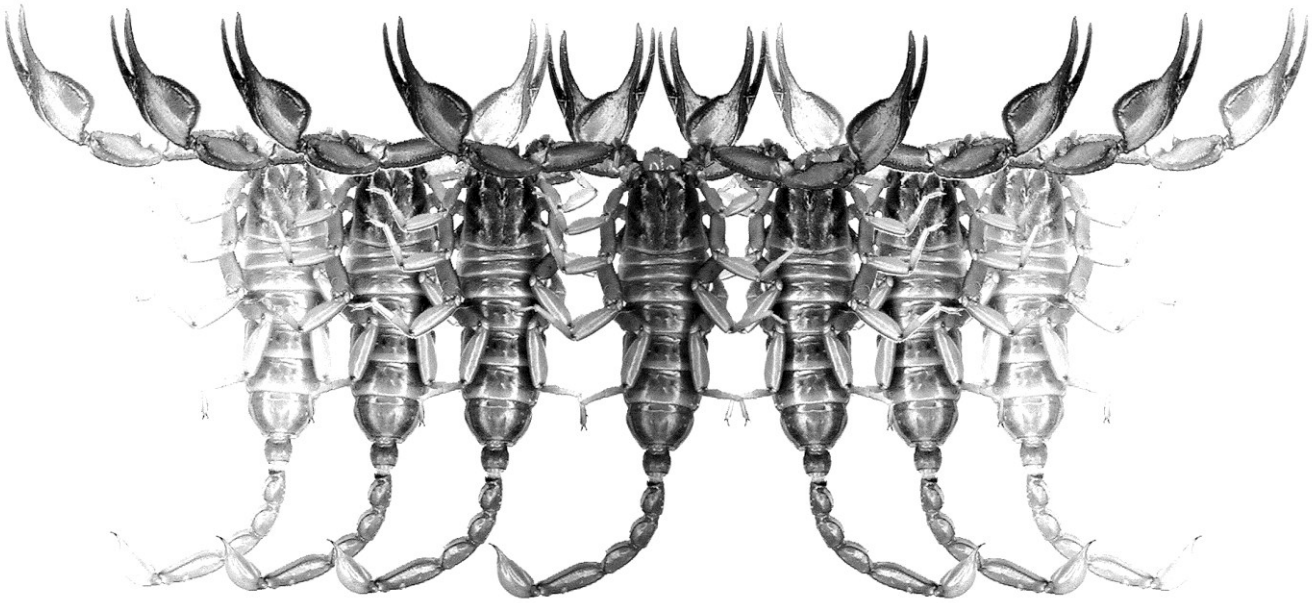
Euscorpius

Occasional Publications in Scorpiology



Two New *Euscorpius* Species from Central-Western Greece (Scorpiones: Euscorpiidae)

Gioele Tropea & Victor Fet

April 2015 — No. 199

Euscorpius

Occasional Publications in Scorpiology

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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 at: **http://www.science.marshall.edu/fet/Euscorpius**
(Marshall University, Huntington, West Virginia 25755-2510, USA)

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- **Biotaxa,** http://biotaxa.org/Euscorpius (ICZN-approved and ZooBank-enabled)
- **Marshall Digital Scholar**, http://mds.marshall.edu/euscorpius/. (This website also archives all *Euscorpius* issues previously published on CD-ROMs.)

Between 2000 and 2013, ICZN ***did not accept online texts*** as "published work" (Article 9.8). At this time, *Euscorpius* was produced in two ***identical*** versions: online (*ISSN 1536-9307*) and CD-ROM (*ISSN 1536-9293*) (laser disk) in archive-quality, read-only format. Both versions had the identical date of publication, as well as identical page and figure numbers. ***Only copies distributed on a CD-ROM*** from ***Euscorpius*** in 2001-2012 represent published work in compliance with the ICZN, i.e. for the purposes of new names and new nomenclatural acts.

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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Euscorpius — Occasional Publications in Scorpiology. 2015, No. 199

Two new *Euscorpius* species from central-western Greece (Scorpiones: Euscorpiidae)

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http://zoobank.org/urn:lsid:zoobank.org:pub:8606D409-8F6E-489A-8985-2665117C966D

Summary

Two new *Euscorpius* species are described, based on specimens collected by P.M. Giachino & D. Vailati in central-western Greece in neighboring Aitoloakarnania (Western Greece) and Fokida (Central Greece) regional units. No *Euscorpius* specimens were previously available from this area. The first new species, *Euscorpius giachinoi* **sp. n.**, is very similar to a recently described *E. birulai* Fet et al., 2014 from Euboea Island, and is also characterized by a low trichobothrial count (*Pv* = 7, *et* = 5), a low pectinal teeth count (*Dp* = 7 in males, 6 in females), and long-limbed features. The second species, *E. vailatii* **sp. n.**, is widely found in the studied area, and it is characterized by a high trichobothrial and pectinal teeth count (*Pv* = 9–11, *et* = 6–8; *Dp* = 9–10 in males, 7–8 in females).

Introduction

The genus *Euscorpius* Thorell, 1876, widely spread in southern Europe and Anatolia, is one of the most studied scorpion taxa. Despite this, the taxonomy of this genus is very complicated and still far from being resolved. This is also true for Greece, especially due to lack of specimens from many areas. Morphological and taxonomic studies are hindered by existence of cryptic species complexes, which are difficult to resolve even with phylogenetic analysis (Parmakelis et al., 2013; Tropea et al., 2014b). However, recently several studies delineated and described various new species of *Euscorpius* from Greece (Tropea & Rossi, 2012; Fet et al., 2013a, 2013b, 2014; Tropea et al., 2013, 2014a). As a part of an ongoing revisionary study of Balkan scorpions, we describe here two new species from Greece, *E. giachinoi* **sp. n.**, and *E. vailatii* **sp. n.**

The number of valid species of the genus *Euscorpius* in Greece is thus increased to 21, namely: *E. avcii* Tropea et al., 2012; *E. birulai* Fet et al., 2014; *E. candiota* Birula, 1903; *E. corcyraeus* Tropea et Rossi, 2012; *E. erymanthius* Tropea et al., 2013; *E. giachinoi* **sp. n.**; *E. hadzii* Di Caporiacco, 1950; *E. italicus* (Herbst, 1800); *E. kinzelbachi* Tropea et al., 2014; *E. koschewnikowi* Birula, 1900; *E. kritscheri* Fet et al., 2013; *E. mylonasi* Fet et al., 2014; *E. naupliensis* (C.L. Koch, 1837); *E. ossae* Di Caporiacco, 1950; *E. scaber* Birula, 1900; *E. sicanus* (C.L. Koch, 1837); *E. solegladi* Fet et al., 2014; *E. stahlavskyi* Tropea et al., 2014; *E. vailatii* **sp. n.**; *E. vignai* Tropea et al., 2014; and *E. yagmuri* Kovařík et al., 2015.

Methods and Material

The trichobothrial notation follows Vachon (1974). Morphological measurements are given in millimeters (mm) following Tropea et al. (2014c). Morphological nomenclature follows Stahnke (1971), Hjelle (1990), and Sissom (1990); the chela carinae and denticle configuration follows Soleglad & Sissom (2001); and sternum terminology follows Soleglad & Fet (2003). The territorial-administrative division of Greece is given according to 2011 Kallikratis reform (Greek Law 3852 /2010).

Abbreviations

V: trichobothrial series on pedipalp chela manus ventral surface (not including Et_1); *Pv*: trichobothria on the ventral aspect of pedipalp patella; *Pe*: trichobothria on the external surface of pedipalp patella; *et*: external terminal; *est*: external subterminal; *em*: external median; *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;

Figures 1–2: *Euscorpius giachinoi* **sp. n.**, male. **1**. Dorsal view. **2**. Ventral view.

Lchel: chela length; *Wchel:* chela width (=*Wchel-A* of Tropea et al., 2014c); *Lcar*: carapace length; *Wcar*: carapace width; *Lfem*: femur length; *Wfem*: femur wide; *Lpat*: patella length; *Wpat*: patella wide; *Lmet*: sum of the length of all metasomal segments; *Wmet:* sum of the width of all metasomal segments; *met.seg*: metasomal segment; *CarA/CarP%*: ratio of the 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; imm.: immature specimen (in any stage of development).

Depositories: GTC, personal collection of Gioele Tropea, Rome, Italy; MSNB: Museo Civico di Scienze Naturali "E. Caffi", Bergamo, Italy; MZUR, Museo di Zoologia dell'Università di Roma "Sapienza", Rome, Italy; NHMC, Natural History Museum of Crete, University of Crete, Heraklion, Crete, Greece; NHMW, Naturhistorisches Museum Wien, Vienna, Austria; PMGC: Pier Mauro Giachino collection, Torino, Italy.

Material Studied: A detailed list of the type material with label data is provided below. All specimens were collected by P.M. Giachino & D. Vailati.

Systematics

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

Subgenus Incertus

Euscorpius giachinoi Tropea et Fet, 2015, **sp. n.**
(Figs. 1–18, 37, 39, 41, 43, 45 Table 1)
http://zoobank.org/urn:lsid:zoobank.org:act:61B2E027-750E-4A54-A0D9-78214DA09CD4

Figures 3–4: *Euscorpius giachinoi* **sp. n.**, female. **3**. Dorsal view. **4**. Ventral view.

Type material (13 specimens: 6 ♂, 7 ♀). All specimens leg. P.M. Giachino & D. Vailati.

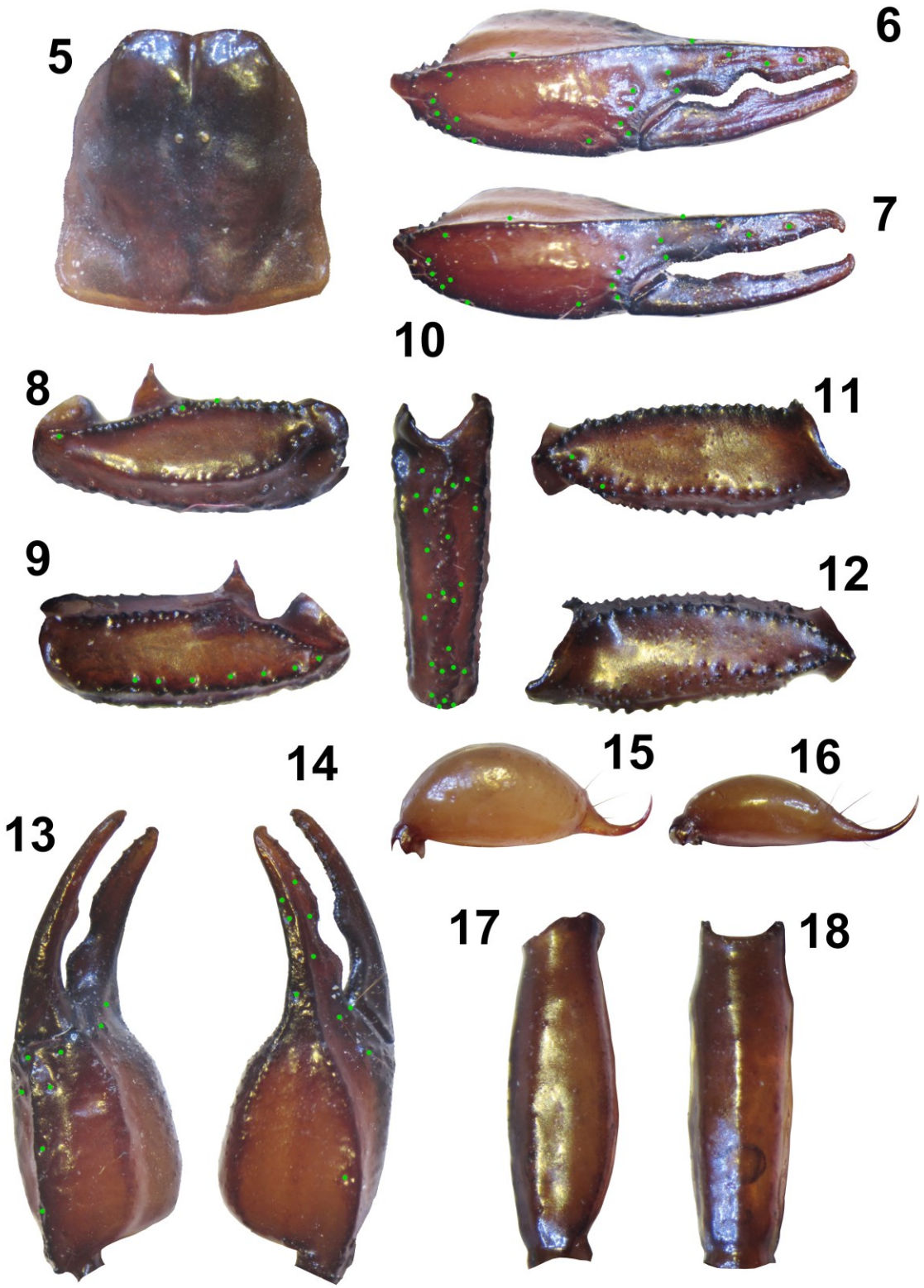
Holotype*:** ♂, GREECE. Central Greece: ***Fokida: Trikorfa Mts., Stilia, 790 m, 38°28'03.1"N 22°06'15.9"E, 27 May 2011–9 June 2012 (GTC).

Paratypes*:** GREECE. Central Greece: ***Fokida: same label as holotype, 1 ♂, 1 ♀ (MZUR); Trikorfa Mts., Milea, 620 m, 38°26'33.1"N 22°08'53.4"E, 27 May 2011–9 June 2012, 1 ♂, 1 ♀ (GTC); Trikorfa Mts., road Potidania–Paleohori, 770 m, 38°29'01"N 22°02'38.4"E, 27 May 2011–9 June 2012, 1 ♀ (PMGC). Western Greece: ***Aitoloakarnania***: Nafpaktos, Ardinis Mts., 950 m, 38°38'35.6"N, 21°50'38.4"E, 4 June 2008–8 June 2010, 1 ♂ (MSNB); same label as previous, 1030 m, 1 ♂ imm. (MSNB); Nafpaktos, Perivolia, 800 m, 38° 29'26.3"N, 21°51'28.4"E, 9 June 2010–28 May 2011, 1 ♂ (MSNB); Nafpaktos, road Perivolia–Ano Hora, 1150 m, 38°31'40.9"N, 21°50'54.8"E, 9 June 2010–28 May 2011, 1 ♀ (MSNB); Nafpaktias Mts., 510 m, cave 3 km before Rigani (approximately 38°28'47.6"N, 21°45' 09.8"E), 31 May 2005–31 May 2006, 1 ♀ (MSNB); Miti Mts., road Agrinio–Karpenissi, before Chouni, 630 m, 38°50'17.0"N, 21°32'19.4"E, 10 June 2010–29 May 2011, 1 ♀ (NHMC); road Katafigi–Anavriti, 750 m, 38° 29'27.6"N 21°54'57.3"E, 28 May 2011–10 June 2012, 1 ♀ (GTC).

Etymology: Named in honor of Dr. Pier Mauro Giachino, an Italian entomologist and biospeleologist, who contributed greatly to the studies of the entomofauna and arachnofauna of Greece.

***Geographic range*:** GREECE. Western Greece (Aitoloakarnania); Central Greece (Fokida) (Fig. 47).

Diagnosis. A long-limbed, small *Euscorpius* species, total length 24–28 mm (mean 25.8 mm). Color of adults light brown to reddish-brown, with a darker reddish/brown carapace, and yellowish legs, telson, and chelicerae, without variegation or marbling. The number of trichobothria on the pedipalp manus ventral surface is 4 ($V_{1\text{-}3}$+Et_1). The number of trichobothria on the pedi-



Figures 5–18: *Euscorpius giachinoi* **sp. n. 5.** Carapace. **6.** External view of the chela of adult male. **7.** External view of the chela of adult female. **8.** Dorsal view of pedipalp patella. **9.** Ventral view of pedipalp patella. **10.** External view of pedipalp patella. **11.** Dorsal view of pedipalp femur. **12.** Ventral view of pedipalp femur. **13.** Ventral view of the chela. **14.** Dorsal view of the chela. **15.** Telson of adult male. **16.** Telson of adult female. **17.** Lateral view of the metasomal segment V. **18.** Ventral view of the metasomal segment V.

		***E. giachinoi* sp. n.**		***E. vailatii* sp. n.**	
		Holotype ♂	**Paratype ♀**	**Holotype ♂**	**Paratype ♀**
Total	**Length**	26.42	24.62	29.63	26.65
Carapace	**Length**	3.72	3.66	4.02	4.08
	Post. width	3.60	3.36	4.08	4.08
Metasoma	**Length**	10.28	9.08	10.67	9.61
Segment I	**Length**	1.32	1.17	1.44	1.26
	Width	1.26	1.14	1.32	1.37
Segment II	**Length**	1.59	1.43	1.68	1.48
	Width	1.14	1.02	1.10	1.15
Segment III	**Length**	1.80	1.56	1.91	1.67
	Width	1.08	0.96	1.08	1.08
Segment IV	**Length**	2.03	1.80	2.17	1.93
	Width	1.02	0.91	1.02	1.08
Segment V	**Length**	3.54	3.12	3.48	3.27
	Width	1.02	0.90	1.03	1.07
Telson	**Length**	3.84	3.36	3.9	3.24
Vescicle	**Length**	2.94	1.87	2.94	2.10
	Width	1.62	1.08	1.26	1.01
	Height	1.50	0.99	1.44	1.02
Aculeus	**Length**	0.90	1.08	0.96	1.14
Femur	**Length**	3.51	3.36	3.72	3.48
	Width	1.20	1.14	1.35	1.32
Patella	**Length**	3.48	3.36	3.72	3.57
	Width	1.20	1.14	1.44	1.44
Chela	**Length**	7.14	6.78	7.74	7.56
	Width–A	2.46	2.34	2.94	2.76
Movable finger	**Length**	3.90	3.48	4.32	3.84
Ratios	***CarA (%)***	37.09	37.70	41.79	40.44
	Lcar/Wcar	1.033	1.089	0.985	0.962
	Lcar/Lfer	1.069	1.089	1.080	1.172
	Lcar/Ltel	0.969	1.089	1.031	1.259
	Lchel/Wchel	2.902	2.897	2.632	2.739
	L/W met.seg I	1.047	1.026	1.091	0.921
	L/W met.seg II	1.395	1.400	1.522	1.293
	L/W met.seg III	1.666	1.625	1.766	1.544
	L/W met.seg IV	1.988	1.987	2.123	1.788
	L/W met.seg V	3.470	3.466	3.392	3.062
	Lmet/Wmet	1.862	1.843	1.923	1.674
	Lmet/Lcar	2.763	2.480	2.655	2.356
	Lfem/Lpat	1.010	1.000	1.000	0.975

Table 1: Measurements (mm) and morphometric ratios of *Euscorpius giachinoi* **sp. n.** and *E. vailatii* **sp. n.**

palp patella ventral surface usually is 7. The number of trichobothria on pedipalp patella external surface usually is: *eb* = 4, eb_a = 4, *esb* = 2, *em* = 4, *est* = 4, *et* = 5. The pectinal teeth number in males usually is 7, in females usually is 6. Long-limbed chelae (mean *Lchel/Wchel* ratio 2.9 in males and 3 in females). Chelal carinae *V1* follows an oblique direction toward the inside of the trichobothrium Et_1. Dorsal patellar spur very developed and pointed. Femur usually as long as the patella (mean *Lfem/Lpat* ratio is 1). Carapace slightly longer than wide (mean ratio *Lcar/Wcar* 1.075). Small median eyes, located very distally for genus *Euscorpius* (mean distance from center of median eyes to anterior margin of the carapace is 37.34% of the carapace length). Space

between the median eyes is greater than, or equal to the width of two eyes. Carinae of the metasoma smooth to weakly granulated. Mean ratio *Lmet/Lcar* is 2.67 in males and 2.50 in females. Metasomal segment I usually longer than wide (1.042). The ventral row of spinules of tarsus usually ending with a decentralized spinule, or with a single central, larger spinule.

***Trichobothrial and pectinal teeth count variation*.**

The variation observed in 13 examined specimens (6 ♂, 7 ♀) is given below.

Pectinal teeth in males (n=6): 7/7 (6); in total, 7 in 100 % (12).

Pectinal teeth in females (n=7): 6/5 (1), 6/6 (6); in total, 6 in 92.86 % (13) and 5 in 7.14 % (1); mean = 5.93, SD = 0.26.

Pedipalp patella trichobothria Pv (n=13): 7/6 (1), 7/7 (11), 8/7 (1); in total, 6 in 3.84 % (1) %, 7 in 92.32 % (24), and 8 in 3.84 % (1); mean = 7, SD = 0.29.

Pedipalp patella trichobothria Pe (n=13): *est* = 4/3 (1), 4/4 (12); eb_a = 4/3 (1), 4/4 (12); in all specimens, *et* = 5/5; *em* = 4/4; *esb* = 2/2; *eb* = 4/4.

***Hemispermatophore*.** Both right and left hemispermatophores of two specimens were studied. They have a well-developed lamina tapered distally; well-developed basal constriction present; truncal flexure present; median projection with primary and secondary acuminate processes; internal projection distally with 7–8 tines in its crown.

Description of the male holotype

***Coloration*:** Light brown-reddish-brown basic color, with a darker reddish/brown carapace, and legs, telson, and chelicerae yellowish; sternites and pectines and genital operculum very light brownish-ivory; all pedipalps carinae darker, dark brown to blackish colored.

***Carapace*:** A barely visible very fine granulation is present; anterior edge rough and more or less straight; two pairs of lateral eyes, and a pair of small median eyes, situated distally of the middle; distance from center of median eyes to anterior margin is 37.09% of carapace length; ocular tubercle poorly developed.

***Mesosoma*:** Tergites nearly smooth; sternites glossy and smooth. Very small spiracles inclined about 45° downward towards outside.

***Metasoma*:** Dorsal carinae on segments I–IV smooth; ventrolateral and ventromedian carinae absent on segment I; ventrolateral carinae smooth and little marked to obsolete on segment II–V; ventromedian carinae absent on segment II–IV, smooth on segment V; intercarinal spaces smooth. Segment I longer than wide (1.047).

***Telson*:** Vesicle smooth, with ventral setae of different size, especially near the vesicle/aculeus juncture. Two slightly furrowed stripes are present in the ventral part over the entire length, starting from vesicle/aculeus juncture.

***Pectines*:** Teeth number 7/7; middle lamellae number 4/4; several microsetae on proximal area of teeth, marginal lamellae, middle lamellae and fulcra.

***Genital operculum*:** The genital operculum is formed by two longitudinally separated subtriangular sclerites; genital papillae protruding; a few microsetae are present.

***Sternum*:** Pentagonal shape, type 2; more or less as long as wide, with a deep posterior emargination.

***Pedipalps*:** Coxa and trochanter with tuberculated carinae. Femur: dorsal internal and ventral internal carinae tuberculated; dorsal exernal carinae formed by spaced tubercles; irregular ventral external carinae formed by tubercles of increasing size from distal to proximal area; external median carinae formed by serrulated tubercle; anterior median adjacent to ventral internal carinae, formed by about large, conical and spaced tubercles; dorsal and ventral intercarinal spaces with small and scattered. Patella: all patellar carinae granulated, well developed and marked; intercarinal surfaces are smooth and below the level of carinae. Dorsal patellar spur very developed and pointed. Chelal carina D_1 is distinct, strong, dark and smooth; D_4 is rounded and rough; V_1 is distinct, strong, dark and rough with a few tubercles proximally, following an oblique direction toward the inside of the trichobothrium Et_1; V_3 rounded, dark, smooth to rough; external carina rough; dorsal intercarinal tegument from smooth to granulated, with the granules positioned mostly in central position, in correspondence with a vestigial D_3 carina; the internal intercarinal surfaces granulated, the other intercarinal surfaces from smooth to rough; the line of the lock of the fixed finger more or less follows the line of the movable finger, like a negative about each other, having the lobe on the movable finger centered or slightly distal compared to the center of the notch of the fixed finger. Finger dentition: In the most distal part is present a *DD* on the tip; *MD* is formed by very small denticles closely spaced forming a more or less straight line, discontinued any 5–7 denticles at level of the *OD*, in proximal position the *MD* denticles may overlap forming two lines; fixed finger has 6 *OD*, 7 *ID*, and 4 *IAD*; movable finger has 7 *OD*, 6 *ID*, and 6 *IAD*.

***Trichobothria*:** Chela: trichobothria on the pedipalp manus ventral surface 4/4 ($V_{1\text{-}3}$+Et_1); trichobothrium V_4 in the middle of the carina V_1. Patella ventral (*Pv*): 7/7. Patella external (*Pe*): *et* = 5/5, *est* = 4/4, *em* = 4/4, *esb* = 2/2, eb_a = 4/4, *eb* = 4/4. Femur: trichobothrium *d* is slightly proximal to *i*, while trichobothrium *e* is distal to both *d* and *i,* and situated on dorsal external carina.

***Legs*:** With two pedal spurs; no tarsal spur; ventral row of spinules on all tarsi poorly developed, some missing or broken; tarsus III has a total of 8/6 stout spinules,

ending with a decentralized larger spinules; 3/2 flanking tarsal setae plus a very small, vestigial seta on all tarsi. Basitarsus with a few prolateral stout spinules on legs I–III; granulation well developed on ventral surface of leg femora I–III, less marked, and present only on 3/5 of length, on femur IV, and well present on dorsal surface of leg femora I–IV; it is mostly marked and dark ventrally.

***Chelicerae*:** Movable finger: the dorsal distal denticle is much 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 small subdistal, one large median, and a small basal. Fixed finger has four denticles: one distal, one subdistal, one median, and one basal, the last two in a fork arrangement; the internal surface has brush-like setae.

Subgenus ***Euscorpius*** Thorell, 1876

Euscorpius vailatii Tropea et Fet, 2015, **sp. n.**
(Figs. 19–36, 38, 40, 42, 44, 46, Table 1)
http://zoobank.org/urn:lsid:zoobank.org:act:0A3EA4FC-24E2-46C7-9660-F347CC73FC3C

Type material (20 specimens: 13 ♂, 7 ♀). All specimens leg. P.M. Giachino & D. Vailati.

Holotype*:** ♂, GREECE. Western Greece: ***Aitoloakarnania: road Katafigi–Anavriti, 750 m, 38°29'27.6" N, 21°54'57.3"E, 28 May 2011–10 June 2012 (GTC).

Paratypes*:** GREECE. Western Greece: ***Aitoloakarnania: Nafpaktos, Ardinis Mts., 1030 m, 38°38' 24.5"N, 21°50'37.0"E, 4 June 2008–8 June 2010, 1 ♂ (MSNB); same data, 1 ♂ (MZUR); Nafpaktos, road Perivolia–Ano Hora, 1235 m, 38°31'59.4"N 21°50' 56.0"E, 9 June 2010–28 May 2011, 1 ♀ (MZUR); Serekas Mts., near Megalo Spilio, 38°46'06.1"N 20° 57'22.3"E, 950 m, 12 June 2012–1 June 2014, 1 ♂, 1 ♀ (PMGC); same data, 2 ♂, 1 ♀ (NHMW); same data, 2 ♂, 1 ♀ (NHMC); same data, 1 ♂, 1 ♀ (GTC); Serekas Mts., near Megalo Spilio, 38°46'06.1"N, 20°57'22.3"E, 1000 m, 3 June 2007–2 June 2008, 1 ♀ (MSNB); same locality, 12 June 2012–1 June 2014, 1 ♂ (PMGC); Kilisura Gorge, 200 m, 38°30'00.3"N 21°22'23.1"E, 12 June 2012–2 June 2014, 1 ♀ (PMGC); road Kentriki–Anavriti, 975 m, 38°33'05.6"N, 21°54'28.4"E, 9 June 2007–3 June 2008, 1 ♂ (MSNB). Central Greece: ***Fokida***: Trikorfa Mts., road Dafnohori–Kallithea, 850 m, 38°24'10.2"N 22°07'45.2"E, 27 May 2011–9 June 2012, 1 ♂ (MZUR); Trikorfa Mts., Milea, 620 m, 38°26'33.1"N 22°08'53.4"E, 27 May 2011–9 June 2012, 1 ♂ (GTC).

Other material examined (11 ♂, 8 ♀, not included in type series). All specimens leg. P.M. Giachino & D. Vailati.

GREECE. ***Aitoloakarnania***: Nafpaktos, Ardinis Mts., 950m, 38°38'35.6" N, 21°50'38.4" E, 4 June 2008–8 June 2010, 1 ♂ imm. (MSNB); Nafpaktos, Perivolia, 800 m, 38°29'26.3"N, 21°51'28.4"E, 9 June 2010–28 May 2011, 3 ♂ imm. (MSNB); Nafpaktos, road Perivolia–Ano Hora, 1235 m, 38°31'59.4"N 21°50' 56.0"E, 9 June 2010–28 May 2011, 1 ♂ imm. (MSNB); Nafpaktos, Dounaika, 350 m, (approximately 38°28' 07.13"N, 21°40'09.2"E), 3 June 2014, 1 ♀ (PMGC); Serekas Mts., near Megalo Spilio, 38°46'06.1"N 20°57'22.3"E, 950 m, 12 June 2012–1 June 2014, 3 ♀ imm. (PMGC); Serekas Mts., near Megalo Spilio, 38° 46'06.1"N 20°57'22.3"E, 1000 m, 3 June 2007–2 June 2008, 1 ♂ imm., 2 ♀ imm. (MSNB); road Katafigi–Anavriti, 750 m, 38°29'27.6"N 21°54'57.3"E, 28 May 2011–10 June 2012, 1 ♂ imm., 1 ♀ imm. (PMGC); Miti Mts., road Agrinio–Karpenissi, before Chouni, 630m, 38°50'17.0"N, 21°32'19.4"E, 10 June 2010–29 May 2011, 1 ♂ imm. (MSNB); Oxia Mts., road Mandrini–Livadaki, 780 m, 09 June 2006–10 June 2007, 1 ♂ imm., 1 ♀ imm. (MSNB). ***Fokida***: Trikorfa Mts., road Dafnohori–Makrini, 990 m, 38°25'18.9"N 22°06'26.5"E, 27 May 2011–9 June 2012, 2 ♂ imm. (MSNB).

***Etymology*:** Named in honor of Dr. Dante Vailati, an Italian entomologist and biospeleologist, who contributed greatly to the studies of the entomofauna and arachnofauna of Greece.

***Geographic range*:** GREECE. Western Greece (Aitoloakarnania); Central Greece (Fokida) (Fig. 47).

Diagnosis. A medium-small *Euscorpius* species, total length 25–34.5 mm (mean 29.3 mm). Color of adults light brown to brown-reddish; darker reticulation or marbling on chelicerae, carapace, mesosoma, metasoma and legs may be present. The number of trichobothria on the pedipalp manus ventral surface is 4 ($V_{1\text{-}3}$+Et_1). The number of trichobothria on the pedipalp patella ventral surface is 9–11. The number of trichobothria on pedipalp patella external surface is: *eb* = 4, eb_a = 4, *esb* = 2, *em* = 4, *est* = 4, *et* = 6–8 (7). The pectinal teeth number in males usually is 9–10; in females usually is 7–8, more rarely 9. Mean *Lchel/Wchel* ratio is 2.46 in males and 2.60 in females. Notch on the fixed finger very pronounced. Dorsal patellar spur well developed. Femur more or less as long as the patella; it may be slightly longer (usually in males *Lfem/Lpat* 1.013) or shorter (usually in females *Lfem/Lpat* 0.985). Carapace more or less as long as wide; it may be either slightly longer or wider, but tends to be wider (mean ratio *Lcar/Wcar* 0.986); mean distance from center of median eyes to anterior margin of the carapace is 41% of the carapace length. Mean ratio of *Lmet/Lcar* is 2.57 in males and 2.38 in females. Metasomal segment I in males usually

Figures 19–20: *Euscorpius vailatii* **sp. n.**, male. **19**. Dorsal view. **20**. Ventral view.

longer than wide (1.051). Ventral row of spinules on tarsus usually ending with two larger, paired spinules.

***Trichobothrial and pectinal teeth count variation*.** The variation observed in 39 examined specimens (24 ♂, 15 ♀) is listed below.

Pectinal teeth in males (n=24): 8/9 (2), 9/9 (10), 9/10 (1), 10/9 (2), 10/10 (9); in total, 8 in 4.16 % (2), 9 in 52.09 % (25), and 10 in 43.75 % (21); mean = 9.40, SD = 0.57.

Pectinal teeth in females (n=15): 7/7 (3), 7/8 (1), 8/7 (2), 8/8 (7), 8/9 (2); in total, 7 in 30 % (9), 8 in 63.34 % (19) and 9 in 6.66 % (2); mean = 7.77, SD = 0.56.

Pedipalp patella trichobothria Pv (n=39): 8/9 (1), 9/8 (1), 9/9 (9), 9/10 (3), 10/9 (3), 10/10 (18), 10/11 (2), 11/11 (2); in total, 8 in 2.56 % (2), 9 in 33.33 % (26), 10 in 56.42 % (44), and 11 in 7.69 % (6); mean = 9.69, SD = 0.64.

Pedipalp patella trichobothria Pe (n=39): *et* = 6/6 (4), 6/7 (1), 7/6 (1), 7/7 (30), 8/7 (2), 8/8 (1); in total, 6 in 12.82 % (10), 7 in 82.05 % (64), and 8 in 5.13 % (4); mean = 6.92, SD = 0.41; in all specimens, *est* = 4/4; *em* = 4/4; *esb* = 2/2; eb_a = 4/4; and *eb* = 4/4.

***Hemispermatophore*.** Both right and left hemispermatophores of four specimens were studied. They have a well-developed lamina tapered distally; well-developed

Figures 21–22: *Euscorpius vailatii* **sp. n.**, female. **21**. Dorsal view. **22**. Ventral view.

basal constriction present; truncal flexure present; median projection with primary and secondary acuminate processes; internal projection distally with 7–9 (8) tines in its crown.

Description of the male holotype

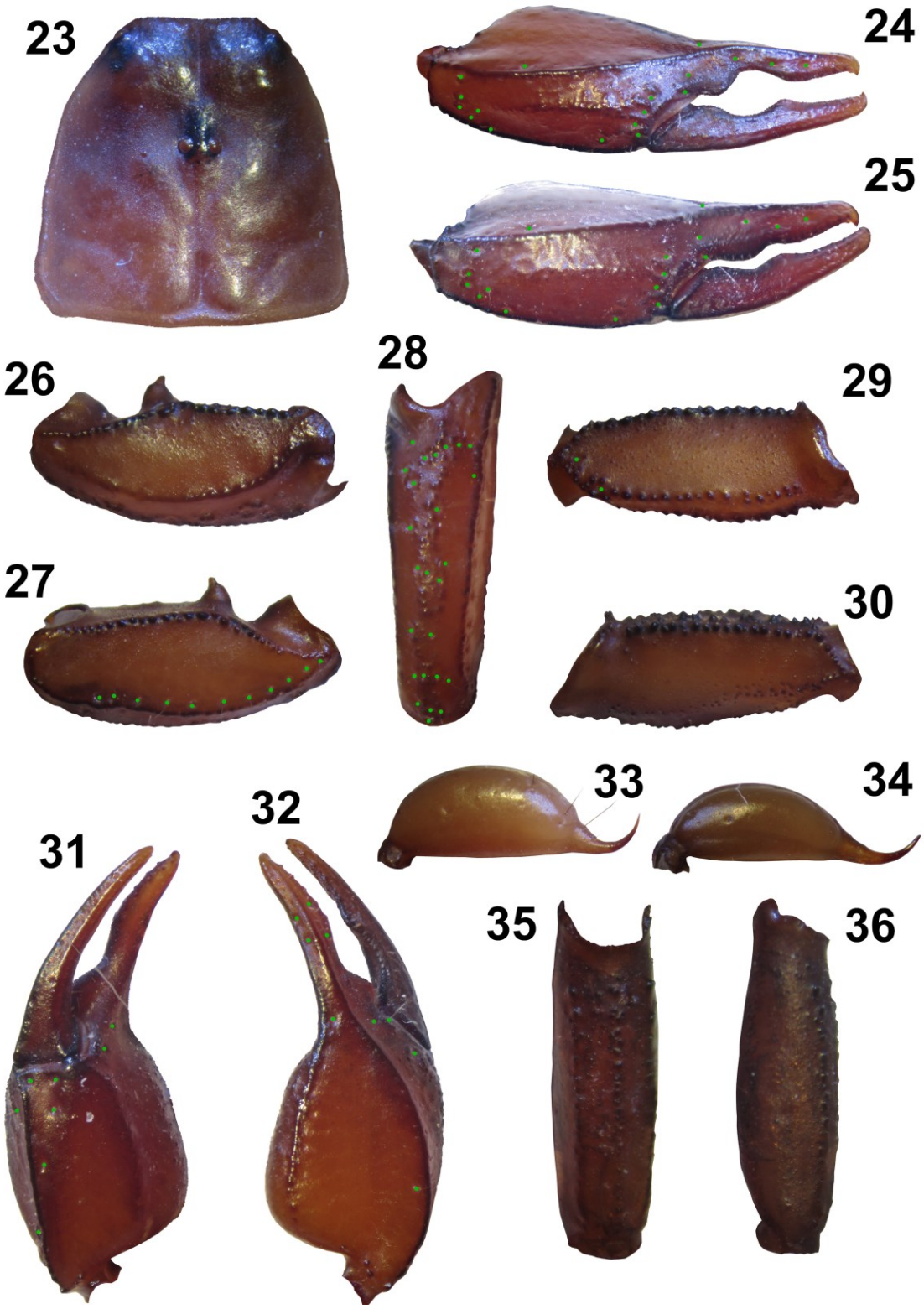
***Coloration*:** Whole color light brownish/reddish with mesosoma lighter and marbling on metasoma; sternites and pectines and genital operculum very light brownish/ivory; chelicerae yellowish with marbling; telson yellowish with dark reddish aculeus tip; all pedipalp carinae darker, dark brown to blackish colored.

***Carapace*:** A very fine granulation is present; anterior edge granulate and straight; furrows not well marked; two pairs of lateral eyes; a pair of median eyes situated distally of the middle (distance from center of median eyes to anterior margin is 42.37 % of carapace length).

***Mesosoma*:** Tergites very finely granulated; sternites glossy and punctated. Small spiracles inclined about 45° downward towards outside.

***Metasoma*:** Dorsal carinae on segments I–IV with spaced granules, less marked on segment I; a few very small spaced granules on barely visible dorsolateral carinae are present on one-third to one-half of the length; ventrolateral absent on segment I, obsolete on segment II, with a few minuscule granules on segment III, and little granulated on segment V; ventromedian carinae absent or obsolete on segment I–IV; ventromedian and ventrolateral carinae well formed by serrulated granules of increscent size from proximal to distal on segment V; dorsal and lateral intercarinal spaces with a fine granulation, smooth or almost smooth on the ventral surface.

***Telson*:** Vesicle almost smooth, with ventral setae of different size, especially near the vesicle/aculeus juncture.



Figures 23–36: *Euscorpius vailatii* **sp. n. 23.** Carapace. **24.** External view of the chela of adult male. **25.** External view of the chela of adult female. **26.** Dorsal view of pedipalp patella. **27.** Ventral view of pedipalp patella. **28.** External view of pedipalp patella. **29.** Dorsal view of pedipalp femur. **30.** Ventral view of pedipalp femur. **31.** Ventral view of the chela. **32.** Dorsal view of the chela. **33.** Telson of adult male. **34.** Telson of adult female. **35.** Ventral view of the metasomal segment V. **36.** Lateral view of the metasomal segment V.

***Pectines*:** Teeth number 9/9; middle lamellae number 6/6; several microsetae on proximal area of teeth, marginal lamellae, middle lamellae and fulcra.

***Genital operculum*:** The genital operculum is formed by two longitudinally separated subtriangular sclerites; genital papillae protruding; a few microsetae are present.

***Sternum*:** Pentagonal shape, type 2; slightly wider than long, with a deep posterior emargination.

***Pedipalps*:** Coxa and trochanter with tuberculated carinae. Femur: dorsal and ventral internal carinae tuberculated; dorsal external carinae formed by slightly spaced and serrulated tubercles; external median carinae serrulated; irregular ventral external carinae formed by small tubercles of increscent size from distal to proximal; anterior median formed by 11/12 spaced conical tubercles, varying in size; dorsal and ventral intercarinal spaces with granules of variable size. Patella: dorsal and ventral internal carinae tuberculated to granulated; dorsal and ventral external carinae formed by small and spaced granules on proximal 2/5 with increasing size from proximal to distal up to become crenulated tubercles; uniformly granulated; ventral intercarinal surface from smooth to granulated near to ventral. Chelal carina D_1 is distinct, strong, dark, slightly undulated and smooth with a few tubercles proximally; D_4 is dark, rounded, rough with a few tubercles proximally; V_1 is distinct, strong, dark and slightly crenulated with a few tubercles proximally, following direction toward the external of the trichobothrium Et_1; V_3 rounded, dark, smooth to rough; external carina granulated; dorsal intercarinal tegument with granules positioned so as to form a reticulation, the other intercarinal surfaces from smooth to rough with granules of variable size; fixed finger has a large notch of the fixed finger, on movable finger a small lobe is present very distal from the center of the notch on fixed finger, forming a weak notch on the movable finger. Finger dentition: a *DD* is present on the distal tip; *MD* row is formed by very small denticles closely spaced forming a more or less straight line, discontinued at each 7–8 denticles at the level of the *OD*; the last *MD* series is oblique; in proximal position the *MD* denticles may overlap forming two series. Fixed finger has 6 *OD*, 7 *ID*, and 4 *IAD*; Movable finger has 7 *OD*, 8 *ID*, and 7 *IAD*.

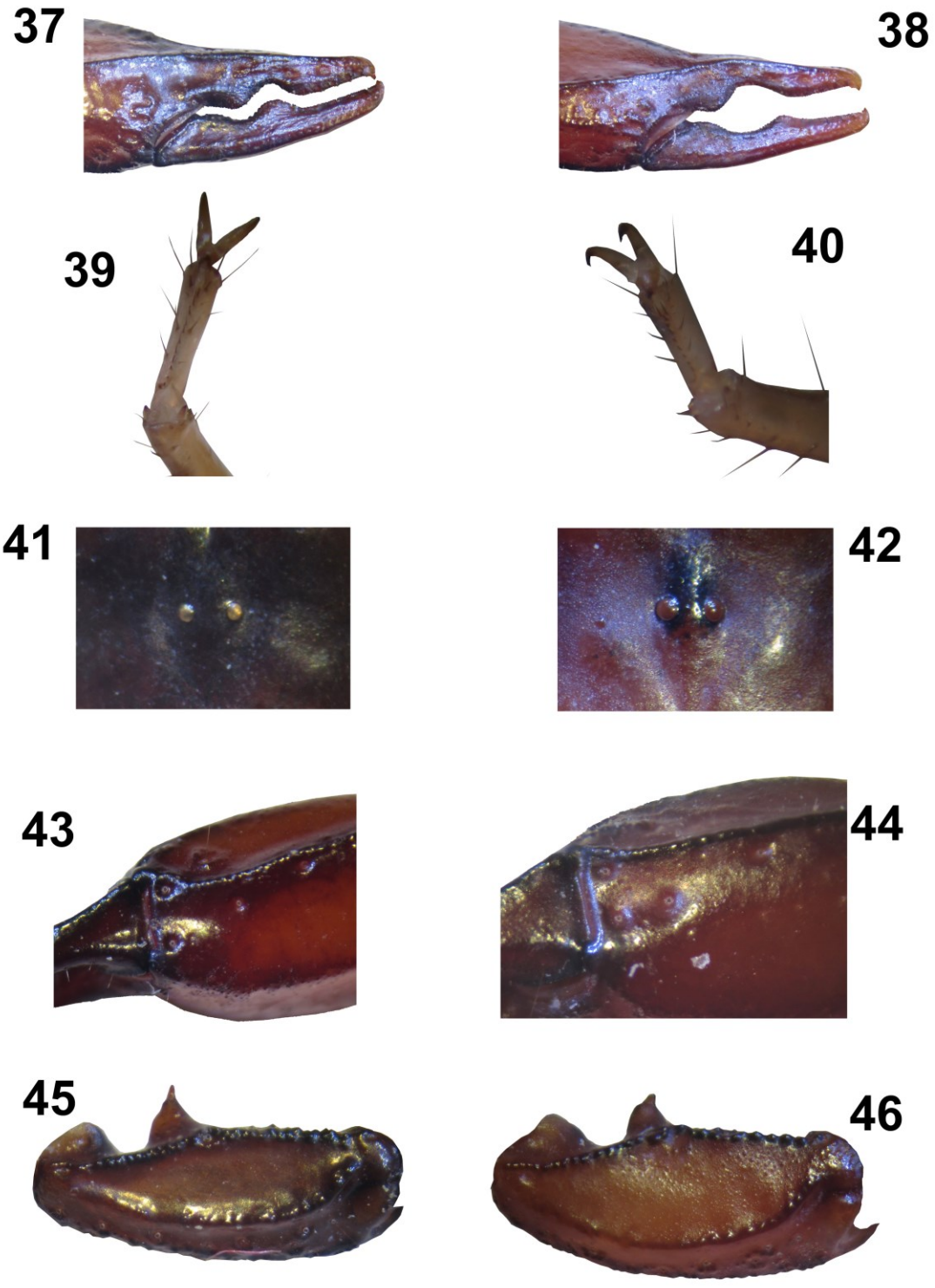
***Trichobothria*:** Chela: trichobothria on the pedipalp manus ventral surface 4/4 (V_{1-3}+Et_1); trichobothrium V_4 is located in the external surface of chela, removed from the carina V_1. Patella ventral (*Pv*): 10/10. Patella external (*Pe*): *et* = 7/7, *est* = 4/4, *em* = 4/4, *esb* = 2/2, eb_a = 4/4, *eb* = 4/4. Femur: trichobothrium *d* is proximal to *i*, while trichobothrium *e* is distal to both *d* and *i,* and situated on dorsal external carina.

***Legs*:** With two pedal spurs; no tarsal spur; ventral row of tarsus III with a total of 12/11 spinules, of increasing size from proximal to distal, ending with two larger, paired spinules. Basitarsus with prolateral stout spinules on legs I–II; granulation well present on ventral and dorsal surface of leg femora; it is mostly marked and dark ventrally.

***Chelicerae*:** Movable finger: the dorsal distal denticle is much 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 small subdistal, one large median, and a small basal. Fixed finger has four denticles: one distal, one subdistal, one median, and one basal, the last two in a fork arrangement; the internal surface has brush-like setae.

Comparison between *E. giachinoi* sp. n. and *E. vailatii* sp. n.

E. giachinoi **sp. n.** and *E. vailatii* **sp. n.** are easily distinguished from each other by the following characters: (1) *E. giachinoi* **sp. n.** has a *Pv* = 7 while *E. vailatii* **sp. n.** has *Pv* = 9 to 10; (2) *E. giachinoi* **sp. n.** has *et* = 5 while *E. vailatii* **sp. n.** has *et* = 7; (3) *E. giachinoi* **sp. n.** has *Dp* = 7 in males and 6 in females, while *E. vailatii* **sp. n.** has *Dp* = 9–10 in males and 7–8 in females; (4) mean *CarA*% is 37.34% in *E. giachinoi* **sp. n.** versus 41% in *E. vailatii* **sp. n.**; (5) *E. giachinoi* **sp. n.** has more elongated pedipalps than *E. vailatii* **sp. n.**; the mean *Lfem/Wfem* ratio in *E. giachinoi* **sp. n.** (2.991) is close to its *Lpat/Wpat* (2.931), while in *E. vailatii* **sp. n.** both these ratios are lower, *Lfem/Wfem* (2.706) being higher than *Lpat/Wpat* (2.528); also the chelae are more elongated in *E. giachinoi* **sp. n.**, with *Lchel/Wchel* 2.93 in males and 3.12 in females, while *E. vailatii* **sp. n.** has 2.46 in males and 2.60 in females; (6) mainly in males, *E. giachinoi* **sp. n.** has the telson wider than its height (mean ratio *Htel/Wtel* 0.935) as compared to *E. vailatii* **sp. n.** (1.143); in females this mean ratio is 0.918 in *E. giachinoi* **sp. n.** and 0.983 in *E. vailatii* **sp. n.**; (7) *E. giachinoi* **sp. n.** has the spinules on tarsus in a single row or the last one spinule is decentralized, while *E. vailatii* **sp. n.** has the last two spinules paired; (8) in the area of chela "lock", in *E. giachinoi* **sp. n.**, the profile of fixed finger more or less a mirrors that of the movable finger, with the lobe on the movable finger centered or slightly distal in relation to the center of the notch on the fixed finger; at the same time, *E. vailatii* **sp. n.** has a larger notch of the fixed finger, and a smaller lobe on the movable finger shifted to a very distal position, an asymmetry that forms an extra notch on the movable finger; (9) *E. giachinoi* **sp. n.** is a smaller scorpion, with size range of 24–28 mm (mean 25.8) versus 25–34.5 mm (mean 29.3 mm) in *E. vailatii* **sp. n.**; (10) in *E. giachinoi* **sp. n.** the carina V_1 usually is directed obliquely inward from of the trichobothrium Et_1, while in *E. vailatii* **sp. n.** this carina is directed outward from the trichobothrium Et_1; (11) *E. giachinoi* **sp. n.** has the trichobothrium V_4 in the middle of the carina V_1, while *E. vailatii* **sp. n.** has it removed from the



Figures 37–46: Comparison of some features between *E. giachinoi* **sp. n.** and *E. vailatii* **sp. n. 37.** Finger lobe and notch, male, *E. giachinoi* **sp. n. 38.** Finger lobe and notch, male, *E. vailatii* **sp. n. 39.** Ventral view of leg tarsus, *E. giachinoi* **sp. n. 40.** Ventral view of leg tarsus, *E. vailatii* **sp. n.** 41. Smaller median eyes of *E. giachinoi* **sp. n. 42.** Larger median eyes of *E. vailatii* **sp. n. 43.** *E. giachinoi* **sp. n.**: pedipalp chela: carina V_1 runs obliquely inward of the trichobothrium Et_1, and then turns outward, creating a bifurcation, inside which the trichobothrium Et_1 is located. **44.** *E. vailatii* **sp. n.**: carina V_1 runs externally to the trichobothrium Et_1. **45.** *E. giachinoi* **sp. n.** pedipalp patella is more slender, with a more developed and pointed DPS; the dorsal intercarinal surface is below the level of carinae; compared to **46.** *E. vailatii* **sp. n.** pedipalp patella dorsal view.

carina V_1 or very near to it, but never in the middle, so this trichobothrium is always located on the external aspect of chela manus; (12) in *E. giachinoi* **sp. n.**, the metasomal segment V is smooth or almost smooth, while *E. vailatii* **sp. n.** has it well granulated; (13) in *E. giachinoi* **sp. n.** the space between the median eyes is greater than, or equal to the width of two eyes, while in *E. vailatii* **sp. n.**, it is slightly larger than the width of a single eye. In addition, *E. giachinoi* **sp. n.** has no marbling.

Comparison with other species

Other *Euscorpius* species that have been found close to the range of *E. giachinoi* **sp. n.** and *E. vailatii* **sp. n.**, are: *E. sicanus* complex, *E. erymanthius*, and *E. yagmuri*. All these taxa are easily distinguished from *E. giachinoi* **sp. n.** and *E. vailatii* **sp. n.** as follows:

Both *E. giachinoi* **sp. n.** and *E. vailatii* **sp. n.** are easily distinguishable from *E. sicanus* complex because of pedipalp patella trichobothrial series *eb* = 4 in the new species, and 5 in *E. sicanus.*

Two other geographically closest species are *E. erymanthius* from northern Peloponnese, and a recently described *E. yagmuri* from southwestern Epirus. *E. giachinoi* **sp. n.** can be differentiated from these two species primarily by (1) the lower number of *Pv* = 7 versus 8–9 in both *E. erymanthius* and *E. yagmuri*; (2) the lower number of pedipalp patella external series *et* = 5 versus 6–7 in *E. erymanthius* and and 5–6 in *E. yagmuri*; (3) the lower number of *Dp*, 7 in males and 6 in females, versus usually 8 in males and 7 in females in both *E. erymanthius* and *E. yagmuri*; (4) the lower mean *CarA*%, 37.34% in *E. giachinoi* **sp. n.**, versus 41.5% in *E. erymanthius* and 40.6% in the holotype of *E. yagmuri*; (5) *E. giachinoi* **sp. n.** having the metasomal segment I longer than wide; (6) *E. giachinoi* **sp. n.** is larger (range 24–28 mm, and mean 25.8 mm), than *E. erymanthius* (range 20–24.5 mm, and mean 22) and *E. yagmuri* (16–22 mm).

Therefore, *E. giachinoi* **sp. n.** is morphologically well separated from all known geographically close species of *Euscorpius*. Instead, it is very similar to the recently described species *E. birulai* from Euboea Island off the coast of eastern Greece. Several characters in common between these two species are their low trichobothrial and pectinal teeth count, the coloration, the small median eyes, the general slender aspect, the longer than wide metasomal segment I, highly developed patellar spur, and a longer than wide carapace. However, it is possible to differentiate these two species since: (1) *E. giachinoi* **sp. n.** has *Pv* = 7 versus 8 in *E. birulai*; (2) *E. giachinoi* **sp. n.** has *et* = 5 versus usually 6 in *E. birulai*; (3) *E. giachinoi* **sp. n.** has mean *CarA*% of 37.34% while *E. birulai* has 41.73%; (4) male telson in *E. giachinoi* **sp. n.** is wider as related to its height than in *E. birulai*, with mean ratio *Htel/Wtel* of 0.935 in *E. giachinoi* **sp. n.** and 1.042 in *E. birulai*; (5) *E. giachinoi* **sp. n.** is smaller (24–28 mm) than *E. birulai* (32–40 mm); (6) *E. giachinoi* **sp. n.** has the mean *Lmet/Wmet* ratio 1.822 versus 1.928 in *E. birulai*.

E. vailatii **sp. n.** can be differentiated from *E. erymanthius* and *E. yagmuri* by (1) its larger size (range 24.6–34.5 mm; mean 29.3) compared to *E. erymanthius* (range 20–24.5 mm; mean 22) and *E. yagmuri* (16–22 mm); (2) the longer than wide metasomal segment I in males of *E. vailatii* **sp. n.** versus wider than long in *E. erymanthius* and *E. yagmuri*; (3) a higher *Pv* count, 9–10 (mean 9.69) in *E. vailatii* **sp. n.** versus 8–9 (mean 8.77) in *E. erymanthius* and 8–9 (mean 8.35) in *E. yagmuri*; (4) a higher number of pedipalp patella external series *et*, which usually is 7 (mean 6.92) in *E. vailatii* **sp. n.** versus 6–7 (mean 6.31) in *E. erymanthius* and 5–6 (mean 5.89) in *E. yagmuri*; (5) the higher *Dp* (mainly in males), 9–10 in *E. vailatii* **sp. n.** versus 8 in both *E. erymanthius* and *E. yagmuri*; *Dp* in females is 7–8 (mean 7.77) in *E. vailatii* **sp. n.** versus 7 (mean 7.07) in *E. erymanthius*, and 6–7 (mean 6.78) in *E. yagmuri*; (6) the lighter color of *E. vailatii* **sp. n.** with marbling less marked than in *E. erymanthius* and *E. yagmuri*.

Comments

1. The elongated features and smaller median eyes of *E. giachinoi* **sp. n.** would suggest a beginning or partial adaptation to cave life. As mentioned above, *E. giachinoi* **sp. n.** appears to be very closely related to species *E. birulai*, which is known only from Agia Triada Cave of Euboea Island (Fet et al., 2014). *E. giachinoi* **sp. n.** has also been found in a cave near Rigani. However, the fact that *E. birulai* is known only from a cave could be just due to the lack of data. In fact, there are no other reports of *Euscorpius* collected in the area near the Agia Triada Cave, and there are still large undercollected areas in Greece such as Aitoloakarnania and Fokida, where our two new species were discovered. Several *Euscorpius* species have been found in caves, including *E. aquilejensis* (C.L. Koch, 1837) and *E. feti* Tropea, 2013 (Tropea, 2013a; Tropea, unpublished data). These species, especially the latter one, also clearly have more elongated features, more long-limbed than most of the other species of *Euscorpius*. Besides, many *Euscorpius* species are often found in garages, basements, or other human constructions, which could be considered a sort of artificial caves. Thus it is quite possible that some *Euscorpius* species are more or less troglophilic, and, where an opportunity presents itself, spend part or all of their lives inside a cave or a similar space.

2. We have no genetic data of *E. giachinoi* **sp. n.** and *E. vailatii* **sp. n.**, although we can hypothesize from the morphology features that *E. giachinoi* **sp. n.** may be

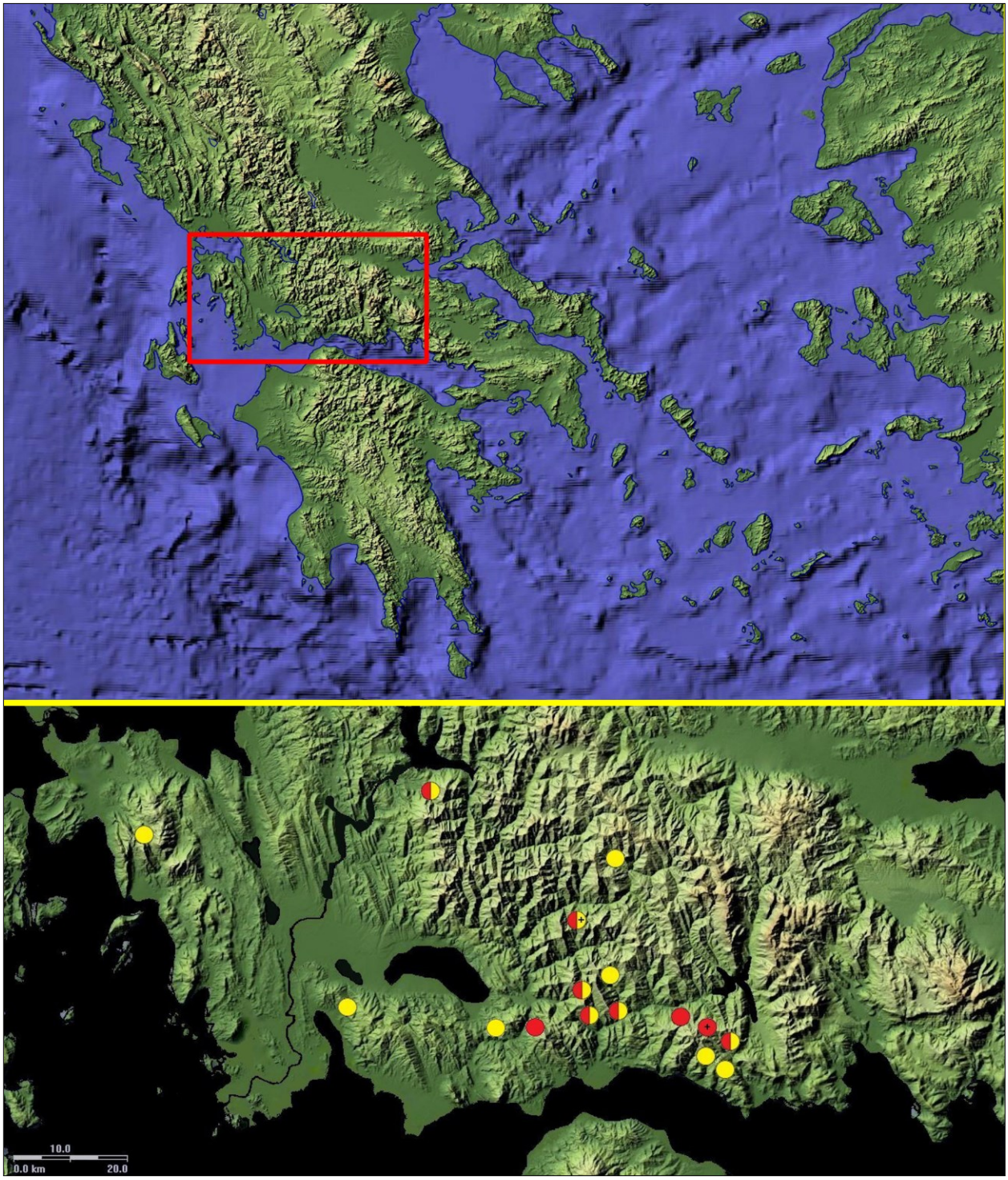


Figure 47: Distribution of *Euscorpius giachinoi* **sp. n.** (red circles) and *E. vailatii* **sp. n.** (yellow circles). Areas of sympatry are marked with a half-red and half-yellow circle. Type localities are marked with (+).

one of the "basal" species, and likely does not belong to the subgenus *Euscorpius* s.str. (Tropea, 2013a; 2013b); thus we do not assign this species to any subgenus. At the same time, considering its range and morphology, *E. vailatii* **sp. n.** appears to be closer to species that are considered part of the subgenus *Euscorpius* s.str., in

particular the species of "*E. candiota* clade" of Parmakelis et al. (2013); thus, we tentatively assign *E. vailatii* **sp. n.** to the subgenus *Euscorpius* s.str.

Conclusions

In the last 15 years, due to detailed studies, both morphological and molecular, the diversity of the genus *Euscorpius* increased more than tenfold: from four "main" species—*E. italicus* (Herbst, 1800), *E. flavicaudis* (DeGeer, 1778), *E. carpathicus* (Linnaeus, 1767), and *E. germanus* (C.L. Koch, 1837)—to as many as 42 species (including the two new species described here), 20 of which have been described only since 2012. In addition, descriptions of several further new species are now in press or in preparation. This large increase in species diversity, and in studies that led to establishing these taxa, reflect a great degree of speciation and endemism in *Euscorpius*. Species of *Euscorpius* are often restricted to very limited areas such as a mountain range or an island, or a small group of mountains or islands. The recent studies also have brought to light the drastic shortage of specimens required for true understanding of true *Euscorpius* diversity. For example, *E. giachinoi* **sp. n.** and *E. vailatii* **sp. n.** are mainly found in Aitoloakarnania, as well as in the western part of Fokida region. These regional units cover a quite large area in central-western Greece, but until now no specimens of *Euscorpius* were reported from this area. Much more detailed field studies are required to clarify the true taxonomic diversity, biogeography, and the ecology of the genus *Euscorpius* in Greece. More specimens of the two new species are needed to clarify their taxonomic position by for molecular analyzes.

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References

FET, V., M.E. SOLEGLAD, A. PARMAKELIS, P. KOTSAKIOZI & I. STATHI. 2013a. Three more species of *Euscorpius* confirmed for Greece (Scorpiones: Euscorpiidae). *Euscorpius*, 165: 1–27.

FET, V., M.E. SOLEGLAD, A. PARMAKELIS, P. KOTSAKIOZI & I. STATHI. 2013b. A new species of *Euscorpius* from Tinos Island, Greece (Scorpiones: Euscorpiidae). *Revista Ibérica de Aracnología,* 23: 3–10.

FET, V., M.E. SOLEGLAD, A. PARMAKELIS, P. KOTSAKIOZI & I. STATHI. 2014. Two new species of *Euscorpius* (Scorpiones: Euscorpiidae) from Euboea Island, Greece. *Arthropoda Selecta*, 23(2): 111–126.

HJELLE, J.T. 1990. Anatomy and morphology. Pp. 9–63 *in*: Polis, G.A. (ed.), *Biology of Scorpions*. Stanford, CA: Stanford University Press.

PARMAKELIS, A., P. KOTSAKIOZI, I. STATHI, S. POULIKARAKOU & V. FET. 2013. Hidden diversity of *Euscorpius* (Scorpiones: Euscorpiidae) in Greece revealed by multilocus species-delimitation approaches. *Biological Journal of the Linnean Society*, 110: 728–748.

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

SOLEGLAD, M.E. & V. FET. 2003. The scorpion sternum: structure and phylogeny (Scorpiones: Orthosterni). *Euscorpius*, 5: 1–33.

SOLEGLAD, M.E. & W.D. SISSOM. 2001. Phylogeny of the family Euscorpiidae Laurie, 1896: a major revision. Pp. 25–112 *in*: Fet, V. & P. A. Selden (eds.), *Scorpions 2001. In Memoriam Gary A. Polis.* Burnham Beeches, Bucks, UK: British Arachnological Society.

STAHNKE, H.L. 1971. Scorpion nomenclature and mensuration. *Entomological News*, 81(1970): 297–316.

TROPEA, G. 2013a. Reconsideration of the taxonomy of *Euscorpius tergestinus* (Scorpiones: Euscorpiidae). *Euscorpius*, 162: 1−23.

TROPEA, G. 2013b. A new species of *Euscorpius* Thorell, 1876 from the western Balkans (Scorpiones: Euscorpiidae). *Euscorpius*, 174: 1−10.

TROPEA, G., V. FET, A. PARMAKELIS, P. KOTSAKIOZI & I. STATHI. 2013. A new species of *Euscorpius* Thorell, 1876 from Peloponnese, Greece (Scorpiones: Euscorpiidae). *Euscorpius*, 169: 1–11.

TROPEA, G., V. FET, A. PARMAKELIS, P. KOTSAKIOZI & I. STATHI. 2014a. Three new species of *Euscorpius* (Scorpiones: Euscorpiidae) from Greece. *Euscorpius*, 190: 1–22.

TROPEA, G., A. PARMAKELIS, N. SZISZKOSZ, K. BALANIKA & A. BOUDERKA. 2014b. A new species of *Euscorpius* Thorell, 1876 from Naples Province, Italy (Scorpiones: Euscorpiidae). *Euscorpius*, 182: 1–12.

TROPEA, G. & A. ROSSI. 2012. A new species of *Euscorpius* Thorell, 1876 from Greece, with notes on the subgenus *Euscorpius* from Greece (Scorpiones, Euscorpiidae). *Onychium*, 9: 27–37.

TROPEA, G., E.A. YAĞMUR & F. YEŞILYURT. 2014c. A new species of *Euscorpius* Thorell, 1876 from the Antalya Province, southern Turkey (Scorpiones: Euscorpiidae). *Euscorpius*, 184: 1–13.

VACHON, M. 1974. Etude des caractères utilisés pour classer les familles et les genres de scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les scorpions. *Bulletin du Muséum National d'Histoire naturelle, Paris*, 140: 859–958.