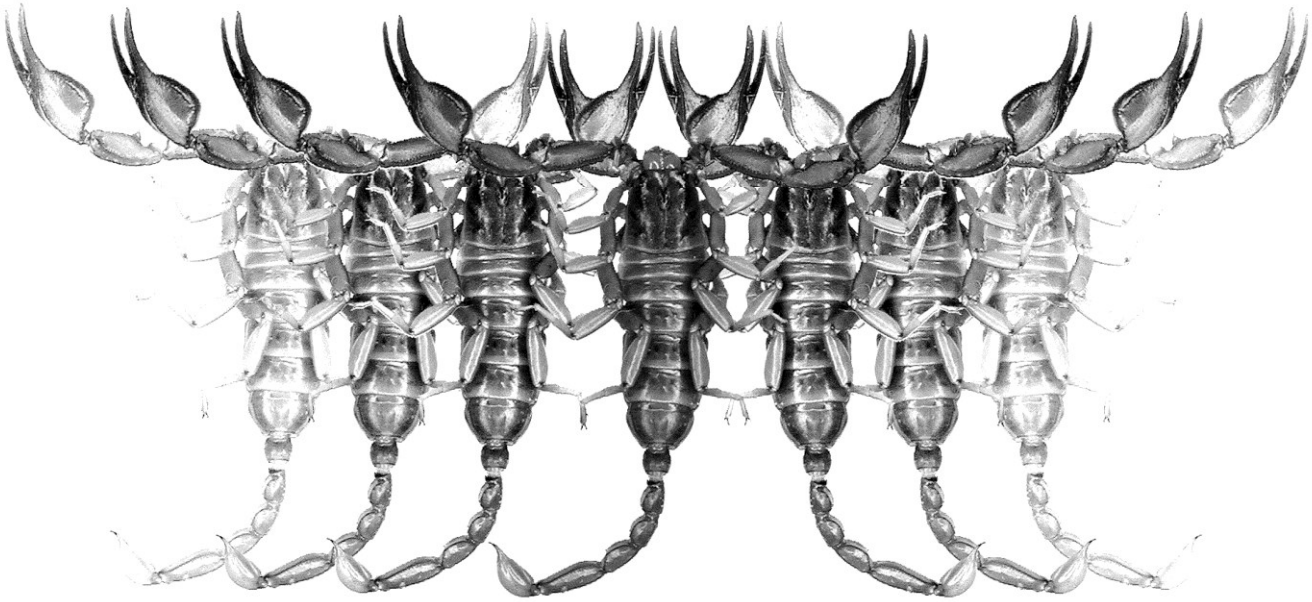
Euscorpius

Occasional Publications in Scorpiology



A New Species of *Euscorpius* Thorell, 1876 from Peloponnese, Greece (Scorpiones: Euscorpiidae)

Gioele Tropea, Victor Fet, Aristeidis Parmakelis, Panayiota Kotsakiozi & Iasmi Stathi

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Occasional Publications in Scorpiology

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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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In September 2012, ICZN Article 8. *What constitutes published work*, has been amended and allowed for electronic publications, disallowing publication on optical discs. From January 2013, ***Euscorpius*** discontinued CD-ROM production; only online electronic version (*ISSN 1536-9307*) is published. For further details on the new ICZN amendment, see http://www.pensoft.net/journals/zookeys/article/3944/.

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A new species of *Euscorpius* Thorell, 1876 from Peloponnese, Greece (Scorpiones: Euscorpiidae)

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http://zoobank.org/urn:lsid:zoobank.org:pub:E77E9CA9-F0F2-4DA9-A3FD-37E2A59DE313

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Summary

A new scorpion species, *Euscorpius (Euscorpius) erymanthius* **sp. n**., is described from Peloponnese, Greece (Erymanthos Mts.), based on genetic and morphological evidence. It is characterized by small size, light brown to reddish color, and a standard trichobothrial pattern (*Pv* = 8–9, *et* = 7–6, *em* = 4 and *eb* = 4). In a phylogeny based on multiple DNA markers, the new species groups close with *E. corcyraeus* Tropea et Rossi, 2012 from Corfu (Kerkyra) Island.

Introduction

The genus *Euscorpius* Thorell, 1876 (Euscorpiidae) is one of the most studied taxa of scorpions, very common in southern Europe and Anatolia. Its species occupy diverse habitats from xeric to mesic, from the sea level up to at least 2,400 m a.s.l. Taxonomy of this genus is complicated and still unresolved throughout its range, due to inaccurate old descriptions, lost type specimens, lack of specimens from many areas as well as existence of cryptic species complexes, which exhibit very similar, "standard" morphological characters. The populations of *Euscorpius* in Greece have been the focus of many studies because of the complex geological history and position of this area in the center of the range of the genus *Euscorpius*. With its high mountain ranges and over 3000 islands, which over the course of geological eras have been united as mainland and fragmented by the sea, the territory of Greece presented multiple opportunities for speciation resulting in high endemism of plant and animal species. Several early authors contributed to the knowledge of the genus *Euscorpius* in Greece: *Euscorpius naupliensis* (C. L. Koch, 1837) was described from Peloponnese (as *Scorpius naupliensis*); *E. koschewnikowi* Birula, 1900, and *E. scaber* Birula, 1900, from northeastern Greece; and *E. candiota* Birula, 1903, from Crete. Di Caporiacco (1950) described *E. carpathicus aegaeus* from Antiparos Island in the Aegean Sea, and *E. c. ossae* (now *E. ossae*) from Mt. Ossa in Thessaly. Species *E. naupliensis*, *E. koschewnikowi*, *E. scaber*, *E. candiota*, and *E. ossae* have been recently redescribed (Gantenbein et al., 2002; Fet & Soleglad, 2002; Fet et al., 2013). Most recently, Tropea & Rossi (2012) described *E. corcyraeus* from Corfu (Kerkyra) Island, and *E. avcii* Tropea et al., 2012 has been found in Samos Island (Parmakelis et al., 2013). Other systematic studies have clarified some aspects of *Euscorpius* fauna in Greece. Kinzelbach (1975) divided *E. carpathicus* (L., 1767) into two species: *E. carpathicus* and "*E. mesotrichus* Hadži, 1929". The latter name, however, is not available because it is a junior homonym of *E. italicus mesotrichus* Hadži, 1929 (Di Caporiacco, 1950; Fet, 1997). The name "*E. mesotrichus" sensu* Kinzelbach also refers to other species besides *E. tergestinus*, including *E. sicanus* (C. L. Koch, 1837), documented by Fet et al. (2003) for many localities in Greece. At the same time, *E. carpathicus* s. str. was restricted to the populations of the type locality in Romania (Fet & Soleglad, 2002).

Currently, 10 species of *Euscorpius* have been confirmed for Greece: *Euscorpius (Polytrichobothrius) italicus* (Herbst, 1800), *E. (P.) naupliensis* (C.L. Koch,

1837), *E. (Euscorpius) sicanus* (C.L. Koch, 1837), *E. (E.) koschewnikowi* Birula, 1900, *E. (E.) scaber* Birula, 1900, *E. (E.) candiota* Birula, 1903, *E. (E.) hadzii* Di Caporiacco, 1950, *E. (E.) ossae* Di Caporiacco, 1950, *E. avcii* Tropea et al., 2012, and *E. (E.) corcyraeus* Tropea et Rossi, 2012 (Gantenbein et al., 2002; Fet & Soleglad, 2002; Fet et al., 2003; Vignoli & Salomone, 2008; Tropea & Rossi, 2012; Parmakelis et al., 2013; Fet et al., 2013). In addition to these species, status of *E. "carpathicus" aegaeus* Di Caporiacco, 1950, needs clarification.

An ongoing investigation of many populations from Greece using multiple DNA markers (Parmakelis et al., in press) allowed further revealing of a diverse set of species, many of them yet undescribed. A new species, *Euscorpius* (*Euscorpius*) *erymanthius* **sp. n.**, from type locality of Erymanthos Mts., Peloponnese, Greece, is described here.

Material and Methods

Material examined

All type specimens from Erymanthos Mts. as well as specimens used for comparison from Chelmos Mts. have been captured using pitfall traps by Dr. Yiannis Anastasiou (University of Athens, Greece).

A total of 62 type specimens of *Euscorpius erymanthius* **sp. n.** have been examined (see *Type material*). Further 42 specimens from Peloponnese have been examined for comparison by G.T. and V.F.: **Greece, *Peloponnese*:** Chelmos Mts., XD, maquis, 850 m, 38°02'N, 22°07'E, 5 October – 1 December 1996, leg. Y. Anastasiou, 2 ♂ (NHMC 1925, Eus31); Chelmos Mts., XD, maquis, 850 m, 38°02'N, 22°07'E, 5 October – 1 December 1996, leg. Y. Anastasiou, 1 ♀ (NHMC 1925, Eus32); Chelmos Mts., XD, maquis, 850 m, 38°02'N, 22°07'E, 5 October – 1 December 1996, leg. Y. Anastasiou, 1 ♂ (NHMC1925, Eus33); Chelmos Mts., XB42, maquis, 850 m, 38°02'N, 22°07'E, 1 October – 16 December 1995, leg. Y. Anastasiou, 1 ♂, 1 ♀ (NHMC 1924, Eus34); Chelmos Mts., XB49, maquis, 850 m, 38°02'N, 22°07'E, 1 October – 16 December 1995, leg. Y. Anastasiou, 3 ♂ (NHMC1924, Eus35); Chelmos Mts., XDB44, maquis, 850 m, 38°02'N, 22°07'E, 1 October – 16 December 1995, leg. Y. Anastasiou, 1 ♂ (NHMC1924, Eus36); Chelmos Mts., XE, maquis, 850 m, 38°02'N, 22°07'E, 6 July–5 October 1996, leg. Y. Anastasiou, 2 ♂ (NHMC 1923, Eus39); Chelmos Mts., 2 km before Kalavryta, 4 October 1996, leg. Y. Anastasiou, 3 ♂, 1 ♀ (NHMC, Eus37); Chelmos Mts., Kalavryta, maquis, 5 October 1996, leg. Y. Anastasiou, 9 ♂, 2 ♀ (NHMC, Eus38); Chelmos Mts., Kalavryta, maquis, 5 October 1996, leg. Y. Anastasiou, 2 ♂, 1 ♀ (GTC); Moira, 960 m, 30 May 1995, leg. P. M. Giachino, 1 ♂, 1 ♀ (MSNB 13914); nom. Ahaia, pass between Klitoria and Kalivia, 1200 m, 26 May 1982 leg. M. Zapparoli, 2 ♂ (MZUR).

In addition, 56 specimens have been examined for comparison by G.T. from other areas: ***E. avcii***: Turkey, Dilek Peninsula National Park, Canyon, Dilek Peninsula, near Davutlar Town, Kuşadası District, 7 October 2005, leg. H. Koç, 2 ♂, 2 ♀ (GTC 258–260; paratypes); Guzelcamli Village, 2 km S of Seke, 9 May 2012, leg. E. A. Yağmur, 2 ♂ (GTC 261, 262); ***E.* cf. *candiota***: Greece, Crete, Gonies, stream bank, 31 March 1989, leg. M. Zapparoli, 1 ♂, 1 ♀ (MZUR 44, 45); Crete, Gonies, 31 March 1989, leg. M. Bologna, 1 ♂ (MZUR 46); Crete, Gonies, 560–800 m, 31 March 1989, leg. M. Lucarelli, 1 ♂ (MZUR 96); ***E. corcyraeus***: Greece, Corfu (Kerkyra) Island, Greece, 23 April 1957, leg. A. Valle and Bianchi, 1 ♂, 20 ♀ (MSNB 906, 907, 909–914, 920–922, 924–930, 933–935, 937; type specimens); Greece, Corfu (Kerkyra) Island, 23 April 1957, leg. A. Valle and Bianchi, 1 ♀ (GTC 266, paratype); ***E.* cf. *corcyraeus***: Greece, Corfu (Kerkyra) Island, Pantokrator Mts., 39°43'34.82" N, 19°49'59.72" E, 29 May 2012, leg. E. Ruzzier, 1 ♀ (GTC 287); Corfu (Kerkyra) Island, Agios Spiridon, 29 April 1984, 2 ♀ (MZUR 58, 59); Corfu (Kerkyra) Island, Kassiopi, 28 May 1984, leg. G. Carpaneto, 2 ♀ (MZUR 72, 73); Corfu (Kerkyra) Island, Perithia, 100–500 m, 29 April 1984 leg. G. Carpaneto, 2 ♀ (MZUR 83, 84); ***E. ossae***: Greece, Thessaly, Larisa, Mt. Ossa, near Karitsa, leg. Vigna, 3♀ (MSNB 10013–10015); Thessaly, Larisa, Mt. Ossa, near Karitsa, 20 October 1974, leg. Bianchi, 1 ♀, (MSNB 10020); Thessaly, Larisa, Mt. Ossa, 1150 m, Spilia–Anatoli, 5 June 2012, leg. Z. Lucbauer, 1 ♂, 1 ♀ (GTC 254, 255); ***E. sicanus* complex**: Greece, Mt. Parnassos, 1 ♀ (GTC 297); Viotia, Mt. Parnassos, 1700–1850 m, Athens Ski Club, 30 April 1984, leg. A. Vigna, 3 ♀ (MZUR 51–53); Thessaly, Mt. Pelion, Vizitsa, 7 May 2001, leg. V. Fet, 1 ♂, 3 ♀ (VFPC); Peloponnese, Laconia, Mystras, 18 September 1983, leg. P. Beron & S. Beshkov, 2 ♀ (NMNHS 68). Also, multiple specimens of these and other species from Greece and adjacent countries were examined by V.F. during preparation of this and other contributions concerning Greek fauna.

DNA Analysis and Species Validation

Validity of the new species was supported by our molecular phylogenetic study of *Euscorpius* populations across Greece (Parmakelis et al., in press). All DNA work was performed in the University of Athens by P.K. and A.P. For details on molecular and phylogenetic analyses, see Parmakelis et al. (in press). Several methods of species delimitation and a species validation method were employed in Parmakelis et al. (in press) based on the phylogeny inferred using sequence data from one nuclear and three mtDNA loci. Except from one species delimitation methods (see Fig. 3 in Parmake-

Figure 1: Dorsal and ventral views of *Euscorpius erymanthius* **sp. n.** male.

lis et al., in press), the new *Euscorpius* species described herein was always strongly supported as corresponding to an independent evolutionary unit.

In a resulting phylogeny (Parmakelis et al., in press), the new species described in this work is placed within the nominotypic subgenus *Euscorpius* s.str., and forms a sister species to *E. corcyraeus* Tropea et Rossi, 2012 from Corfu (Kerkyra) island.

Abbreviations

V: ventral trichobothria on pedipalp chela manus; *Pv*: ventral trichobothria on pedipalp patella; *Pe*: external trichobothria on pedipalp patella; *et*: external terminal; *est*: external subterminal; *em*: external medium; *esb*: external suprabasal; eb_a: external basal *a*; *eb*: external basal; *db*: dorsal basal trichobothrium on fixed finger; *Dp*: pectinal teeth number; *L*: length; *H*: height; *Lchel*: chela length; *Wchel*; chela width; *Lcar*: carapace length; *Wcar*: carapace width; *Lfem*: femur length; *Lpat*: patella length; *Lmet*: metasoma length; *CarA/CarP %*: average ratio of distances from center of median eyes to anterior and posterior margins of the carapace; *DPS*: dorsal patellar spur; *DD*: distal denticle; *MD*: median denticles; *OD*: outer denticles; *ID*: inner denticles; *IAD*: inner accessory denticles; FKCP: private collection of František Kovařík, Prague, Czech Republic; GTC: private collection of Gioele Tropea, Rome, Italy; MSNB: Museo Civico di Scienze Naturali "E. Caffi", Bergamo, Italy; MZUR: Museo di Zoologia "Charles Darwin" dell'Università di Roma "La Sapienza", Rome, Italy; NHMC: Natural History Museum of Crete, Heraklion, Crete, Greece; NHMW, Naturhistorisches Museum Wien, Vienna, Austria; NMNHS: National Museum of Natural History, Sofia, Bulgaria; VFPC: private collection of Victor Fet, Huntington, West Virginia, USA.

Figure 2: Dorsal and ventral views of *Euscorpius erymanthius* **sp. n.** female.

Systematics

Family Euscorpiidae Laurie, 1896
Genus *Euscorpius* Thorell, 1876
Subgenus *Euscorpius* Thorell, 1876

***Euscorpius erymanthius* Tropea, Fet, Parmakelis, Kotsakiozi et Stathi, sp. n.**

http://zoobank.org/urn:lsid:zoobank.org:act:C99FC959-5A9B-4FAF-81E5-A41666EADBED

Type material. *Holotype*: ♂, Greece, Peloponnese, Erymanthos Mts., maquis, 850 m, 38°00'N, 21°55'E, EA11, 5 August 1996, leg. Y. Anastasiou (NHMC 1927, Eus57).

Paratypes: Greece, Peloponnese, Erymanthos Mts., maquis, 850 m, 38°00'N, 21°55'E, leg. Y. Anastasiou; EA9, 5 August – 28 October 1996, 3 ♂ (NHMC 1927, Eus46); EA5, 5 August – 28 October 1996, 3 ♂ (NHMC1927, Eus47); EB9L, 4 October 1996 – 11 January 1997, 1 ♀ (NHMC 1928, Eus48); EB8L, 4 October 1996 – 11 January 1997, 1 ♂, 1 ♀ (NHMC 1928, Eus49); EA10, 5 August – 28 October 1996, 3 ♂ (NHMC 1927, Eus50); EA13, 5 August – 28 October 1996, 4 ♂ (NHMC 1927, Eus51); EA8, 5 August – 28 October 1996, 3 ♂, 1 ♀ (NHMC 1927, Eus52); EA6, 5 August – 28 October 1996, 2 ♂ (NHMC 1927, Eus53); EA3, 5 August – 28 October 1996, 7 ♂ (NHMC 1927, Eus56); EA4, 5 August – 28 October 1996, 1 ♀ (NHMC 1927, Eus58), 1 ♂, 1 ♀ (NHMW 21.951), 2 ♂ (FKCP); EB10L, 4 October 1996 – 11 January 1997, 4 ♂ (NHMC 1927, Eus55); EB10L, 4 October 1996 – 11 January 1997, 1 ♂ (NHMC 1928, Eus60); EA11, 5 August – 28 October 1996, 7 ♂ (NHMC 1927, Eus57); EA12, 5 August – 28 October 1996, 8 ♂ (NHMC 1927, Eus59); EA9, 5 August 1996, 2 ♂ (NHMC 1927, Eus54), 2 ♂, 1 ♀ (GTC), 1 ♂, 1 ♀ (MSNB).

***Geographic Distribution*:** Greece: Peloponnese, Erymanthos Mts. (see map in Fig. 15).

Etymology: The specific epithet refers to Latin name of the type locality, Erymanthos Mts.

Diagnosis: A small *Euscorpius* species, total length 20.0–24.5 mm (average length 22 mm). Color of adults light brown-reddish, carapace and pedipalps may be darker reddish. More or less expressed reticulations or marbling on carapace, metasoma and chelicerae is often present. The number of trichobothria on the pedipalp manus ventral surface is 4 ($V_{1\text{-}3}$ + Et_1); the number of ventral trichobothria on the pedipalp patella is usually 9 (9 in 76.61% and 8 in 21.77% of pedipalps examined); the number of external trichobothria on pedipalp patella is: *eb* = 4, eb_a = 4, *esb* = 2, *em* = 4, *est* = 4, *et* = 6/7 (series *et* = 6 in 69.35 % and *et* = 7 in 30.65 % of pedipalps examined). The pectinal teeth count is usually 8 in males (8 in 78.70% and 7 in 12.96% of pectines examined) and 7 in females (7 in 76.92 % and 8 in 15.38 % of pectines examined). The telson vesicle in males is more swollen than in females: average *L/H* ratio of the vesicle is 1.81 in males and 1.97 in females. Chela with a strong notch on fixed finger and scalloping of the movable finger in adult males, obsolete in females; *Lchel/Wchel* ratio is 2.45 in males and 2.59 in females. Dorsal patellar spur medium developed. Femur usually shorter than patella or as long as it; *Lfem/Lpat* ratio is 0.98. Average ratio *Lcar/Wcar* is 1.004; average distance from center of median eyes to anterior margin of the carapace is 41.49 % of the carapace length in males and 39.67 % in females. Average distance from center of median eyes to posterior margin of the carapace is 58.51 % of the carapace length in males and 60.33 % in females. Average ratio of *Lmet/Lcar* is 2.44 in males and 2.20 in females.

Description of the holotype

Coloration: Whole color light brown, tergites outline lighter, a few dark reticulations on carapace, sternites and metasoma; sternites very pale brown; pectines and genital operculum brown-whitish; chelicerae brown-yellowish with dark reticulation; legs and telson lighter brown-yellowish with darker tip of the aculeus.

Carapace: Length 3.42, posterior width 3.48; very fine granulation on whole surface; deep anterior median, posterior lateral and posterior median furrows; two pairs of lateral eyes and two median eyes; length from center of median eyes to anterior margin is 41.23 % of carapace length; length from center of median eyes to posterior margin is 58.77 % of the carapace length.

Mesosoma: Tergites very finely granulated with outline lighter; sternites very finely punctate with spiracles small, oval shaped and inclined to about 45° downwards towards outside, area of overlap between sternites paler.

Metasoma: Dorsal carinae of segment I formed by few visible granules to lightly rough, on II-IV formed by little granules; dorsolateral carinae sketched on segments I, absent or obsolete on II–IV; rounded with scattered granulation on segment V; ventrolateral carinae absent on segment I, absent or obsolete on II–IV, by small granules formed on segment V; ventromedian carina absent on segments I–IV, finely serrulate on segment V; very fine granulation present on dorsal intercarinal spaces, smooth to slight rough on the other parts.

Telson: Vesicle highly swollen; very lightly rough, with ventral setae of different sizes, especially in surround of the vesicle/aculeus juncture; telson height 1.29; telson length 3.06; vesicle length 2.31; vesicle width 1.14; *L/H* ratio of the vesicle 1.79.

Pectines: tooth count 8/8; middle lamellae count 5/5; several microsetae on marginal lamellae, middle lamellae and fulcra.

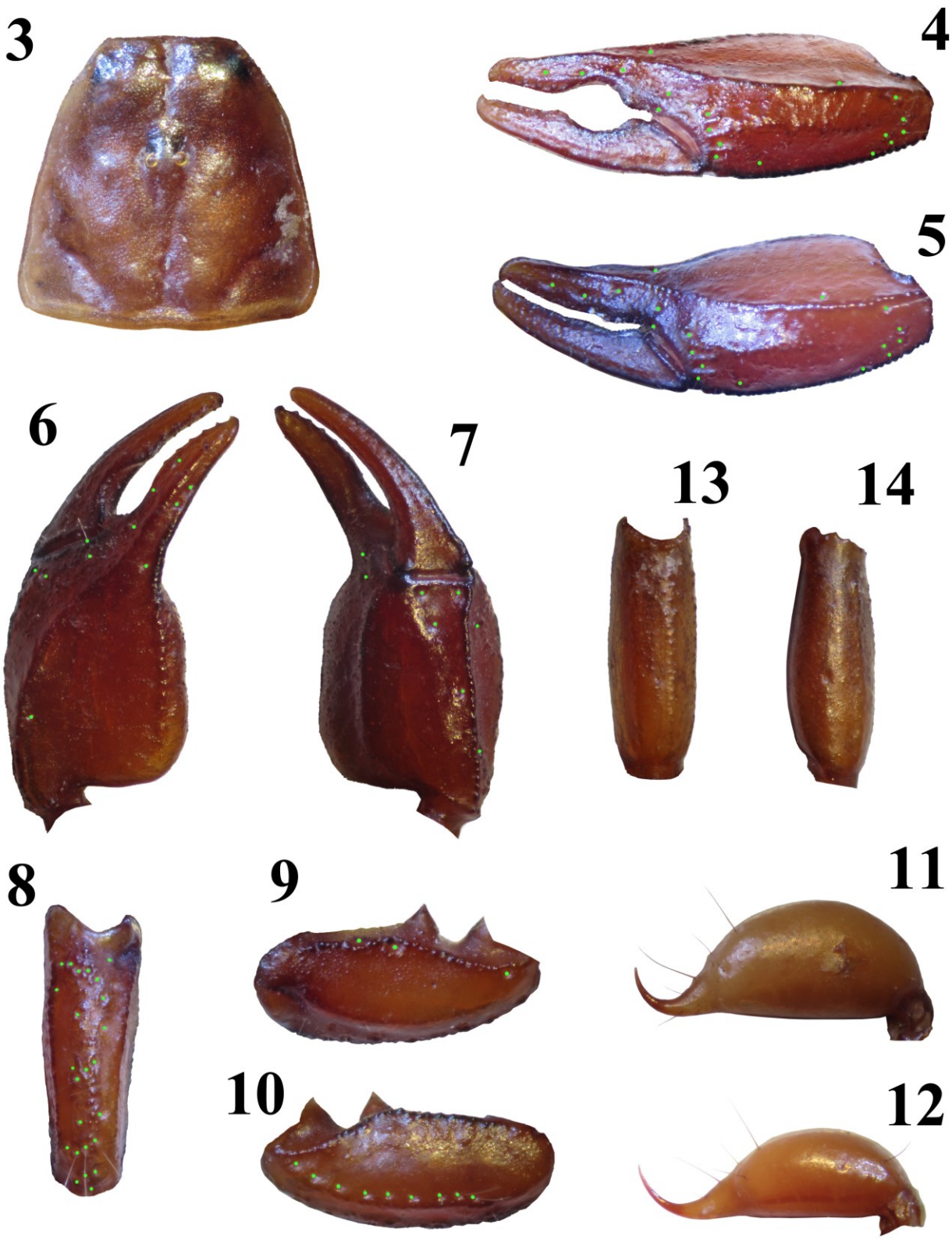
Genital operculum: Partially divided with genital papillae protruding.

Sternum: pentagonal shape, type 2; length approximately equal to width, deep posterior emargination.

Pedipalps: Coxa and trochanter with tuberculate carinae. Femur: dorsal internal carinae tuberculated and dark; dorsal external carinae formed tubercles slightly serrulate and spaced; external median carinae serrulate; anterior median formed by 8/9 conical tubercles, of which three bear a macroseta each; dorsal and ventral intercarinal spaces granulated. Patella: dorsal internal carinae crenulate to tuberculate; dorsal external carinae rough to lightly crenulate; ventral external carinae slightly crenulate to rough; ventral internal carinae tuberculate to lightly serrulate; dorsal intercarinal surface with uniform small granules; ventral intercarinal surface with minute granules near to ventral internal carinae and smooth near to ventral external carinae. Dorsal patellar spur well developed. Chela carina *D1* is distinctly strong, dark and rough; *D4* is granulate to rough; *V1* is distinctly strong, dark and rough to crenulate; *V3* rounded and lightly granulated; external carina granulated; intercarinal tegument rough to granulated by very minute scattered granules. Typical chela finger dentition; *L/W* ratio of the chela 2.53; *Lfem/Lpat* ratio is 0.97.

Trichobothria: Chela: number of trichobothria on the pedipalp manus ventral surface is 4/4 ($V_{1\text{-}3}$ + Et_1). Patella: ventral (*Pv*): 9/9; patella external (*Pe*): *et* = 7/7, *est* = 4/4, *em* = 4/4, *esb* = 2/2, eb_a = 4/4, *eb* = 4/4. Femur: trichobothrium *d* is slightly decentralized and slightly proximal to *i, e* distal to both, situated on dorsal external carina, but mostly on dorsal surface.

Legs: Legs with two pedal spurs; no tarsal spur; ventral row of tarsus III with a total of 7 to 8 stout spinules (including the ventral distal spinules pair) of increasing size from proximal to distal, distally ending with a pair of spinules; 3 flanking pairs of tarsal setae adjacent to the ventral spinules row. Ventral leg femora I–IV with dark tubercles, dorsal leg femora I–IV granulated.



Figures 3-14: *Euscorpius erymanthius* **sp. n. 3.** Carapace. **4.** External view of the chela of adult male. **5.** External view of the chela of adult female. **6.** Dorsal view of the chela. **7.** Ventral view of the chela. **8.** External view of pedipalp patella. **9.** Dorsal view of pedipalp patella. **10.** Ventral view of pedipalp patella. **11.** Telson of adult male. **12.** Telson of adult female. **13.** Ventral view of the metasomal segment V. **14.** Lateral view of the metasomal segment V.

***E. erymanthius* sp. n.**			
		Holotype ♂	**Paratype ♀**
Pv		9/9	9/9
Pe		7/7,4/4,4/4,2/2,4/4,4/4	7/6,4/4,4/4,2/2,4/4,4/4
Dp		8/8	7/7
Total	**Length**	22.99	21.82
Carapace	**Length**	3.42	3.36
	Post. width	3.48	3.54
Metasoma	**Length**	8.23	7.30
Segment I	**Length**	1.08	0.93
	Width	1.11	1.07
Segment II	**Length**	1.29	1.13
	Width	1.02	0.9
Segment III	**Length**	1.41	1.25
	Width	0.96	0.78
Segment IV	**Length**	1.74	1.53
	Width	2.60	0.81
Segment V	**Length**	2.70	2.46
	Width	0.96	0.78
Telson	**Length**	3.06	2.46
Vescicle	**Length**	2.31	1.56
	Width	1.14	0.79
	Height	1.29	0.84
Aculeus	**Length**	0.75	0.90
Femur	**Length**	2.82	2.76
	Width	1.08	1.08
Patella	**Length**	2.91	2.82
	Width	1.19	1.14
Chela	**Length**	5.76	5.64
	Width	2.28	2.16
Movable Finger	**Length**	3.00	3.02
Ratio	***Lcar/Lfer***	1.212	1.217
	CarA-CarP %	41.23-58.77	39.28-60.72
	Lcar/Wcar	0.983	0.949
	Lfer/Lpat	0.969	0.979
	Lchel/Wchel	2.529	2.611
	Lmet/Lcar	2.407	2.173

Table 1: Morphometric measurements (mm) and ratios of *E. erymanthius* **sp. n.**

Chelicerae: smooth, with dark marbling on anterior part, with darker apical portion of denticles; the dorsal distal denticle is smaller than the ventral distal denticle; ventral edge is smooth with brush-like setae on the inner part; dorsal edge has five denticles: one large distal, two medium subdistal, one large median and a small basal; fixed finger has four denticles: one distal, one subdistal, one median and one basal; the median and the basal are in a fork arrangement; the internal surface has brush-like setae.

Hemispermatophore: Well-developed lamina with well visible basal constriction, tapered distally; truncal flexure present and well-developed; capsular lobe com-

Figure 15: Type locality of *Euscorpius erymanthius* **sp. n.** (red circle; map from: http://d-maps.com/carte.php?num_car=2276&lang=it).

plex well-developed, with acuminate process; ental channel spinose distally, exhibiting usually 5 delicate spinules, with a range of 3 to 6 (very rarely).

***Trichobothrial and pectinal teeth count variation*:** The variation observed in 62 studied specimens (55 males, 7 females) is given below. Pectinal teeth in males (n=54): 7/6 (1), 7/7 (4), 7/8 (4), 8/7 (1), 8/8 (39), 9/8 (2), 9/9 (3); in total, 8 in 78.70 % and 7 in 12.96 %; mean = 7.93, SD = 0.47. Pectinal teeth in females (n=14): 7/? (1), 7/6 (1), 7/7 (4), 8/8 (1); in total, 7 in 76.92 % and 8 in 15.38 %; mean = 7.07, SD = 0.47. Pedipalp patella trichobothria *Pv* (n=62): 9/7 (1), 8/8 (6), 8/9 (5), 9/8 (10), 9/9 (39), 10/9 (1); in total, 9 in 76.61 % and 8 in 21.77 %; mean = 8.77, SD = 0.45. Pedipalp patella trichobothria *Pe* (n=62): *et* = 6/6 (36), 6/7 (5), 7/6 (9), 7/7 (12), in total, 6 in 69.35 % and *et* = 7 in 30.65 %; mean = 6.31, SD = 0.46; *est* = 4/4 (62); *em* = 3/3 (1), 3/4 (1), 4/4 (60); *esb*= 2/2 (62); eb_a = 4/4 (62); *eb* = 4/4 (62). Note a rare deviation of *em* = 3, which may become an important phenotypic marker in subgenus *Euscorpius* when fixed in some populations and species (e.g. *E. carpathicus* s.str. from Romania; see Fet & Soleglad, 2002).

Comparisons

The following eight species of the subgenus *Euscorpius* are currently confirmed for Greece: *E. avcii*, *E. candiota*, *E. corcyraeus E. hadzii*, *E. koschewnikowi*, *E. scaber*, *E. sicanus*, and *E. ossae*. In addition, *E. "carpathicus" aegaeus* needs further clarification. Below, these species are compared to *E. erymanthius* sp. n. Most differ immediately by size since, being on average 22 mm long, *E. erymanthius* sp. n. is among the smallest species of the genus *Euscorpius*.

It is possible to distinguish forms of *E. sicanus* complex and *E. hadzii* from *E. erymanthius* sp. n. by the series of trichobothria on pedipalp patella external surface which are eb_a = 4 to 5, *eb* = 5 in *E. sicanus* complex (Fet et al., 2003) and even higher in *E. hadzii* (Fet & Soleglad, 2002) while in *E. erymanthius* sp. n. eb_a = 4, *eb* = 4, which is a "standard" number for many species of subgenus *Euscorpius*.

A small-sized, dark-colored *E. scaber* from the northeast of Greece can be distinguished from *E. erymanthius* sp. n. in: (1) having very high pectinal teeth count (on average 10.53 in males and 7.85 in females) versus a lower pectinal teeth count of *E. erymanthius* sp. n. (7.93 in males and 7.07 in females); (2) *E. scaber* tends to have a lower trichobothrial count in *Pv* and *Pe-et* series which are, respectively, 7.96 and 5.86 versus 8.77 and 6.31 in *E. erymanthius* sp. n.; (3) *E. scaber* is strongly granulated, while *E. erymanthius* sp. n. is not particularly granulated.

The larger in size (about 40 mm) Crete endemic *E. candiota* differs from *E. erymanthius* sp. n. in: (1) having a higher average *Dp* in males, 8.60 versus 7.93 in *E. erymanthius* sp. n.; (2) having a higher *Pv* and *Pe-et* count, which is 9.44 and 6.52 versus, respectively, 8.77 and 6.31 in *E. erymanthius* sp. n.

Another larger in size (about 40 mm) species, *E. ossae*, known only from Thessaly, differs from *E. erymanthius* sp. n. in: (1) lower trichobothrial count, which is on average *Pv* = 7.29 and *et* = 5.36, compared to *Pv* = 8.77 and *Pe-et* = 6.31 in *E. erymanthius* sp. n.; (2) *E. ossae* is dark brown in color with lighter legs and telson, while *E. erymanthius* sp. n. is light brown-reddish; and (3) *E. ossae* tend to have a higher *Dp,* especially in males, with a average of 9.07 in males and 7.25 in females versus 7.93 in males and 7.07 in females of *E. erymanthius* sp. n.

A very large (up to 46 mm) *E. koschewnikowi* also differs from *E. erymanthius* sp. n. as follows: (1) in *E. erymanthius* sp. n., not all metasomal segments are longer than wide, the L/W ratio of metasomal segment I being on average 0.965 in males; (2) *E. koschewnikowi* is exceptionally slender and smooth while *E. erymanthius* sp. n. is not; and (3) *E. erymanthius* sp. n. tends to have a higher count of *Pv* and *Pe-et* (see Table 2).

E. "carpathicus" aegaeus is a light-colored form described from the island of Antiparos, in the central-south of the Aegean Sea. It could be endemic to Cycladic islands, which exhibit a number of local isolates (Parmakelis et al., in press). This form is distinguished from *E. erymanthius* sp. n. by (1) higher *Dp* count, 9 in males and 8 in females, versus 8 and 7 in *E. erymanthius* sp. n.; and (2) lower number of *Pv* trichobothria, 8 versus 9.

A small-sized *E. avcii* from Samos Island near Anatolian coast differs from *E. erymanthius* sp. n. in: (1) lower *Pv*, 7.04 versus 8.77 on average in *E. erymanthius* sp. n.; (2) lower *Pe-et*, on average 5.36 vs. 6.31 in *E. erymanthius* sp. n.; and (3) in *E. avcii*, chelicerae are uniformly yellowish-orange without dark reticulation, while in *E. erymanthius* sp. n. chelicerae are brown-yellowish with dark reticulation. DNA phylogeny (Parmakelis et al., in press) places Samos population (which belongs to *E. avcii*: Parmakelis et al., 2013) in a clade of Aegean endemics, genetically and geographically far from *E. erymanthius* sp. n.

Finally, *E. corcyraeus* from Corfu (Kerkyra) Island is morphologically most similar to *E. erymanthius* sp. n. In the DNA phylogeny, together with some Epiros, Crete, and Kythira populations they form a part of a clade that Parmakelis et al. (in press) call "*E. candiota* complex". In this clade, *E. corcyraeus* and *E. erymanthius* sp. n. group relatively close, although both are validated as separate species.

Morphological differentiation of these two species, as well as other Peloponnese "standard" forms, likely related populations from Ionian Islands, and forms of the mainland western Greece is problematic, as further diagnostic characters should be found. In fact, *E. erymanthius* sp. n and *E. corcyraeus* have both pectinal teeth and trichobothrial counts almost identical; only *Dp* in males appears to be different, but additional specimens from Corfu are needed to verify this data. *E. corcyraeus* was described as very light-colored, but further specimens showed a similar coloration to *E. erymanthius* sp. n. or even darker (Tropea, unpublished data). The only really useful characters for separation of these two species are metasomal granulation and morphometrics. *E. corcyraeus* has the metasoma distinctly more granulated, while *E. erymanthius* sp. n. has smooth or almost smooth metasoma in females to nearly smooth or slightly granulated in males, giving them a more delicate appearance. In addition, the L/W ratio of the metasomal segments of *E. corcyraeus* is lower, giving an overall more squat appearance of the segments compared to *E. erymanthius* sp. n.

Discussion

Taxonomy of genus *Euscorpius* is complicated and for many geographic territories and species complexes

Species	*Dp* ♂	*Dp* ♀	*Pv*	*et*	*est*	*em*	*esb*	eb_a	*eb*
E. erymanthius **sp. n.**	8	7	8-9 (9)	6-7 (6)	4	4	2	4	4
E. avcii	8	7	7	5-6 (5)	4	4	2	4	4
E. candiota	8-9	7	9-10	6-7	4	4	2	4	4
E. corcyraeus	9	7	9	6-7 (6)	4	4	2	4	4
E. ossae	9	7	7-8 (7)	5-6 (5)	4	4	2	4	4
E. hadzii	8-11	7-9	8-13 (11)	6-9 (7)	4	4-5 (4)	2	4-8 (7)	5
E. koschewnikowi	8	6	8	5-6	4	4	2	4	4
E. scaber	10-11	8	8	5-6 (6)	4	4	2	4	4
E. sicanus complex	8-11	7-8	7-11(9-10)	5-8 (7)	4	4	2	4-5	5
E. c. aegaeus	9	8	8	6	4	4	2	4	4

Table 2: Trichobothrial and pectinal tooth counts of *Euscorpius* species discussed in this paper.

still remains unresolved throughout its range. The northern Peloponnese species described here, *E. erymanthius* sp. n., is one of those forms of *Euscorpius* where "standard" characters are shared by several genetically distinct species, making it difficult to clearly separate them on the basis of morphology. This "cryptic species" situation is now known to exist throughout the range of the genus *Euscorpius*; it is commonly exhibited in the part of its range that includes Greece and western Turkey. Additional morphological features to distinguish between such "cryptic species" of the genus *Euscorpius* should be searched for; at the moment, the only way to identify some species is to combine a set of diagnostic characters and statistical data from a considerable number of specimens, also taking into account its locality. At the same time, genetic (DNA) markers serve as a guide to identify "cryptic species" complexes. In this ongoing study, a definitive role was played by using multiple DNA markers (Parmakelis et al., in press; unpublished data) to validate species.

In conclusion, the genus *Euscorpius* in Greece, as well as in the rest of its range, should be studied further, both the populations of already documented species as well as many new forms whose status needs clarification. For instance, within the Peloponnese, an unnamed population of the Taygetos Mts., partially described in Tropea & Rossi (2012), shows morphological characters, which do not allow us to include it in *E. erymanthius* sp. n. In addition, *E. erymanthius* sp. n. shows some differences from a population of Chelmos Mts., not too far away in the north of the Peloponnese, for which we have no genetic data. Additional DNA marker data (Parmakelis et al., in press) show that Erymanthos Mts. population groups closely with nearby population from Panachaiko Mts., for which, however, we have no morphological data. Pending further detailed study of Peloponnese fauna, we do not include Chelmos Mts. and Panachaiko Mts. populations into *E. erymanthius* sp. n.

With the description of *E. erymanthius* sp. n., the number of valid species of the genus *Euscorpius* in Greece increases to 11.

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