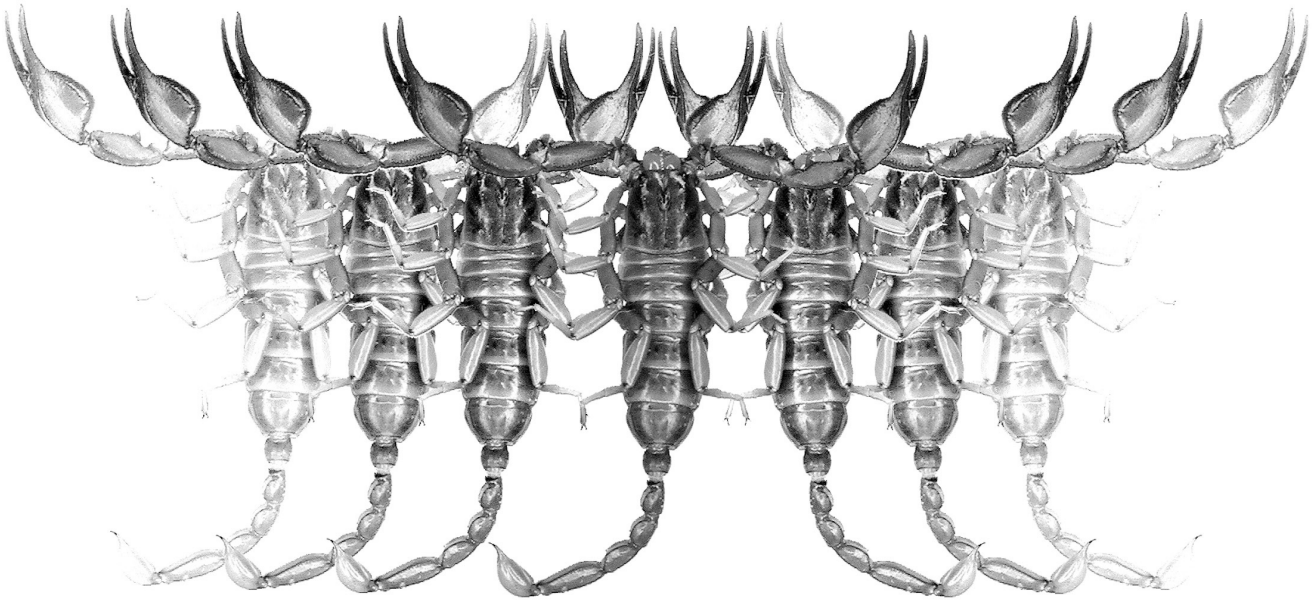
Euscorpius

Occasional Publications in Scorpiology



Euscorpiops neradi sp. n. from Thailand (Scorpiones: Euscorpiidae: Scorpiopinae)

František Kovařík, Jana Plíšková & František Šťáhlavský

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Derivatio Nominis

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

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Euscorpius **— Occasional Publications in Scorpiology. 2013, No. 158**

Euscorpiops neradi sp. n. from Thailand (Scorpiones: Euscorpiidae: Scorpiopinae)

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Summary

Euscorpiops neradi **sp. n.** from Thailand is described and compared with other species of the genus *Euscorpiops* Vachon, 1980. It is the smallest species of the genus, with total length about 25 mm in both sexes. In *E. neradi* **sp. n.** external trichobothria on the patella number 16 (5 *eb*, 2 *esb*, 2 *em*, 3 *est*, 4 *et*) and ventral trichobothria on the patella number 6. Pedipalp fingers are flexed in males and straight in females.

Introduction

Euscorpiops was described by Vachon (1980: 155) as a subgenus, and has become a genus with elevation of the Scorpiopinae to family status. Vachon distinguished *Euscorpiops* from *Scorpiops* on the number of external trichobothria on the patella, 17 in *Scorpiops* and 18–20 in *Euscorpiops*.

Soleglad & Sissom (2001) revised the family Euscorpiidae, in which they placed the subfamily Scorpiopinae and revived the genus *Euscorpiops*, but did so on the basis of position of trichobothrium Eb_3 (Fig. 8 and Soleglad & Sissom, 2001: 52, figs. 114, 115) rather than on the number of trichobothria on the patella.

The genus currently includes 21 species, of which the one most recently discovered (the 20th) is *E. thaomischi* Kovařík, 2012. The paper with description of *E. thaomischi* included a key of all *Euscorpiops* species (Kovařík, 2012: 6). The name *E. thaomischi*, however, was not formed not in accordance with ICZN Article 31.1.2, and is hereby corrected to *Euscorpiops thaomischorum*, **nom. nov**. We thank Rolando Teruel for noticing the incorrect form of the name.

Systematics

Euscorpiops Vachon, 1980
(Figs. 1–19)

Scorpiops Kraepelin, 1899: 179 (in part); Sissom, 1990: 114 (in part); Kovařík, 2000: 164 (in part); Kovařík, 2001: 85 (in part).

Scorpiops (*Euscorpiops*) Vachon, 1980: 155 (in part); Tikader & Bastawade, 1983: 452 (in part); Bastawade, 1997: 104 (in part).

Euscorpiops: Stockwell, 1989: 120 (in part); Kovařík, 1998: 141 (in part); Lourenço, 1998: 246 (in part); Fet, 2000: 488 (in part); Soleglad & Sissom, 2001: 93; Kovařík, 2004: 13 and 17; Kovařík, 2005: 1; Qi et al., 2005: 14; Kovařík, 2009: 32; Kovařík, 2012: 1.

Type species: *Scorpiops asthenurus* Pocock, 1900

DIAGNOSIS. Total length 24–70 mm. First to fourth metasomal segments with paired parallel ventral median carinae in adults. Pair median eyes and three or four pairs of lateral eyes present. Movable fingers of pedipalps with granules in two rows. Ventral edge of cheliceral movable finger with 5–7 denticles. Pedipalp patella with 16–21 external trichobothria. Ventral surface of patella bears 6–18 trichobothria. Ventral surface of manus bears 4 trichobothria, of which V_4 is always situated on ventral aspect of chela. Trichobothrium Eb_3 on external surface of chela manus is between trichobothria *Dt* and *Est*.

Euscorpiops neradi Kovařík, Plíšková et Šťáhlavský, **sp. n.**
(Figs. 1–19)
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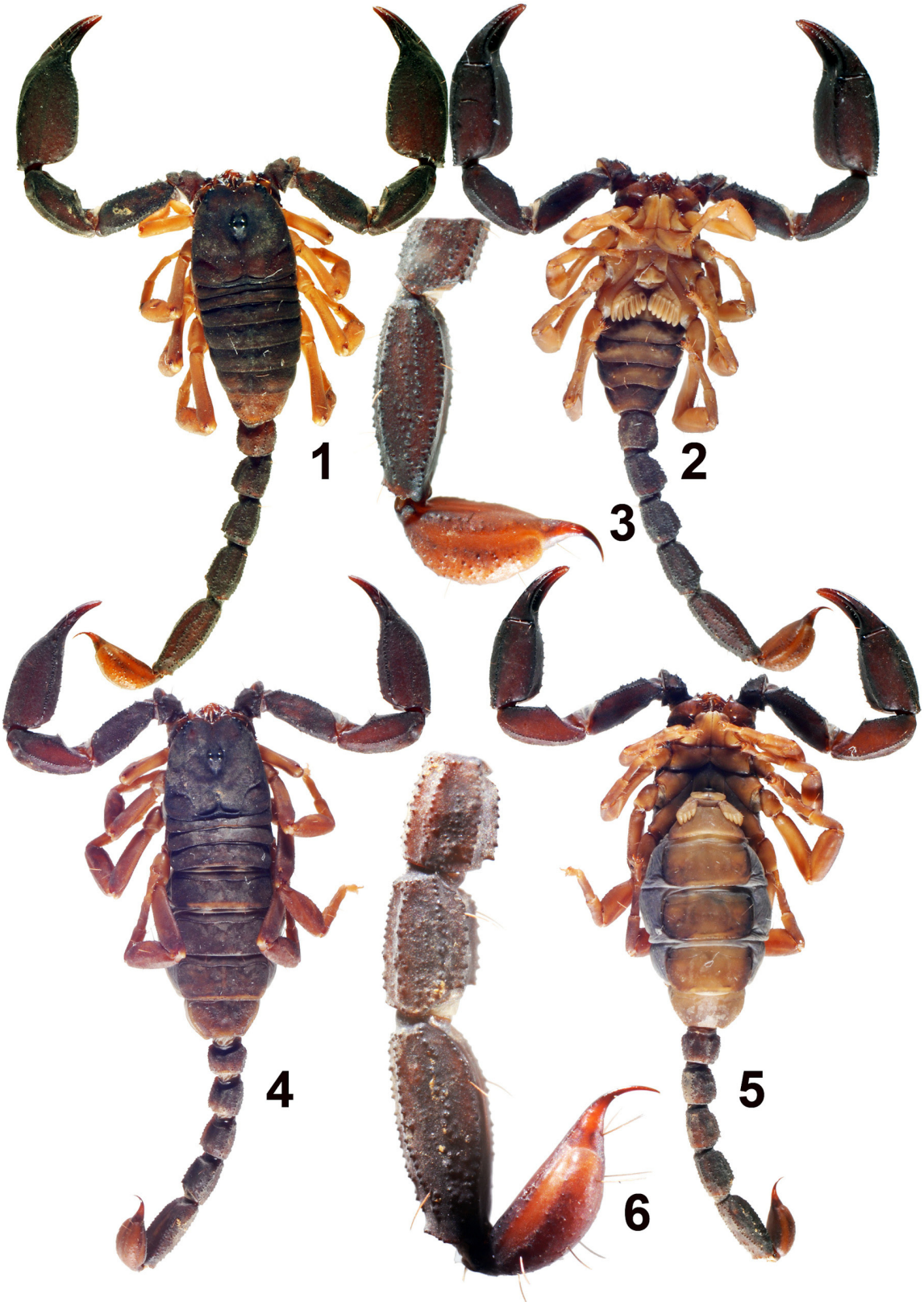
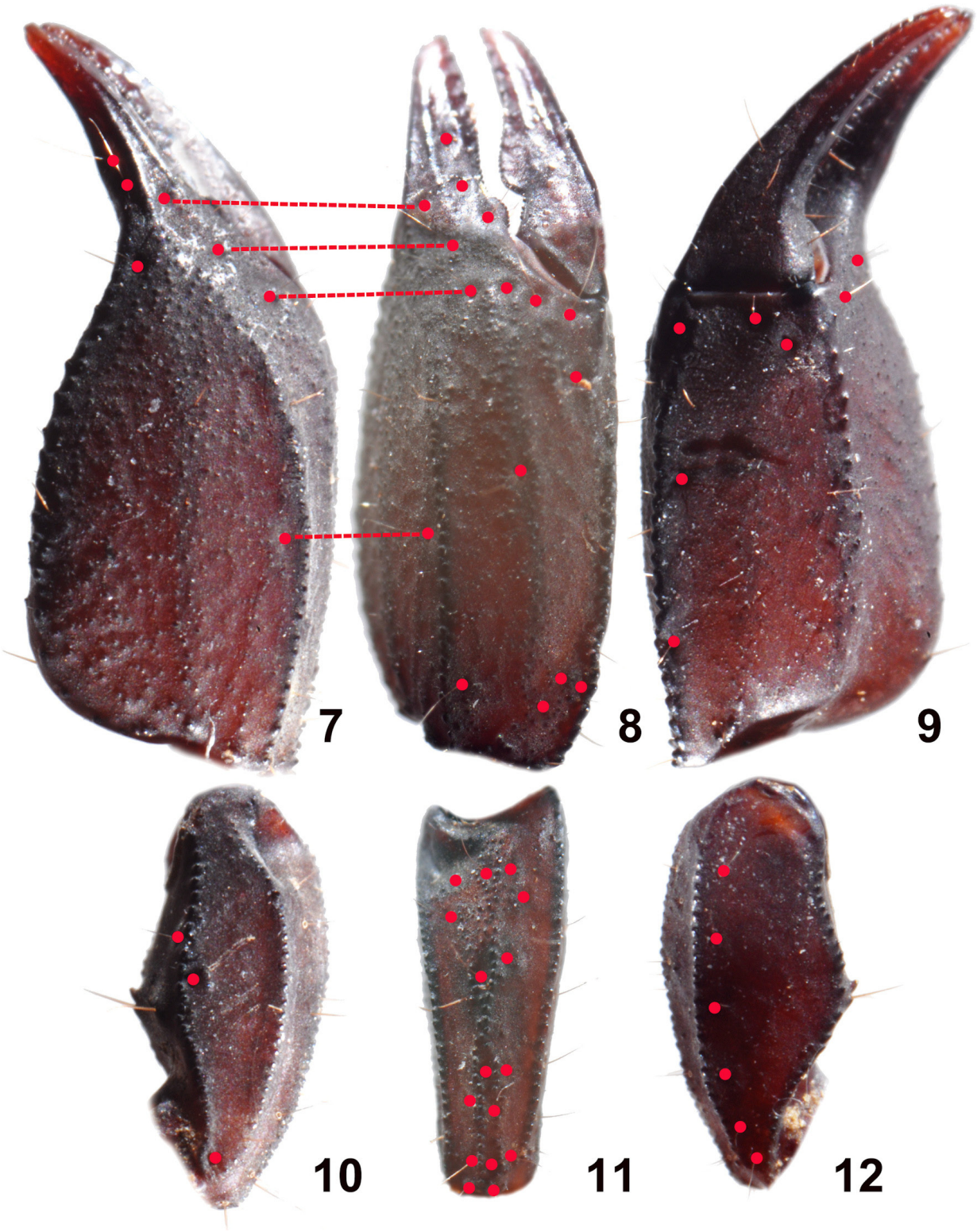
TYPE LOCALITY AND HOLOTYPE REPOSITORY. Thailand, Kaeng Krung, 9.52936N 98.73646E; first author's collection (FKCP).

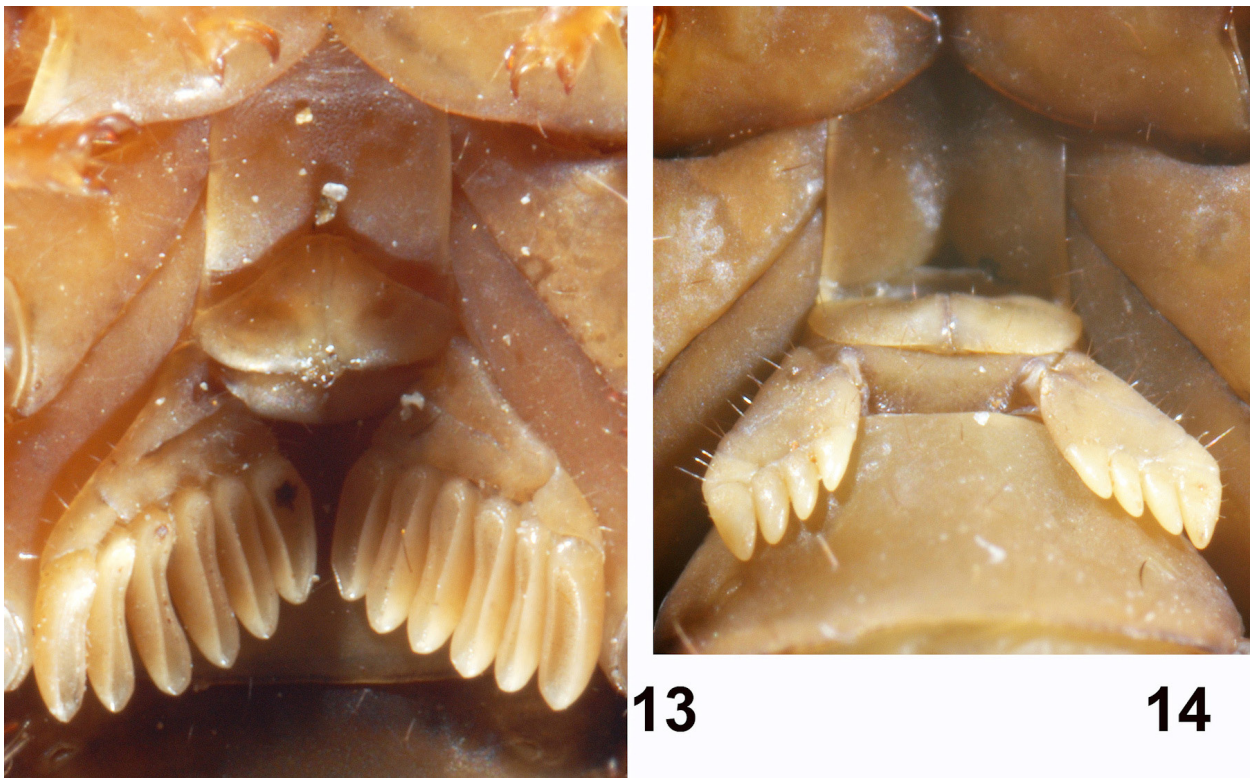


Figures 1–6: *Euscorpiops neradi* **sp. n. 1–3.** Male holotype, dorsal and ventral views, and telson with fifth metasomal segment laterally. **4–6.** Female allotype, dorsal and ventral views, and telson with third to fifth metasomal segment laterally.



Figures 7–12: *Euscorpiops neradi* **sp. n.**, male holotype, trichobothrial pattern. **7.** Chela dorsal. **8.** Chela external. **9.** Chela ventral. **10.** Patella dorsal. **11.** Patella external. **12.** Patella ventral.

TYPE MATERIAL. Thailand, Kaeng Krung, 9.52936N 98.73646E (Loc. No. 9), II.2013, 1 ♂ (holotype), 1♀ (allotypic paratype), and 1 ♂ (paratype); Khao Phanom Bencha, 8.238759N 98.914962E (Loc. No. 4), II.2013, 2♂2♀ (paratypes); Klong Phanom, 8.88039N 98.67387E (Loc. No. 7), II.2013, 1 ♂ 1 ♂im.1♀ (paratypes), leg. Ladislav Nerad. All specimens are in 75% alcohol in the first author's collection (FKCP), ex-



Figures 13–14: *Euscorpiops neradi* **sp. n.**, pectinal areas. **13.** Male holotype. **14.** Female paratype.

cept for one female paratype from locality No. 4 which is alive (Fig. 18) and one male paratype (Figs. 16–17) from locality No. 4 which was used for chromosomal study (Fig. 19) and now is in 96% alcohol in the second author's collection (JPPC).

ETYMOLOGY. Named after Ladislav Nerad, who collected the types.

DIAGNOSIS. Total length 24–28 mm. Base color uniformly reddish black to black, legs and telson yellow to reddish brown. Pectinal teeth number 6 in males and 4–5 in females. External trichobothria on patella number 16 (5 *eb*, 2 *esb*, 2 *em*, 3 *est*, 4 *et*); ventral trichobothria on patella number 6. Male has wider metasomal segments and chela manus of pedipalp than female; chela length to width ratio = 2.47 in male and 2.8 in female. Other sexual dimorphism is in shape of pedipalp fingers (flexed in male, straight in female), shape of telson (bulbous in male, Fig. 3, elongate in female, Fig. 6) and shape of pectines (male has markedly larger pectines; Figs. 13 and 14). First metasomal segment wider than long in both sexes.

DESCRIPTION: Total length 24–28 mm. The base color is uniformly reddish black to black, legs and telson are yellow to reddish brown, sternites are yellowish brown. For habitus see Figs. 1–2 and 4–5. Sexual dimorphism pronounced (see diagnosis).

MESOSOMA AND CARAPACE (Fig. 15): The mesosoma is granulated, with one median carina, and the seventh sternite is sparsely granulated, without carinae. The entire carapace is granulated, without carinae. The anterior margin of the carapace is markedly depressed in the middle. The carapace bears three or four lateral eyes of which two are normal and one or two reduced. The male holotype has four lateral eyes on right margin and three on left (see Fig. 15). Pectinal teeth number 6 in males (10x6) and 4–5 in females (7x4, 1x5).

METASOMA AND TELSON (Figs. 3 and 6): The metasoma is finely granulated, with sparse, relatively large granules. The first segment bears 10 carinae, the second to fourth segments bear eight carinae, and the fifth segment bears seven carinae, all composed of granules some of which are pointed. The dorsolateral carinae of the third and fourth segments posteriorly terminate in a very slightly pronounced tooth. The telson is bulbous in males and elongate in females, and is sparsely granulated.

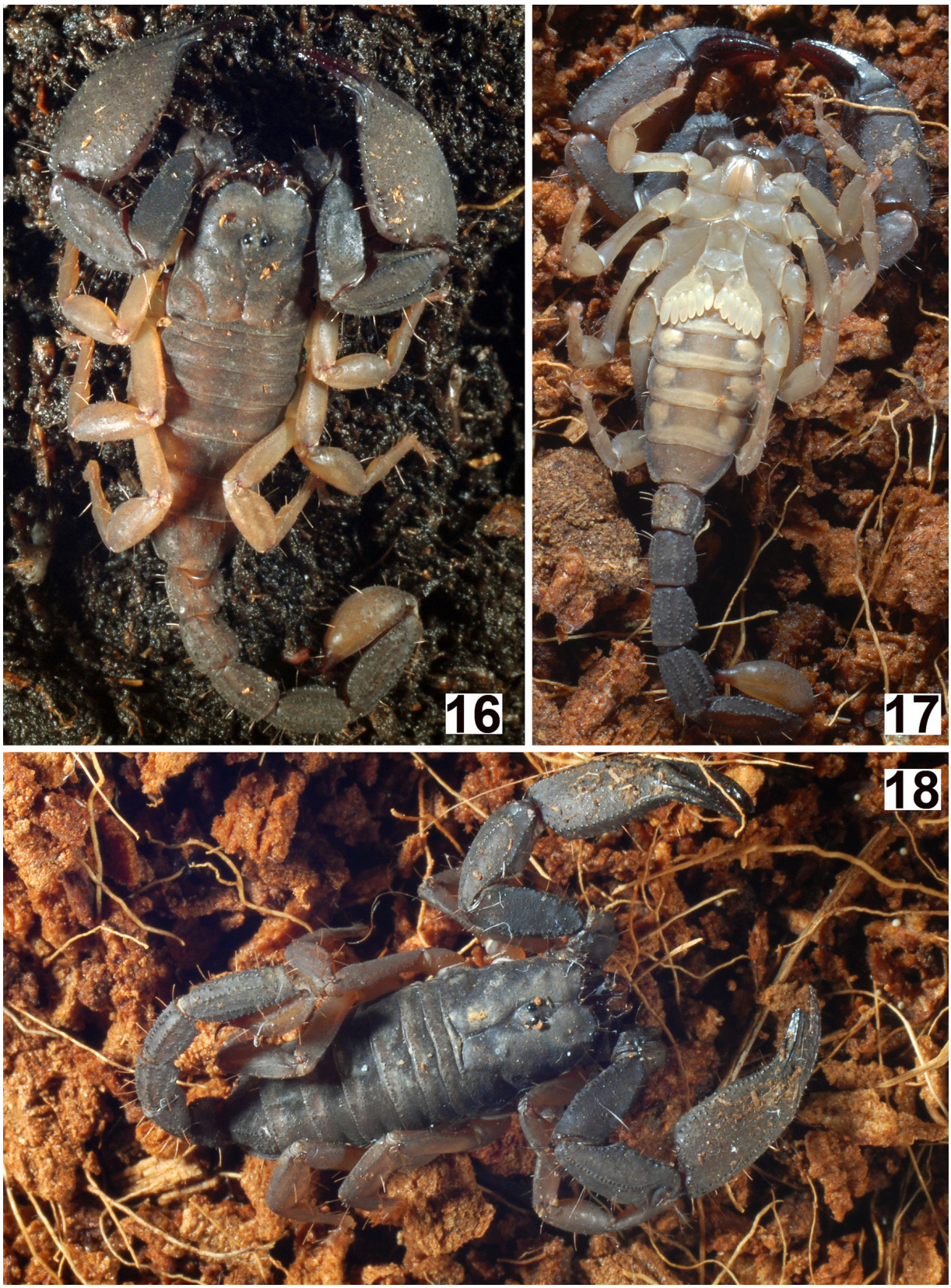
PEDIPALPS: For position and distribution of trichobothria on the patella of pedipalps see Figs. 7–12. External trichobothria on the patella number 16 (5 *eb*, 2 *esb*, 2 *em*, 3 *est*, 4 *et*), one *est* trichobothrium is trans-

Figure 15: *Euscorpiops neradi* **sp. n.**, male holotype, carapace with first to third mesosomal segments.

formed to macroseta or absent (Fig. 11), and ventral trichobothria on the patella number 6 (Fig. 12) in all type specimens, with no apparent variation in trichobothrial pattern. The femur is sparsely granulated (more in males) and has five granulose carinae, and the patella has five carinae with slightly pronounced internal twin tubercles. The manus dorsally bears fine rounded granules, which in the central part form a longitudinal carina. The external surface of the chela is densely covered by minute granules. The movable fingers bear straight double rows of granules with internal and external granules. The pedipalp fingers are flexed in males and straight in females. The flexures of the movable and the fixed fingers alternate perfectly, so the fingers close without any gap.

MEASUREMENTS IN MM: Total length of male holotype 24.3; carapace length 3.65, width 3.9; metasoma and telson length 14.6; first metasomal segment length 1.55, width 1.7; second metasomal segment length 1.65, width 1.45; third metasomal segment length 1.85, width 1.5; fourth metasomal segment length 2.25, width 1.45; fifth metasomal segment length 3.55, width 1.45; telson length 3.75; pedipalp femur length 3.5, width 1.3; pedipalp patella length 3.6, width 1.6; chela length 6.8; manus width 2.75; movable finger length 3.4. Total length of female allotype 25; carapace length 4, width 4.15; metasoma and telson length 12.65; first metasomal segment length 1.25, width 1.55; second metasomal segment length 1.45, width 1.4; third metasomal segment length 1.6, width 1.35; fourth metasomal segment length 1.9, width 1.35; fifth metasomal segment length 3.1, width 1.35; telson length 3.35; pedipalp femur length 3.25, width 1.3; pedipalp patella length 3.5, width 1.5; chela length 6.3; manus width 2.25; movable finger length 3.2.

KARYOTYPE: We analyzed one male paratype of *E. neradi* **sp. n.** from locality No. 4 using standard cytogenetic methods (e.g. Kovařík et al., 2009). The male diploid complement is composed of 48 chromosomes (Fig. 19). They may be classified into the two categories according to the size of chromosomes. The first sixteen chromosomes are large and gradually decrease in size from 5.60% to 3.02% of the diploid set. All other



Figures 16–18: *Euscorpiops neradi* **sp. n.**, live specimens. **16–17.** Male paratype dorsal and ventral views. **18.** Female paratype.

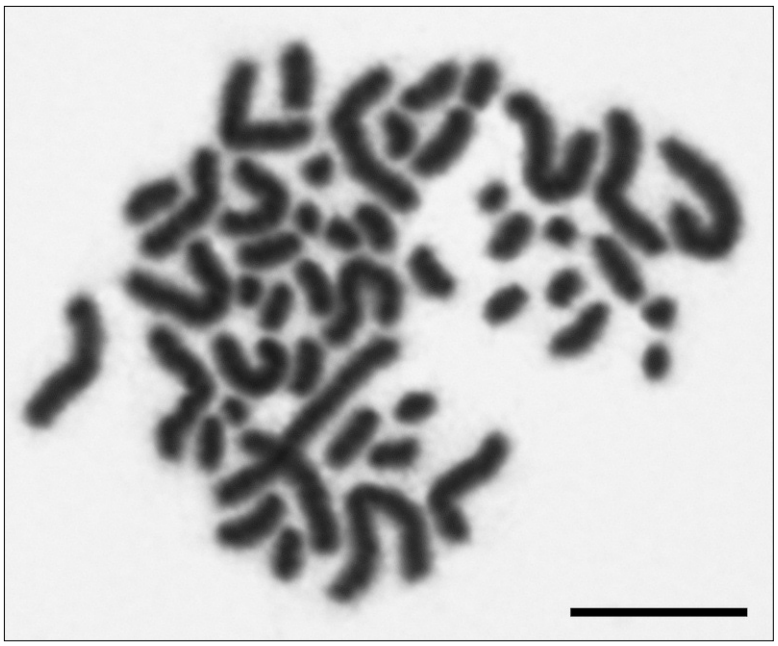


Figure 19: *Euscorpiops neradi* **sp. n.**, male paratype spermatogonial metaphase (2n = 48). Bar = 10 μm.

chromosomes are visibly smaller and gradually decrease in size from 2.04% to 0.40% of the diploid set. The positions of the centromeres are not clearly visible in all chromosomes during mitotic metaphase. Despite of this fact it is evident that metacentrics predominates within large chromosomes and the mix of different morphology may be found within small chromosomes.

VARIABILITY: One paratype is an immature male before the last ecdysis to reach maturity (total length 18 mm). It clearly has larger pectines with six pectinal teeth, but also a narrow chela manus of pedipalp and a straight movable finger. It is thus evident that sexual dimorphism in the shape of male chela manus and flexed fingers takes place only during the last ecdysis. This paratype also lacks ventral carinae on the first to fourth metasomal segments.

AFFINITIES: The described features distinguish *E. neradi* **sp. n.** from all other species of the genus. It is the smallest species of the genus, whose adults reach 24–28 mm; the other 20 species are 31.5 to 70 mm long. *E. neradi* **sp. n.** is only species of *Euscorpiops* with 16 external (5 *eb*, 2 *esb*, 2 *em*, 3 *est*, 4 *et*) and six ventral trichobothria on the patella. The other species have 17–21 external and 7–18 ventral trichobothria on the patella. *E. kaftani* (Kovařík, 1993) from Vietnam, which is the second smallest species (31.5–52 mm long) has 19 external and 13 ventral trichobothria on the patella; only one species with seven ventral trichobothria on the patella (other species have 8–18), *E. kamengensis* Bastawade, 2006 from India (Arunachal Pradesh), is 42.75 mm long and has 19 external trichobothria.

References

BASTAWADE, D. B. 1997. Distribution of *Neoscorpiops* scorpions in the western ghats of Maharashtra and Gujarat and possible trichobothridial variations among isolated populations. *Journal of the Bombay Natural History Society*, 94: 104–114.

BASTAWADE, D. B. 2006. Arachnida: Scorpionida, Uropygi, Schizomida and Oncopodid Opiliones (Chelicerata). *Fauna of Arunuchal Pradesh*, *State Fauna Series*, 13(Part–2): 449–465.

FET, V. 2000. Family Scorpiopidae Kraepelin, 1905. Pp. 487–502 in: Fet, V., W. D. Sissom, G. Lowe & M. E. Braunwalder. 2000. *Catalog of the Scorpions of the World (1758-1998).* The New York Entomological Society, New York, 689 pp.

KOVAŘÍK, F. 1993. Two new species of the genus *Scorpiops* (Arachnida: Scorpiones: Vaejovidae) from south-east Asia. *Acta Societatis Zoologicae Bohemicae*, 57: 109–115.

KOVAŘÍK, F. 1998. *Štíři* [*Scorpions*]. Publishing House ”Madagaskar”, Jihlava (Czech Republic), 176 pp. (in Czech)

KOVAŘÍK, F. 2000. Revision of family Scorpiopidae (Scorpiones), with descriptions of six new species. *Acta Societatis Zoologicae Bohemicae*, 64: 153-201.

KOVAŘÍK, F. 2001. *Catalog of the Scorpions of the World (1758–1998)* by V. Fet, W. D. Sissom, G. Lowe, and M. Braunwalder (New York Entomological Society, 2000: pp. 690). Discussion and supplement for 1999 and part of 2000. *Serket* 7(3): 78–93.

KOVAŘÍK, F. 2004. *Euscorpiops kubani* sp. nov. from Laos (Scorpiones, Euscorpiidae, Scorpiopinae). *Acta Musei Moraviae, Scientiae biologicae* (Brno), 89: 13–18.

KOVAŘÍK, F. 2005. Three new species of the genera *Euscorpiops* Vachon, 1980 and *Scorpiops* Peters, 1861 from Asia (Scorpiones: Euscorpiidae, Scorpiopinae). *Euscorpius*, 27: 1–10.

KOVAŘÍK, F. 2009. Illustrated catalog of scorpions. Part I. Introductory remarks; keys to families and genera; subfamily Scorpioninae with keys to *Heterometrus* and *Pandinus* species. *Clairon Production*, *Prague*, 170 pp.

KOVAŘÍK, F. 2012. *Euscorpiops thaomischi* sp. n. from Vietnam and a key to species of the genus (Scorpiones: Euscorpiidae: Scorpiopinae). *Euscorpius*, 142: 1–8.

KOVAŘÍK, F., F. ŠŤÁHLAVSKÝ, T. KOŘÍNKOVÁ & J. KRÁL. 2009. *Tityus ythieri* Lourenço, 2007 is a synonym of *Tityus magnimanus* Pocock, 1897 (Scorpiones: Buthidae): a combined approach using morphology, hybridization experiments, chromosomes, and mitochondrial DNA. *Euscorpius,* 77: 1–12.

KRAEPELIN, K. 1899. Scorpiones und Pedipalpi. In: F. DAHL (ed.): *Das Tierreich.* Herausgegeben von der Deutschen Zoologischen Gesellschaft. 8. Lieferung. R. Friedländer und Sohn Verlag, Berlin, 265 pp.

LOURENÇO, W. R. 1998. Designation of the scorpion subfamily Scorpiopsinae Kraepelin, 1905 as family Scorpiopsidae Kraepelin, 1905 (stat. nov.): its generic composition and a description of a new species of *Scorpiops* from Pakistan (Scorpiones, Scorpiopsidae). *Entomologische Mitteilungen aus dem Zoologischen Museum Hamburg*, 12(157): 245–254.

QI, J.-X., M.-S. ZHU & W. R. LOURENCO. 2005. Eight new species of the genera *Scorpiops* Peters, *Euscorpiops* Vachon, and *Chaerilus* Simon (Scorpiones: Euscorpiidae, Chaerilidae) from Tibet and Yunnan, China. *Euscorpius*, 32: 1–40.

SISSOM, W. D. 1990. Systematics, biogeography and paleontology. Pp. 64–160 in: Polis, G. A. (ed.), *The Biology of Scorpions*. Stanford University Press, Stanford, 587 pp.

SOLEGLAD, M. E. & SISSOM, W. D. 2001. Phylogeny of the family Euscorpiidae Laurie, 1896 (Scorpiones): a major revision. Pp. 25–111 in: Fet, V. & P. A. Selden (eds.). *Scorpions 2001. In memoriam Gary A. Polis*. British Arachnological Society, Burnham Beeches, Bucks., 404 pp.

STOCKWELL, S. A. 1989. *Revision of the Phylogeny and Higher Classification of Scorpions (Chelicerata).* Ph.D. Dissertation, Univ. of California, Berkeley, Berkeley, 319 pp.

TIKADER, B. K. & D. B. BASTAWADE. 1983. Scorpions (Scorpionida: Arachnida). In: *The Fauna of India, Vol. 3.* (Edited by the Director). Zoological Survey of India, Calcutta, 671 pp.

VACHON, M. 1980. Essai d`une classification sous-générique des Scorpions du genre *Scorpiops* Peters, 1861 (Arachnida, Scorpionida, Vaejovidae). *Bulletin du Muséum National d´Histoire Naturelle Paris*, 4 ser., 2, 1980: 143–160.