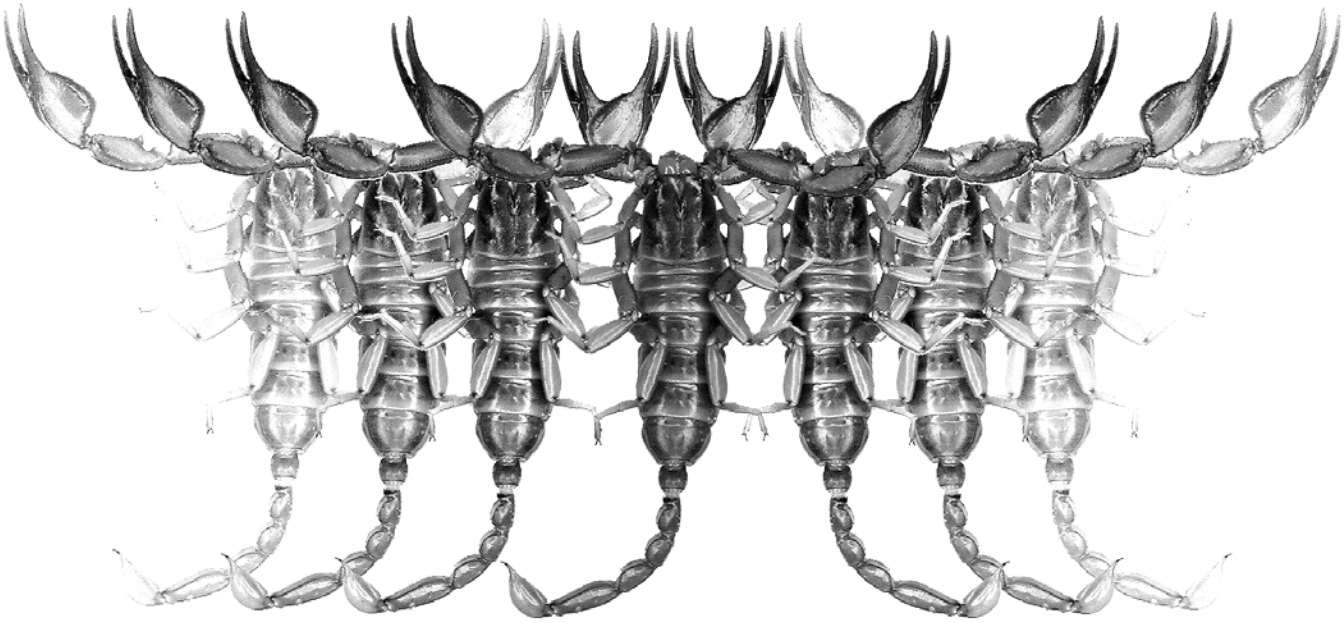
Euscorpius

Occasional Publications in Scorpiology



Complements to the Morphology of *Troglokhammouanus steineri* Lourenço, 2007 (Scorpiones: Pseudochactidae) Based on Scanning Electron Microscopy

Wilson R. Lourenço

November 2007 – No. 59

Euscorpius

Occasional Publications in Scorpiology

EDITOR: **Victor Fet**, Marshall University, **'fet@marshall.edu'**

ASSOCIATE EDITOR: **Michael E. Soleglad, 'soleglad@la.znet.com'**

Euscorpius is the first research publication completely devoted to scorpions (Arachnida: Scorpiones). *Euscorpius* takes advantage of the rapidly evolving medium of quick online publication, at the same time maintaining high research standards for the burgeoning field of scorpion science (scorpiology). *Euscorpius* is an expedient and viable medium for the publication of serious papers in scorpiology, including (but not limited to): systematics, evolution, ecology, biogeography, and general biology of scorpions. Review papers, descriptions of new taxa, faunistic surveys, lists of museum collections, and book reviews are welcome.

Derivatio Nominis

The name *Euscorpius* Thorell, 1876 refers to the most common genus of scorpions in the Mediterranean region and southern Europe (family Euscorpiidae).

Euscorpius is located on Website **'http://www.science.marshall.edu/fet/euscorpius/'** at Marshall University, Huntington, WV 25755-2510, USA.

The International Code of Zoological Nomenclature (ICZN, 4th Edition, 1999) does not accept online texts as published work (Article 9.8); however, it accepts CD-ROM publications (Article 8). ***Euscorpius*** is produced in two *identical* versions: online (ISSN 1536-9307) and CD-ROM (ISSN 1536-9293). Only copies distributed on a CD-ROM from ***Euscorpius*** are considered published work in compliance with the ICZN, i.e. for the purposes of new names and new nomenclatural acts. All *Euscorpius* publications are distributed on a CD-ROM medium to the following museums/libraries:

- **ZR**, Zoological Record, York, UK
- **LC,** Library of Congress, Washington, DC, USA
- **USNM**, United States National Museum of Natural History (Smithsonian Institution), Washington, DC, USA
- **AMNH**, American Museum of Natural History, New York, USA
- **CAS**, California Academy of Sciences, San Francisco, USA
- **FMNH**, Field Museum of Natural History, Chicago, USA
- **MCZ**, Museum of Comparative Zoology, Cambridge, Massachusetts, USA
- **MNHN**, Museum National d'Histoire Naturelle, Paris, France
- **NMW**, Naturhistorisches Museum Wien, Vienna, Austria
- **BMNH**, British Museum of Natural History, London, England, UK
- **MZUC**, Museo Zoologico "La Specola" dell'Universita de Firenze, Florence, Italy
- **ZISP**, Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia
- **WAM**, Western Australian Museum, Perth, Australia
- **NTNU**, Norwegian University of Science and Technology, Trondheim, Norway

---

Publication date: 30 November 2007

Euscorpius — Occasional Publications in Scorpiology. 2007, No. 59

Complements to the morphology of *Troglokhammouanus steineri* Lourenço, 2007 (Scorpiones: Pseudochactidae) based on scanning electron microscopy

Wilson R. Lourenço

Département de Systématique et Evolution, USM 0602, Section Arthropodes (Arachnologie), Muséum national d'Histoire naturelle, CP 053, 61 rue Buffon 75005 Paris, France: e-mail: arachne@mnhn.fr

Summary

A detailed morphological description, based on scanning electron microscopy, is proposed for the recently described pseudochactid scorpion, *Troglokhammouanus steineri* Lourenço, 2007. As already indicated in the original description, the male (juvenile) paratype has been prepared for SEM studies, but the results are only presented in this publication.

Introduction

In a recent publication (Lourenço, 2007) a new genus and species of scorpion, *Troglokhammouanus steineri* Lourenço, 2007, belonging to the family Pseudochactidae Gromov were described based on two specimens collected in the Tham Xe Bangfai Cave, Province of Khammouan in Laos. This new scorpion represents the second known taxon of Pseudochactidae, and the first from Laos. In the present paper, a detailed morphological description, based on scanning electron microscopy (SEM) study, is given for this species. For all other aspects concerning the species, such as ecology, biogeographical conjectures or even orogeny and geodynamics of Indochina and Laos, the reader can refer to the original publication (Lourenço, 2007).

Material and Methods

The male (juvenile) paratype was prepared for SEM study according to standard methods. The prepared material will be deposited in the collection of the Muséum national d'Histoire naturelle, Paris.

Complements to Morphology

Carapace: Anterior margin convex posterior margin shallowly recurved, almost straight (Fig. 1). One pair of very small lateral ocelli (Fig. 2). Median ocular tubercle situated anteromedially, comprising pair of median ocelli, larger than lateral ocelli (Figs. 1–2). One pair of circumocular sutures with a broad U-shaped configuration, but incomplete in the posterior region to median ocular tubercle. Anterosubmedial carinae absent from the zone internal to the circumocular sutures (Fig. 1).

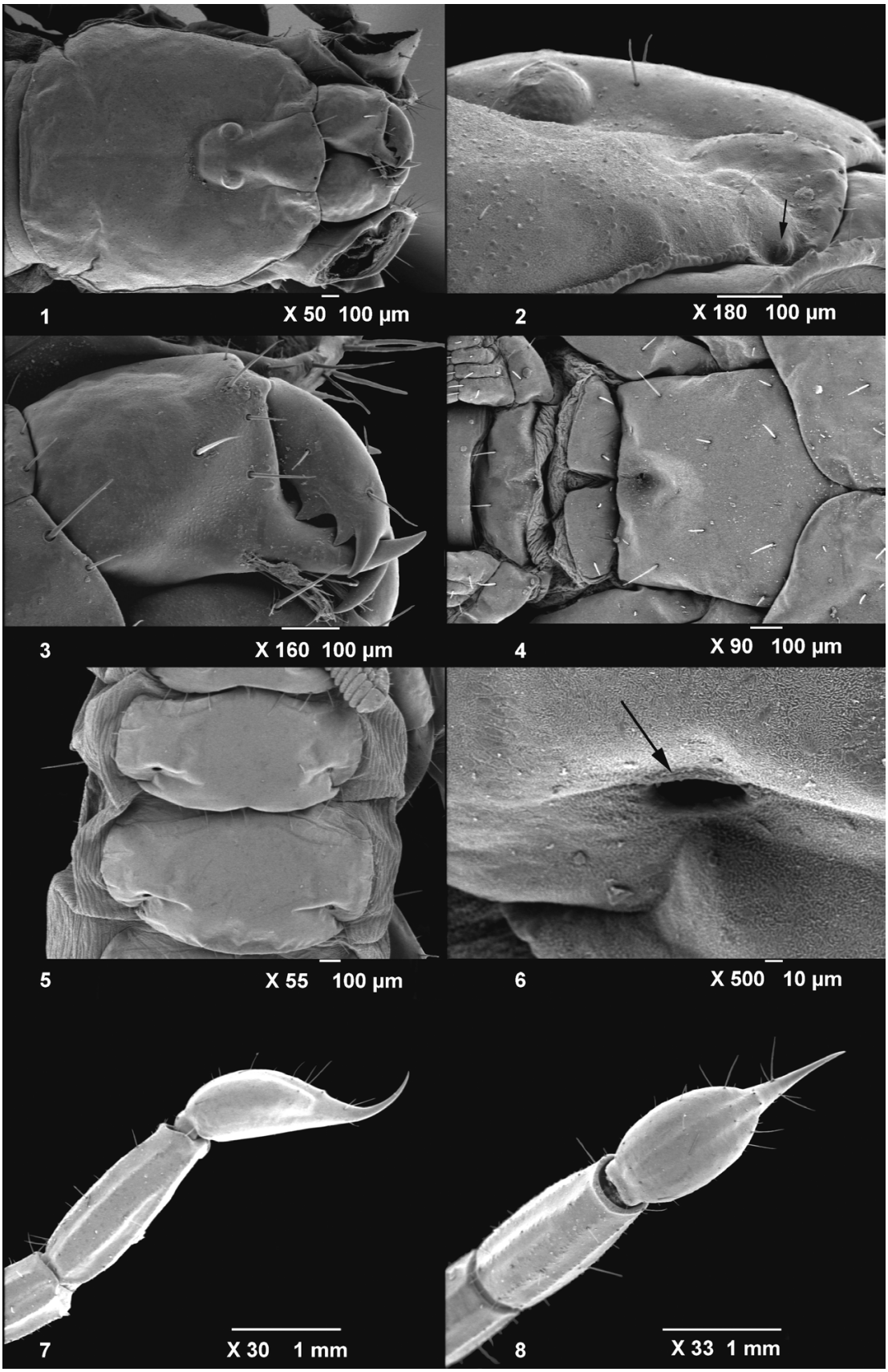
Chelicerae: Fixed finger, dorsal edge with four teeth (basal, medial, subdistal, distal); movable finger, dorsal edge with three teeth (medial, subdistal, external distal), without basal teeth; external distal tooth smaller than internal distal tooth (Fig. 3).

Sternum: Pentagonal, moderately compressed horizontally, slightly longer than wide, external aspect not flat, with a concave region, posteromedian depression round (Fig. 4).

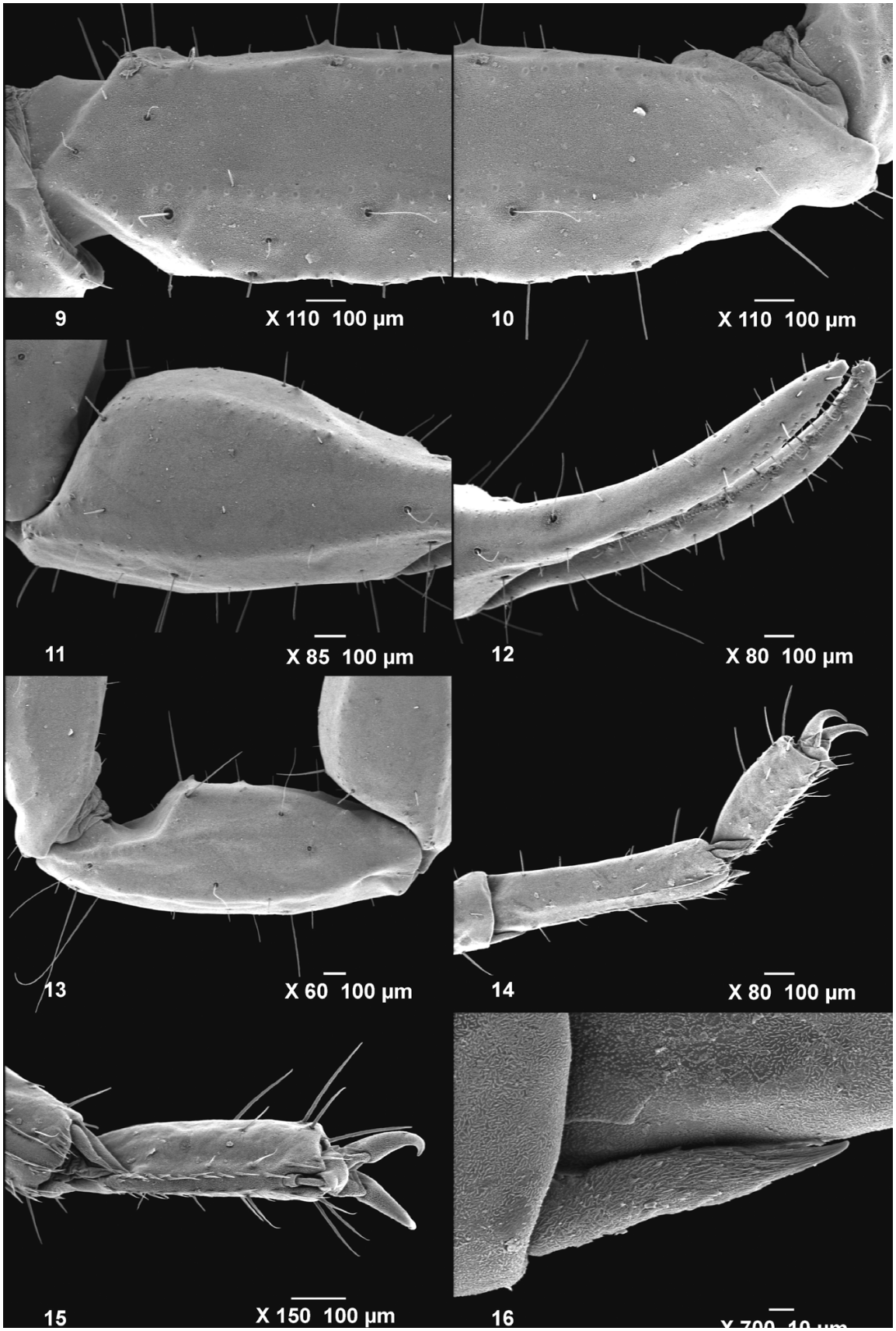
Genital operculum: Operculum completely divided longitudinally (Fig. 4).

Sternites: Almost entirely smooth, acarinate; surfaces with scattered macrosetae; distal margins each with sparse row of macrosetae (Fig. 5); respiratory spiracles small, oval in shape (Figs. 5–6).

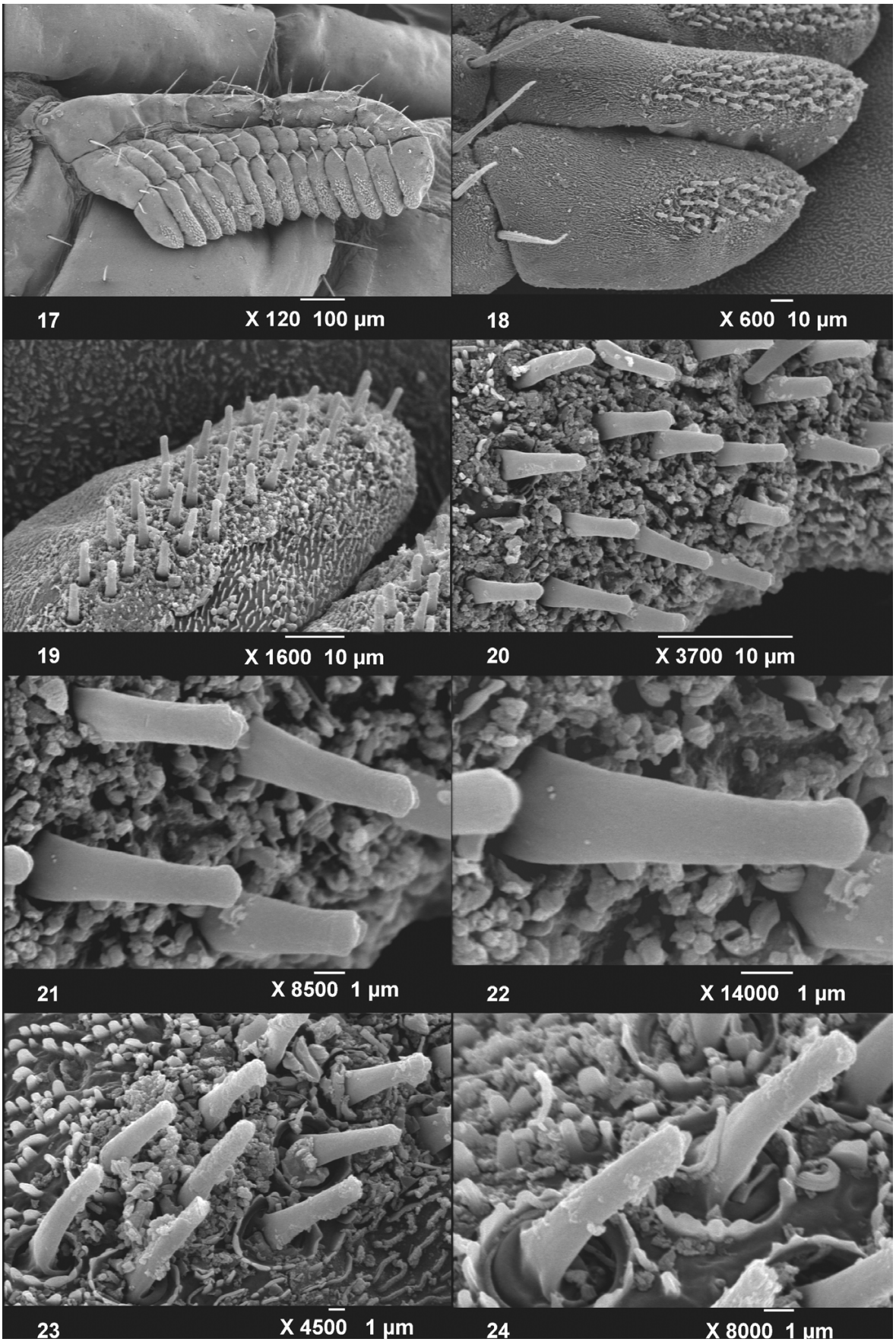
Metasoma: Almost apilose; very sparsely covered in short microsetae. Segment V with nine carinae. Dorsosubmedian carinae absent. Dorsolateral carinae well-developed, costate granular throughout length of segment. Median lateral carinae well developed. Ventrolateral carinae well-developed throughout length of segment. Ventrosubmedian carinae well-developed, granular throughout length of segment. Ventromedian carina moderately to strongly marked between ventrosubmedian carinae. Intercarinal surfaces smooth



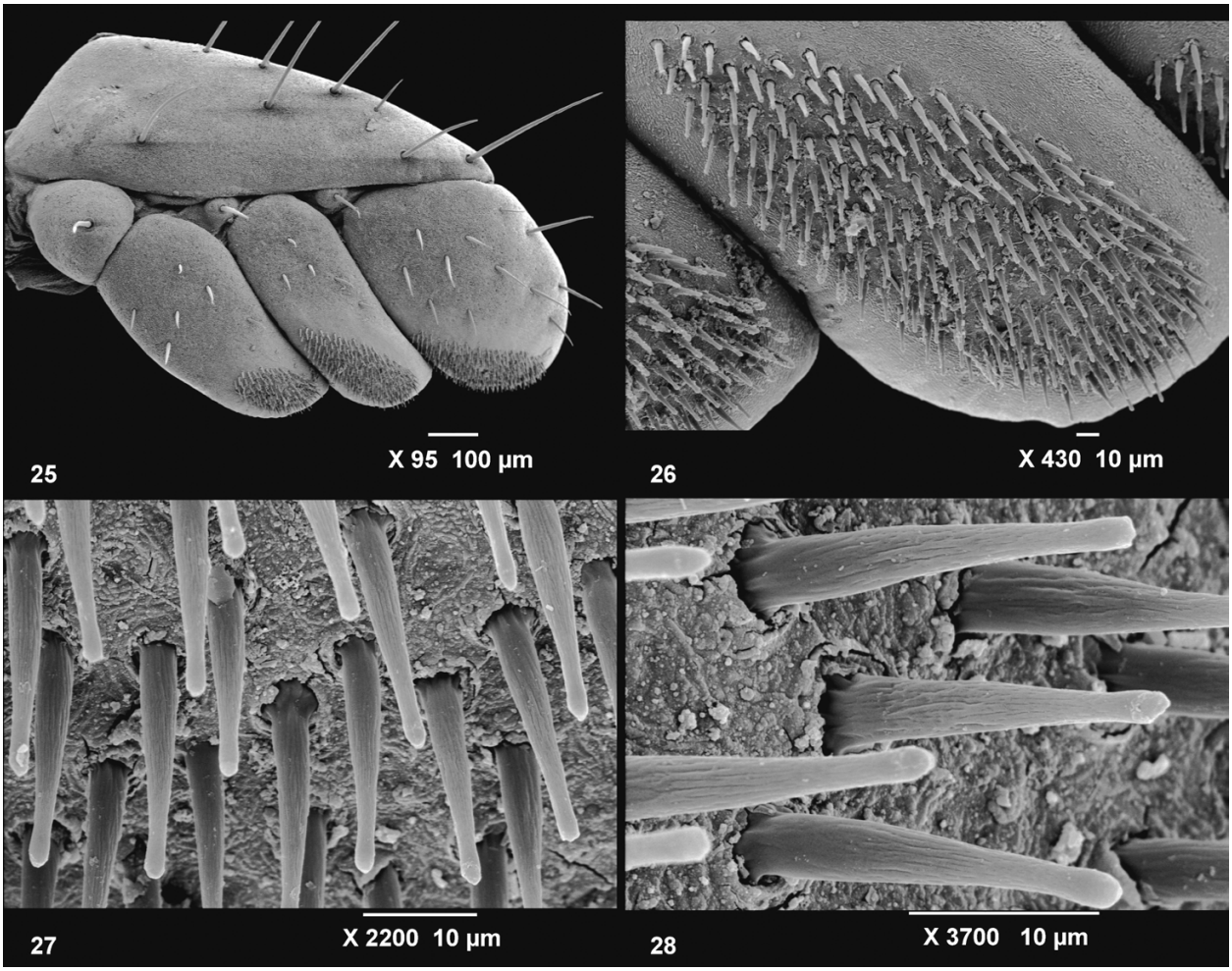
Figures 1–8: *Troglokhammouanus steineri* Lourenço, male paratype. **1.** Carapace and chelicerae, dorsal aspect. **2.** Carapace, lateral aspect, showing the small lateral ocelli (arrow). **3.** Chelicera, dorsal aspect. **4.** Sternum and genital operculum. **5.** Sternites IV and V showing spiracles. **6.** Spiracle in detail (arrow). **7–8.** Metasomal segment V and telson, lateral and ventral aspects.



Figures 9–16: *Troglokhammouanus steineri* Lourenço, male paratype. **9–10.** Femur, dorsal aspect. **11.** Chela hand, dorso-external aspect. **12.** Fixed and movable fingers of chela, dorso-external aspect. **13.** Patella, dorsal aspect. **14.** Basitarsi and telotarsi of leg IV, showing spurs. **15.** Telotarsi of leg IV with a pair of ventrosubmedian rows of spinules. **16.** Tibial spur in detail.



Figures 17–24: *Troglokhammouanus steineri* Lourenço, male paratype. **17.** Left pecten, global view. **18–19.** Microstructure of peg sensillae on teeth. **20–24.** Peg sensillae in detail at different magnifications.



Figures 25–28: *Chaerilus celebensis* Pocock, female from Indonesia. **25.** Left pecten, global view. **26.** Microstructure of peg sensillae on teeth. **27–28.** Peg sensillae in detail at different magnifications.

(Figs. 7–8). Telson vesicle smooth dorsally, with moderately marked granules laterally and ventrally; aculeus without a subaculear tubercle ventrally (Figs. 7–8).

Pedipalps: Segments almost apilose, sparsely covered in short microsetae and occasional macrosetae (Figs. 9–13). Femur with 5 discernable carinae (Figs. 9–10); intercarinal surfaces smooth. Patella with 6 discernable carinae; dorsointernal carina well developed; anterior process well developed, comprising a pair of dorsal and ventral spinoid tubercles; intercarinal surfaces smooth (Fig. 13). Chela with 6–7 discernable carinae; intercarinal surfaces smooth except for coarse, scattered granules on internal surface of manus (Fig. 11). Fixed and movable fingers, dentate margins each with median denticle row comprising 7–8 oblique granular subrows; each subrow comprising several small granules and a large proximal granule (Fig. 12).

Trichobothria: Orthobothriotaxic, Type D, β (beta) configuration, $\mathbf{d_2}$ situated on dorsal surface, $\mathbf{d_3}$ and $\mathbf{d_4}$ in same axis, parallel and closer to dorsoexternal carina than $\mathbf{d_1}$, angle formed by $\mathbf{d_1}$, $\mathbf{d_3}$ and $\mathbf{d_4}$ opening toward internal surface (Figs. 9–10); totals: femur, 12; patella, 10; chela, 13 (Figs. 9–13).

Leg IV: With spurs (Fig. 14–16). Basitarsi each with a pair of pro- and retrolateral pedal spurs (Figs. 14–15). Telotarsi each with a pair of ventrosubmedian rows of spinules (Fig. 15).

Pectines: Each pecten with three distinct marginal lamellae and 13 well-delineated median lamellae. Fulcra present but reduced. Pectinal tooth count: 14-14 (Fig. 17).

Pectinal peg sensillae: The SEM study of peg sensillae in *T. steineri* proved to be one of the most interesting characters not yet observed for this species (see Lourenço, 2007). For *Pseudochactas ovchinnikovi* Gromov, 1998, the only other species of the family Pseudochactidae, Prendini et al (2006), described the pectinal peg sensillae as "stout, square distally, with pair of processus at laterodistal margins". From these observations, these authors arrive to the conclusion that "the peg sensillae of *P. ovchinnikovi* are stout and square distally, as seen in buthid and liochelid, but differ from those of all other scorpions thus far studied in possessing a pair of processes at the laterodistal margins". These authors also add that "the significance of these processes will only become apparent when the morphology of the peg sensillae has been studied in a wider taxon sample

of scorpions (e. g., the peg sensillar morphology is currently undocumented in *Chaerilus*) than is possible at this time".

In this aspect, these authors are correct, since nothing has been published until now on the pectinal peg sensillae of *Chaerilus*. That is the reason why, I decided to complement the observations on *T. steineri* with some other on *Chaerilus celebensis* Pocock, 1894.

As it can be observed in Figures 18–19, the surface covered with peg sensillae in *T. steineri* is much less dense than in other scorpions, but can be similar to other cave species such as *Troglocormus willis* Francke, 1981 or *Troglotayosicus vachoni* Lourenço, 1981 (see Lourenço, 2006). The pegs of *T. steineri* are from cylindrical to bottle-shaped, therefore, totally different from these found in *P. ovchinnikovi* which are stout and square distally (Figs. 20–21) Even in a distinct view, this shape can be confirmed (Figs. 23–24). Even more important, is the fact that the pair of processes at the laterodistal margins of each peg is not observed for *T. steineri*. The absence of this character brings additional support to the validity of the genus *Troglokhammouanus*.

Comparatively, Figures 25–28 show the pecten and the peg sensillae in *Chaerilus celebensis* (Chaerilidae) from Indonesia. In this species the surface covered with peg sensillae is also poorly dense (Figs. 25–26), and pegs have a strongly cylindrical shape and are rather long (Figs. 27–28). Consequently, as already suggested by Prendini et al (2006), a much wider taxon sample of scorpions must be studied before any final conclusion may be possible on the significance of the morphology of pectinal peg sensillae in scorpions.

Acknowledgments

I am very grateful to Régis Cleva and Laurent Albenga, Départment de Systématique et Evolution, Muséum national d'Histoire naturelle, Paris, for their help with the preparation of SEM illustrations and to Prof. John L. Cloudsley-Thompson, London, and Dr. Victor Fet, Marshall University for reviewing the manuscript.

References

LOURENÇO, W. R. 2006. Further considerations on the genus *Troglotayosicus* Lourenço, 1981 (Scorpiones: Troglotayosicidae or *Incertae sedis*). *Boletin de la Sociedad Entomológica Aragonesa*, 39: 389–395.

LOURENÇO, W. R. 2007. First record of the family Pseudochactidae Gromov (Chelicerata, Scorpiones) from Laos and new biogeographic evidence of a Pangaean palaeodistribution. *Comptes Rendus Biologies*, 330: 770–777.

PRENDINI L., E. VOLSCHENK E., S. MAALIKI S. & A. V. GROMOV. 2006. A 'living fossil' from Central Asia: The morphology of *Pseudochactas ovchinnikovi* Gromov, 1998 (Scorpiones: Pseudochactidae), with comments on its phylogenetic position. *Zoologischer Anzeiger*, 245: 211–248.