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A NEW SPECIES OF *PALAEOANANTERIS* LOURENÇO & WEITSCHAT, 2001, FOSSIL SCORPION FROM UKRAINIAN AMBER (SCORPIONES, BUTHIDAE)

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Abstract: A new species of fossil scorpion, *Palaeoananteris ukrainensis* **sp. n.** is described based on a specimen found in Ukrainian amber. The new species is the third described for the genus *Palaeoananteris* and thus belongs to the same lineage as the majority of other scorpions known from Baltic amber, which is clearly associated with the extant scorpion fauna of tropical regions in America and Africa. This new find attests, however, to a considerable degree of diversity in the Baltic and Ukrainian amber-producing forests. This is the first fossil scorpion found in Ukrainian amber.
Key words: Scorpiones, Buthidae, new species, fossil, amber, Ukraine.

Una especie nueva de *Palaeoananteris* Lourenço & Weitschat, 2001, escorpión fósil del ámbar ucraniano (Scorpiones, Buthidae)
Resumen: Se describe una especie nueva de escorpión fósil, *Palaeoananteris ukrainensis* **sp. n.**, sobre un ejemplar encontrado en ámbar de Ucrania. La especie nueva es la tercera descrita del género *Palaeoananteris* y pertenece por tanto al mismo linaje que la mayoría de los escorpiones conocidos del ámbar báltico, que está claramente asociado con la fauna actual de escorpiones de las regiones tropicales de América y África. Este nuevo hallazgo evidencia, sin embargo, un considerable nivel de diversidad en los bosques ambaríferos del Báltico y Ucrania. Se trata del primer escorpión fósil encontrado en ámbar ucraniano.
Palabras clave: Scorpiones, Buthidae, especie nueva, fósil, ámbar, Ukraine.

Taxonomy/Taxonomía: *Palaeoananteris ukrainensis* **sp. n.**

Introduction

As already discussed in previous papers (Lourenço & Weitschat, 1996, 2005; Lourenço *et al*., 2005; Lourenço, 2009), scorpions can be considered rare among the arthropods fossilized in amber. However a total of eight specimens have been described in recent years from the Baltic amber (for details see Lourenço & Weitschat, 2005; Lourenço, 2009). This number is rather significant, since only two specimens were reported in the period between 1800 and 1990.

The history of the scorpions found in Baltic amber is complex and has been summarized by Lourenço & Weitschat (1996, 2005) and Lourenço (2009). All Baltic amber scorpions discovered since the 1990s have been studied and described as new genera or at least new species of Buthidae (Lourenço & Weitschat, 1996, 2000, 2001, 2005; Lourenço, 2004; Lourenço *et al*., 2005). It was concluded, however, that with one exception (Lourenço *et al*., 2005), all these distinct genera and species represent a single phylogenetic lineage.

In this publication, a new species belonging to the genus *Palaeoananteris* Lourenço & Weitschat, 2001 is described, representing an additional element of the most common lineage, which now counts for eight of the nine scorpion species known from Baltic amber. This new find attests, however, to a considerable degree of diversity in the Baltic and Ukrainian amber-producing forests. Moreover, this new fossil scorpion is the first to have been found in amber from Ukraine. For accounts of the ecology of the amber-producing forests, see Lourenço & Weitschat (1996, 2000, 2001, 2005).

Material and methods

The specimen investigated was obtained by the second author from a Ukrainian amber dealer. It is trapped in a clear, rounded piece of reddish-yellow amber (about 7 × 4 cm in size). The amber shows a typical layered structure, characteristic of Baltic amber. It is possible to see how individual layers have been formed as a result of several resin flows with regular intervals. Only the dorsal side of the scorpion is clearly visible. The ventral side is partly covered by deposits, which do not allow detailed investigation of the structures. A similar situation is also present for the appendages, consequently trichobothria can only be partially observed. Therefore our suggestion that the trichobothrial pattern may be orthobothriotaxic is based on extrapolations from previously examined fossil specimens in Baltic amber. Most probably these deposits are the result of autoclave treatment. The schematic drawings were made with the aid of a Wild M5 stereomicroscope with a drawing tube (camera lucida); these are partially an interpretation of what was observable, since the resin flows covered by deposits are not clear enough for a proper observation. Measurements were made in the Zoological Institute of the University of Hamburg, with the help of Dipl. zool. K. Schütter and Dr. R. Peters, using a digital microscope (Keyence/

VHX 500F). The type specimen is deposited in a private collection and, any further studies may be rather complicate for the moment.

Ukrainian amber (Rovno amber)

The amber deposits in the northern and western regions of Ukraine were discovered long ago and described in detail by P.A. Tutkowskij (1911). The main area of distribution is located on the northwestern slope of the Ukrainian shield, where Palaeogene sediments occur in the peripheral zone of crystalline rocks.

Comprehensive geological amber explorations were carried out between 1978 and 1985 in northern Ukraine and southern Belarus. Over 50 amber-bearing deposits were found in Palaeogene sediments of the Pripyat River Basin (Vassilishin & Pantschenko, 1996). The amber is most common in lignite-bearing sands and in glauconitic sands resembling the 'blue earth' of the Samland area. Amber from this basin is mined in the Klesov and Dubrovitsa deposits.

Biostratigraphically this amber was formerly dated as of Oligocene age (Grygyalis & Burlak, 1996; Weitschat & Wichard, 2002) and later classified in the Late Eocene.

Like the amber from the 'blue earth' of Jantarniy (Kaliningrad district), the Ukrainian amber is a succinite (Kosmowska-Ceranowicz, 1992).

Plant and animal inclusions appear to be much rarer in Ukrainian amber than in the Samland and Bitterfeld deposits. Personal observations indicate an unusually low proportion of layered amber material. It is conceivable that the relatively fragile layered amber pieces were largely destroyed during redeposition.

The question of the origin of the Ukrainian amber was firstly discussed by Katinas (1971, 1987). His hypothesis that the amber was transported by palaeocurrents from the north across the Eocene Sea to the sites of its deposition, and thus could have originated in the same region as the Baltic amber. During the last decade, a number of palaeogeographically, palaeontological, sedimentological, and mineralogical papers were published, which indicate that the amber from the Ukrainian Shield is independent and par-autochthonous.

The comparison of the flora and fauna with Baltic and Bitterfeld amber held the clue to answering the question of the origin of the Ukrainian amber. Analysing amber inclusions from the Klesov and Dubrovitsa deposits, Perkovsky *et al*. (2003) concluded that the Ukrainian amber fauna is 'rather different from that of the Baltic amber'. The most evident differences were observed while comparing the hymenopteran fauna with that of the Baltic amber.

These results were confirmed by Kosmowska-Ceranowicz (2008), who analysed the heavy-mineral assemblages of amber-bearing sediments from the Samland 'blue earth' and those from the Ukrainian amber-bearing sediments. For the Baltic amber, the mineral *epidote* indicates that the fossil resin came from Fennoscandia. The amber-bearing sediments from Klesov contain *andalusite* and *turmalite*, both typical markers of the Ukrainian Shield, and there is no doubt at all that the 'Ukrainian amber forest' was located on the southern coast of the Paleogene Sea.

Systematic description

Family BUTHIDAE C. L. Koch, 1837

Genus *Palaeoananteris* Lourenço & Weitschat, 2001

***Palaeoananteris ukrainensis* sp. n.**
Fig. 1-7. Table I.

HOLOTYPE: An adult female. Considering the slender pedipalps, the morphology of the mesosoma, the size and structure of one observable pecten and the global size, it is unquestionably a female.

TYPE LOCALITY AND HORIZON: Klesov deposits, Rivne Oblast (Province), Ukraine, Late Eocene.

DEPOSITORY: The specimen is currently in the private collection of Jonas Damzen, Vilnius, Lithuania.

DIAGNOSIS: Total length 21.71 mm. Morphology somewhat similar to that of the other species of *Palaeoananteris*. The new species is characterized by the combination of several particular characters: Sternum semi-triangular. Trichobothrial pattern A-α (alpha). Fixed and movable fingers of pedipalp chela with 5-6 longitudinal rows of granules; distal extremity of fingers with three sharp spinoid granules. Pectines not rounded distally and with 12 or 13 teeth; fulcra vestigial. Genital operculum plates with a semi-oval shape. Tibial spurs present on legs III and IV. Metasoma with 10-10-8-8-5 carinae; dorsal carinae on segments I to IV with several spinoid granules; the first four segments with a smooth shallow dorsal depression.

DERIVATIO NOMINIS: The specific name refers to Ukraine, the country where the new species was found.

DESCRIPTION (Table I):

Coloration: the general colour of the amber is yellowish, but the scorpion is reddish-brown to dark brown, including pedipalps and legs. The ventral aspect of the specimen cannot be clearly observed but appears to be paler, more yellowish.

Morphology. Carapace moderately to strongly granular; anterior margin with a moderate median concavity. Anterior median superciliary and posterior median carinae weakly marked; other carinae vestigial. All furrows weak. Strong granules present on anterior and posterior edges of the carapace. Median ocular tubercle distinctly anterior to centre of carapace. Median eyes rather large and separated by a little more than one ocular diameter. Three pairs of lateral eyes. Sternum semi-triangular. Mesosomal tergites moderately granular; tergites I to VI with one longitudinal carina, weak to moderate; tergite VII pentacarinated. Venter not well observed. Only left pecten can be observed, with 12 or 13 teeth; fulcra vestigial. Sternites not observed. Metasomal segments I and II with ten carinae; segments III and IV with eight carinae; segment V with five carinae; dorsal carinae of segments I to IV with several stronger spinoid granules. Vesicle elongated and weakly granular to smooth; aculeus of same length as vesicle, with a strong and spinoid subaculear tubercle. Cheliceral dentition not observed. Pedipalp femur pentacarinate; external and internal face with large granules; patella with two dorsal

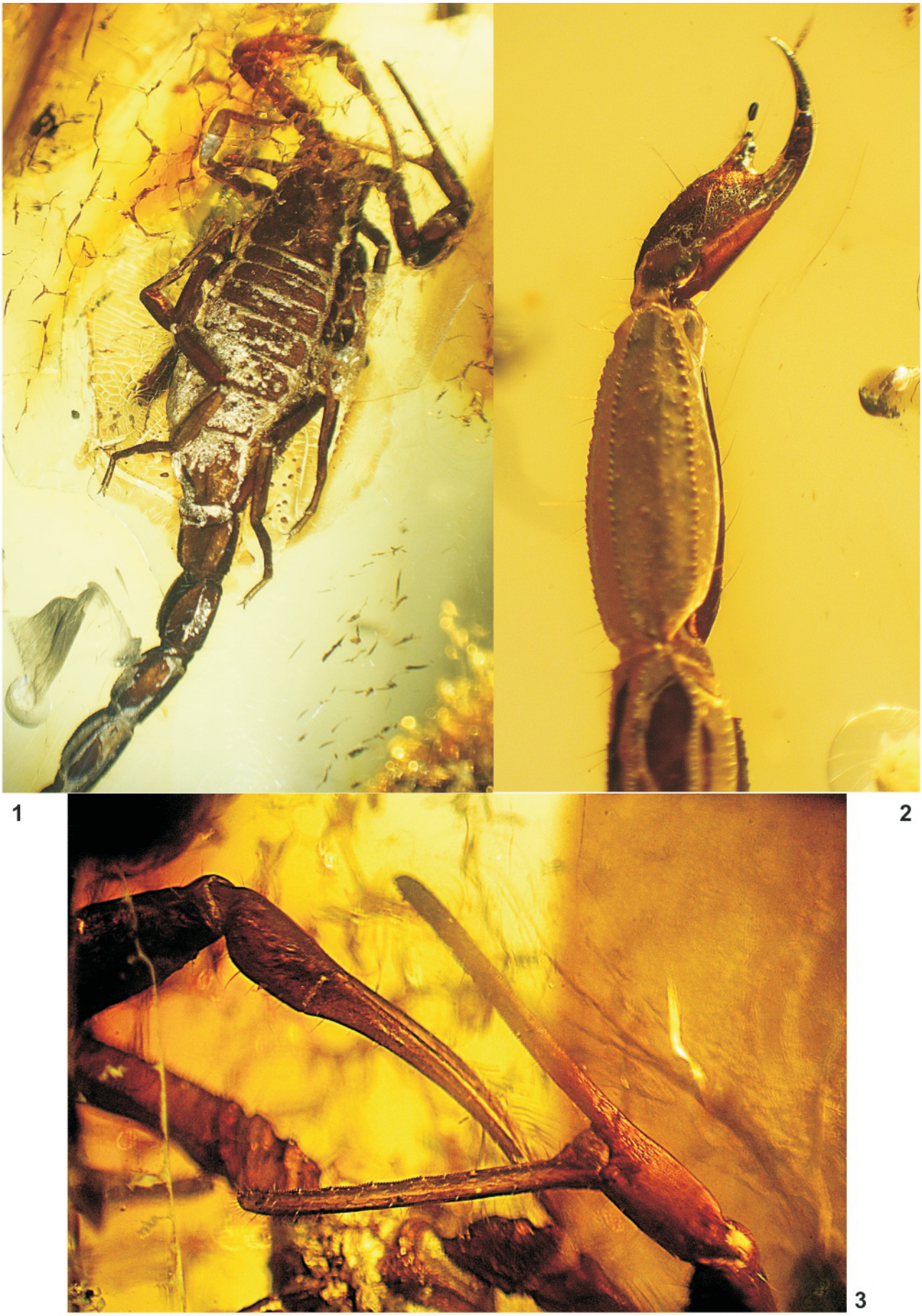

Fig. 1-3. *Palaeoananteris ukrainensis* sp. n. Female holotype. **1.** Habitus, dorsal aspect. **2.** Metasomal segment V and telson, lateral aspect. **3.** Fixed and movable fingers of pedipalps, showing rows of granules.

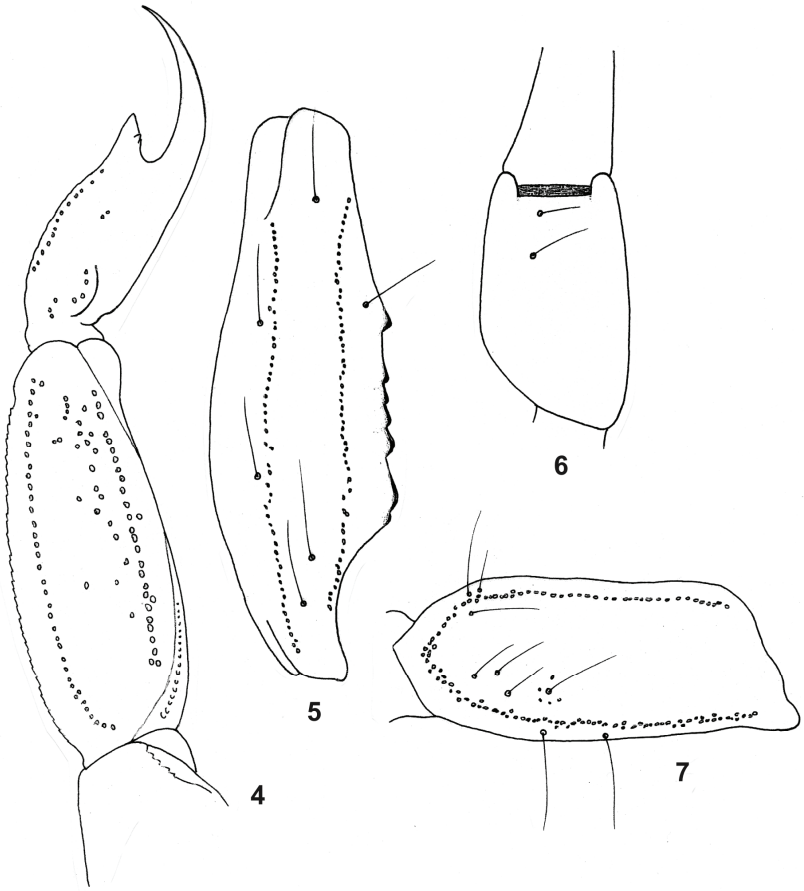

Fig. 4-7. *Palaeoananteris ukrainensis* sp. n. Female holotype. **4.** Metasomal segment V and telson, lateral aspect. **5-7.** Trichobothrial pattern. **5.** Patella, left, dorsal aspect. **6.** Chela, left, ventral aspect. **7.** Femur, right, dorsal aspect.

Table I. Morphometric values (in mm) of the female holotype of *Palaeoananteris ukrainensis* sp. n.

Total length	21.71
Carapace:	
- length	2.30
- anterior width	1.27
- posterior width	2.20
Metasomal segment I:	
- length	1.79
- width	1.20
Metasomal segment II:	
- length	1.91
- width	1.16
Metasomal segment III:	
- length	1.93
- depth	1.15
Metasomal segment IV:	
- length	2.22
- depth	1.22
Metasomal segment V:	
- length	2.91
- depth	1.01
Vesicle:	
- length	2.60
- depth	0.70
Pedipalp:	
- Femur length	1.81
- Femur width	0.59
- Patella length	2.28
- Patella width	0.82
- Chela length	3.69
- Chela width	-
- Chela depth	0.61
Movable finger:	
- length	2.58

and one internal carinae; internal face with several spinoid granules. Chela with vestigial carinae; all faces weakly granular, almost smooth. Fixed and movable fingers with 5-6 longitudinal rows of small, rounded granules, separated by sharp spinoid accessory granules; extremity of fingers with three sharp spinoid granules. Trichobothriotaxy of type A-α (alpha) (Vachon, 1974, 1975), possibly orthobothriotaxic; trichobothria $\mathbf{e_1}$ of femur distad of $\mathbf{d_5}$. Leg tarsi with thin ventral setae. Tibial spurs present and strongly marked on legs III and IV.

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