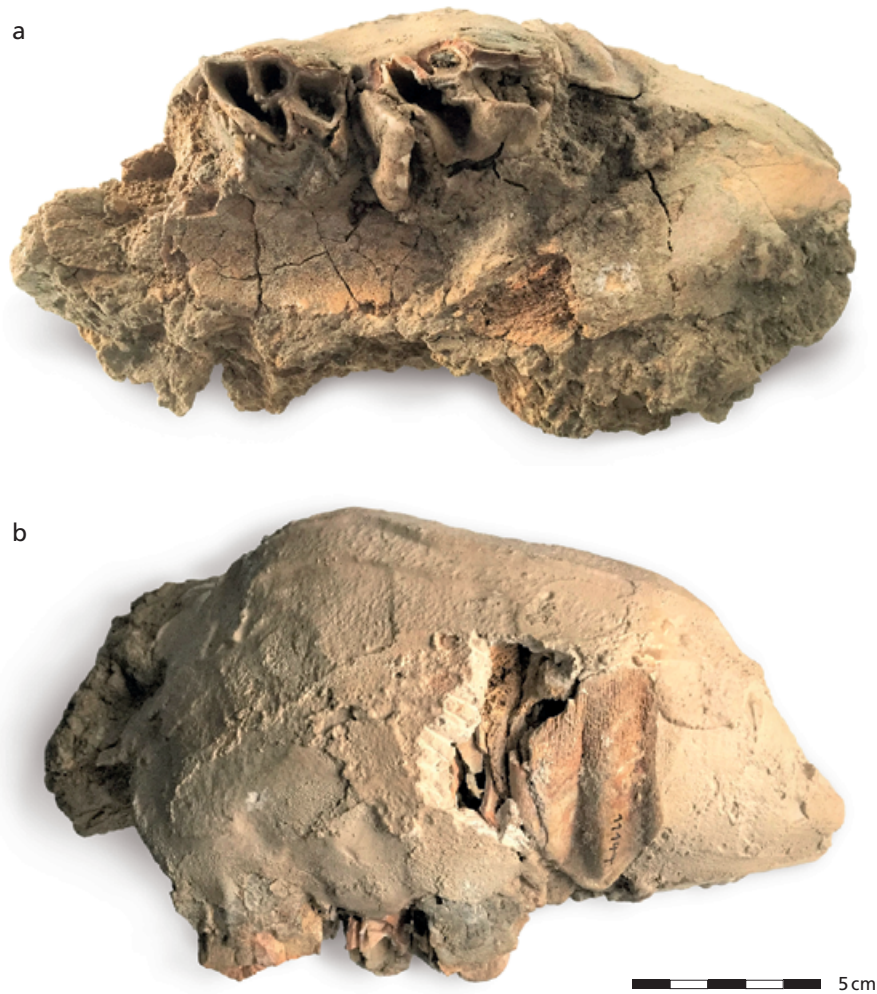


Fig. 3 The Seweckenberge rhinoceros skull fragment in the collection of the *Museum für Naturkunde und Vorgeschichte Dessau* (Museum of Natural History and Prehistory Dessau) in Dessau-Roßlau (MNVD-G 11.144). **a** occlusal view; **b** lingual view. – (Photo: Thijs van Kolschoten).

THE SEWECKENBERGE PLEISTOCENE FOSSIL RECORD

The Pleistocene fossils Otto von Guericke used for his reconstruction, were found in 1663 (Gröning and Brauckmann, 2011). Carl-Andreas Bischof collected Pleistocene fossils in the period before 1863 (Ludwig, 2012) and part of his collection is nowadays stored in the *Museum für Naturkunde und Vorgeschichte Dessau* (Museum of Natural History and Prehistory Dessau) in Dessau-Roßlau. Lampe (Quedlinburg) collected in 1903-1904 a large amount of Pleistocene vertebrate fossils from a doline exposed in one of the quarries in the Sewecken Hills; this collection is stored in the *Museum für Naturkunde* (Museum of Natural History) Berlin. Alfred Nehring (1845-1904), a German zoologist and palaeontologist, published an extensive description of the Lampe collection (Nehring, 1904). Nehring identified 26 different species: amphibia, birds and small rodents as well as large mammals (**Tab. 1**). The fauna is diverse; rodents and carnivores are well represented with respectively seven and six species (Nehring, 1904). Remarkable is the absence in Nehring's list of the Woolly mammoth.

The Sewecken Hill fauna, listed by Nehring (1904) is dominated by smaller mammal species that inhabit a dry steppe environment. The occurrence of the Arctic lemming indicates rather cold climatic conditions. It is

a fauna that is characteristic for the Late Pleistocene Mammoth Steppe ecosystem (Markova and van Kolfschoten, 2008; Markova et al., 2019) and the small mammal assemblage shows similarities with for example the fauna from Villa Seckendorff at Stuttgart-Bad Cannstatt (von Koenigswald, 1985). H.-D. Kahlke (1975) mentions a fossil of a Saiga Antelope, *Saiga tartarica*, from the Sewecken Hills excavated in 1728. The find confirms the assumption that the Pleistocene fauna inhabited a steppe environment.

The Sewecken Hill Pleistocene fossils in the *Museum für Naturkunde und Vorgeschichte Dessau* in Dessau-Roßlau, collected by Carl-Andreas Bischof, is rather limited. It includes a mandible (MNVD-G 9237) and two vertebrae (MNVD-G 9203) of a hyena (*Crocuta crocuta spelaea*), a canine and a distal end of a femur (MNVD-G 9204) of a cave bear (*Ursus spelaeus*), a mandible fragment with a molar (MNVD-G 9235) of a bison (*Bison* sp.) and a mandible fragment and a molar (MNVD-G 9231) of a bovid (*Bos* sp.). A very special Sewecken Hill find in the Dessau collection, described in the paper, is a skull fragment (MNVD-G 11.144) of a juvenile rhinoceros obtained from Bischof in 1869.

THE RHINO SKULL FRAGMENT

The fossil remnant MNVD-G 11.144 consists of a fragmented part of the left side of a skull of a juvenile rhinoceros, embedded in fine grained sediment (**Fig. 3**). The specimen includes (fragments of) four dental elements: P2, DP3, DP4 and M1. The P2 is only represented by the anterior part of the ectoloph which shows a well-developed parastyle and a prominent paracone fold¹. The parastyle is unworn and the upper part of the paracone fold is broken off. The DP3 is damaged; the outer side of the ectoloph as well as the inner side of the molar are (partly) missing. Hence, the possible occurrence of an internal cingulum is unknown. The DP3 shows a well-developed multiple crochet and a crista and a closed medifossette. The enamel is thin and the molar is only slightly worn. The DP4 is also damaged; the outer side of the ectoloph as well as the inner side of the molar are (partly) missing. The DP4 shows a well-developed single crochet and a crista and a closed medifossette. The enamel is thin and the molar is only slightly worn. The M1 is incomplete; only the anterior half of the ectoloph of the molar is clearly visible. It shows a well-developed parastyle and a prominent paracone fold. The molar is unerupted and hence, not worn.

SPECIES IDENTIFICATION

The morphology of the DP3 and DP4, and in particular the closed medifossette, indicate that the specimen should be attributed to the Woolly rhinoceros (*Coelodonta antiquitatis*). The medifossette of the upper milk molars of other possible Late Pleistocene species *Stephanorhinus kirchbergensis* and *Stephanorhinus hemitoechus* is open or very rarely closed whereas it is closed in the upper deciduous molars of *Coelodonta antiquitatis* (Guerin, 1980); a feature that is also visible in the Woolly rhinoceros deciduous upper molars from the Tomsk Priob'ye area of southeast Western Siberia, published by Shpansky (2014).

Table 2 lists the dimensions of the Seweckenberge rhinoceros dental elements and **Table 3** shows that dimensions of the Seweckenberge rhinoceros milk molars are rather small compared to the size range of the *Coelodonta antiquitatis* milk molars from other European Pleistocene localities presented by Guerin (1980) (**Fig. 4**).

¹ The terminology used in the description is based on Guerin (1980) and Lacombat (2006).

THE INDIVIDUAL AGE

The most complete molars of the specimen are small in size, low crowned and the enamel is thin; features that indicate that we are dealing with deciduous/milk molars. Hillman-Smith et al. (1986) published age estimation criteria for the southern White rhinoceros (*Ceratotherium simum simum*) and defined for the molars ten different tooth eruption and wear stages as well as XVI different age classes. Assuming that the eruption sequence and the wear pattern of the White rhinoceros and the extinct Woolly rhinoceros are comparable, the Seweckenberge juvenile rhino skull fragment would fall at the transition of the age classes IV to V, indicating an age at death of ca. 1.5 years.

DISCUSSION AND CONCLUSION

The occurrence of a specimen of a Woolly rhinoceros in the Seweckenberge fossil assemblage is not new. Nehring (1904) mentions the presence of two individuals: three upper milk molars of a single young individual and limb bones of an older rhino. The fauna composition of the assemblage indicates a so-called Mammoth Steppe environment; conditions that were common in Central Europe during most of the Middle and Late Pleistocene. The Woolly rhinoceros, *Coelodonta antiquitatis*, is part of the Mammoth Steppe fauna association in Central Europe since the Elsterian (Marine Isotope Stage 12) when it immigrated from the east (Kahlke and Lacomat, 2008); the species occurred in Central Europe, with some interruptions, until ca. 11 ka BP (Stuart and Lister, 2012; Markova et al., 2013). The Woolly rhinoceros is rather common in the Middle and Late Pleistocene fossil record of Europe.

	P2	DP3	DP4	M1
length		30.5	43	
width		29.5	38	
height	31.5	26		44

Tab. 2 Dimensions (mm) of the dental elements of the Seweckenberge rhinoceros. Because of the poor preservation, most of the measurements are estimations.

	Seweckenberge	<i>Coelodonta antiquitatis</i>			
		N	min.	max.	mean
DP3					
length	30.5	27	31	45.5	41.96
width	29.5	28	31.5	42	37.11
height	26	7	25	33.5	29.79
DP4					
length	43	20	44	57	48.60
width	38	23	39	55	43.35
height		7	33.5	46	40.00

Tab. 3 The dimensions (mm) of the Seweckenberge rhinoceros milk molars compared to the size range of *Coelodonta antiquitatis* milk molars from other European Pleistocene localities presented by Guerin (1980).



Fig. 4 The Woolly rhinoceros *Coelodonta antiquitatis*. – (Drawing: Elke Gröning).

Due to the incomplete and poor conservation of the finds, it is unfortunately not possible to establish the cause of death of the young rhinoceros described in this paper. The flint artefacts and the human remains, found at the site (according to Wüst, 1906) might suggest the possibility that humans might have killed the animal. The fossil record of the localities Biache-Saint-Vaast (France) and Taubach (Germany) indicate the hunting/butchering of the two different rhinoceros species *Stephanorhinus kirchbergensis* and *Stephanorhinus hemitoechus* (Dusseldorp, 2009), the evidence of hominin/human hunting of the Woolly rhinoceros is, however, very limited or absent. The Middle Palaeolithic site Lingjing (Xuchang, Henan, China), yielded a large amount of (stone) artefacts as well as butchered larger mammal remains (van Kolfschoten et al., 2020). A large bovid (*Bos primigenius*) and an equid (*Equus przewalskii*) dominate the faunal assemblage. The age profile of both taxa shows the dominance of prime adults which suggests that both taxa were hunted by humans. The Lingjing fossils record also includes a large number of fossil Woolly rhinoceros remains of at least nine different individuals; the majority is juvenile. The difference in age profile, combined with the absence of butchering marks on the rhinoceros bones, suggests that the Woolly rhinoceros has not been hunted/killed by humans. They died, most probably, a natural death. And we assume that this is also the case with the juvenile rhinoceros from Seweckenberge.

The Seweckenberge rhinoceros is another confirmation of the occurrence of the Woolly rhinoceros in Central Europe during the Middle and Late Pleistocene. The rhinoceros skull fragment in the Dessau collection is, however, special because of its indirect link with the *Magdeburger Einhorn* or *Guericke-Einhorn*.

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Thijs van Kolfschoten

Universiteit Leiden

Faculteit der Archeologie

P.O. Box 9514

NL - 2300 RA Leiden

and

Shandong University

Institute of Cultural Heritage

72 Binhai Highway

CN - Qingdao, 266237

t.van.kolfschoten@arch.leidenuniv.nl

Angelika Hesse

Museum für Naturkunde und Vorgeschichte Dessau

Askanische Str. 32

D - 06842 Dessau-Roßlau