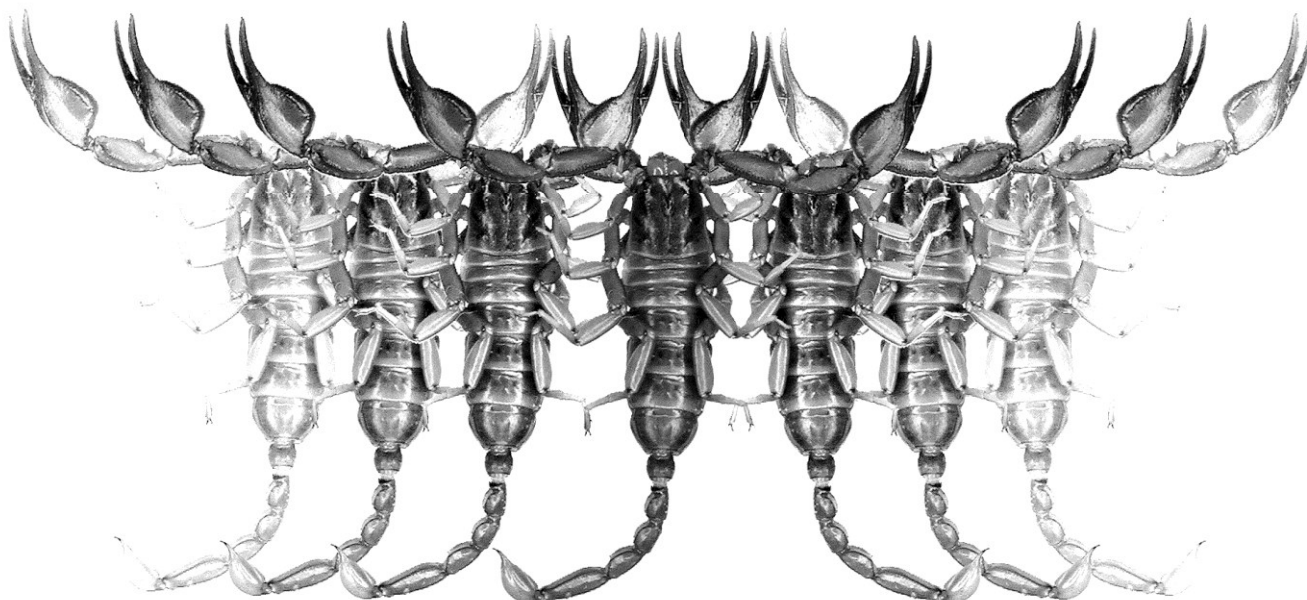


Euscorpium

Occasional Publications in Scorpiology



**A New Species of *Euscorpium* Thorell, 1876 from the
Western Balkans (Scorpionales: Euscorpidae)**

Gioele Tropea

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Euscorpius

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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A new species of *Euscorpius* Thorell, 1876 from the western Balkans (Scorpiones: Euscorpiidae)

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<http://zoobank.org/urn:lsid:zoobank.org:pub:2E50AF1A-9109-4455-9E57-686ADBB00014>

Summary

A new scorpion species, *Euscorpius feti* sp. n., is described from the western Balkans based on morphological evidence. It is characterized by long-limbed overall appearance, medium-large size, light brown to reddish color, and a high trichobothrial count ($Pv = 11-12$, $et = 8$, $em = 4$ and $eb = 4$).

Introduction

The genus *Euscorpius* Thorell, 1876 is one of the most studied taxa of scorpions, very common in southern Europe and Anatolia. Its species occupy diverse habitats 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 morphological characters. The *Euscorpius* populations of Balkans have been poorly studied and many of them are in need of clarification and detailed research. This paper focuses on a small geographic area between the south of Croatia and the north of Montenegro. From this area, four valid species of *Euscorpius* have been known: *E. italicus* (Herbst, 1800), *E. tergestinus* (C.L. Koch, 1837), *E. hadzii* Di Caporiacco, 1950, and *E. mingrelicus* (Kessler, 1874), of which the last two especially need clarification. In this study we describe a new species, which has never been mentioned in the past, *Euscorpius feti* sp. n.

Materials and Methods

Material examined

A total of 7 specimens of *Euscorpius feti* sp. n. have been examined (see Type material). Further 45 specimens have been examined for comparison:

E. aquilejensis (C.L. Koch, 1837). **Italy:** Rome, Via delle Isole Cursolane, May 2013, leg. P. Crucitti, 1

♀ (GTC 316); Rome, Via Cosseria 2, 3 October 2013, leg. S. Tropea, 1 ♂ (GTC 421); Ancona, Genga, Ponte Chiaradovo, 43.42545° N, 12.99003° E to 43.42340° N, 12.99135° E, 14 September 2013, leg. G. Tropea, 6 ♀ (GTC 359–364); Umbria, Perugia, Città della Pieve, 508 m, 2010, leg. C. M. Legittimo, 2 ♀ (GTC 77, 78); Abruzzo, L'Aquila, Celano, 9 July 2011, leg. G. Tropea, 2 ♀ (GTC 422,423); Friuli Venezia Giulia, Trieste, Vicolo del Castagneto 69, 1 ♀ (MSNT); Friuli Venezia Giulia, Trieste, lapidary garden, park, pitfall traps, 28 August – 2 October 1994, leg. Entomological Group of the Museum of Trieste, 1 ♀ (MSNT).

E. balearicus Di Caporiacco, 1950. **Spain:** Balearic Islands, Mallorca, Puerto de Soller, October 1933, leg. C. Alzona, 2 ♀ (MSNG 2847, 2848, paralectotypes); Balearic Islands, Mallorca, Lluc, 16 October 1964, leg. Rallo, 1 ♀ (MSNT).

E. hadzii Di Caporiacco, 1950. **Bosnia & Herzegovina:** Republika Srpska, Vucija Bara, July 1900, leg. [R.] Sturany, 1 ♂, 1 ♀ (MSNB 13360, 13361); Jablan, 8 August 1971, leg. A. Valle and R. Bianchi, 4 ♂, 2 ♀ (MSNB 8713–8718); **Croatia:** Dubrovnik, August 1970, leg. Zullini, 3 ♂, 2 ♀ (MSNB 8454–8458); **Montenegro:** near Trsa, Plužine, Durmitor National Park, 43°10.800' N, 18°55.960' E, 2012, leg. S. Novakovic, 2 ♂, 1 ♀ (GTC 424–426); **Montenegro:** Krivošije, leg. Branksik, 4 ♂, 3 ♀ (NHMW 13354). **Unclear locality** (see Reitter, 1881): “Dalmatien: Castelnuovo, Ragusa, Dricino” [Croatia: Ragusa (now Dubrovnik). – Bosnia & Herzegovina: Drieno (now Drijen, on the road Dubrovnik–Trebinje). – Montenegro: Castelnuovo (now Herceg Novi), April–May] 1880, leg. [E.] Reitter, 1 ♀ imm. (NHMW 13289).



Figures 1–2: *Euscorpius feti* sp. n., female, dorsal and ventral views.

E. tergestinus (C.L. Koch, 1837). **Croatia:** Suškošan, 2012, 3 ♀ (GTC); Mali Halan, 11 August 1970, leg. A. Valle & R. Bianchi, 3 ♀ (MSNB 8173–8175). **Unclear locality** (see Reitter, 1881): “Dalmatien: Castelnuovo, Ragusa, Dricno” [Croatia: Ragusa (now Dubrovnik). – Bosnia & Herzegovina: Drieno (now Drijen, on the road Dubrovnik–Trebinje). – Montenegro: Castelnuovo (now Herceg Novi), April–May] 1880, leg. [E.] Reitter, 2 ♀ (NHMW 13289).

In addition, we studied the data obtained by Tropea (2013); see *Material Examined* in Tropea (2013: 1–3).

Abbreviations

Abbreviations: *V*: trichobothria on pedipalp chela manus ventral surface; *Pv*: trichobothria on patella ventral surface; *Pe*: trichobothria on pedipalp patella external surface; *et*: external terminal; *est*: external sub-

terminal; *em*: external medium; *esb*: external suprabasal; *eba*: 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; *met.seg*: metasomal segment; *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; 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; MSNG: Museo Civico di Storia Naturale “Giacomo Doria”, Genoa, Italy; MSNT: Museo Civico di Storia Naturale di Trieste, Trieste, Italy; NHMW: Naturhistorisches Museum Wien, Vienna, Austria; UL, University of Ljubljana, Ljubljana, Slovenia; VFPC: private collection of Victor Fet, Huntington, West Virginia, USA.

Systematics

Family Euscorpiidae Laurie, 1896

Genus *Euscorpius* Thorell, 1876

Subgenus Incertae Sedis

Euscorpius feti Tropea, sp. n.

(Figs. 1–18, Tab. 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:71FFE745-5538-42CF-928E-A5CFAC8052D7>

Type material. *Holotype*: ♀, **Croatia**: Korčula Island, Vrbovica, April 1999 (UL).

Paratypes: **Croatia**: Lapad Peninsula, May 1952, 1 ♀ (UL); Cavtat (Ragusavecchia), 1 ♂ imm. (MZUR 35). **Bosnia & Herzegovina**: Republika Srpska, Trebinje, 1 ♀ (UL); Petrina, Trebinje, 6 June 2004, leg. D. Pavic, 1 ♀ imm. (VFPC); Zavalá, 1 ♂ imm. (GTC). **Unclear locality** (see Reitter, 1881): “Dalmatien: Castelnuovo, Ragusa, Dricno” [Croatia: Ragusa (now Dubrovnik). – Bosnia & Herzegovina: Drieno (now Drijen, on the road Dubrovnik–Trebinje). – Montenegro: Castelnuovo (now Herceg Novi), April–May] 1880, leg. [E.] Reitter, 1 ♀ (NHMW 13289).

Note: The precise provenance of the specimens NHMW 13289 is not known. The label says “Yu / Dalmatien: Castelnuovo, Ragusa, Dricno, leg. Reitter 1880.” Consulting Reitter (1881), we can say that Castelnuovo refers to the city Herceg Novi, northern Mon-

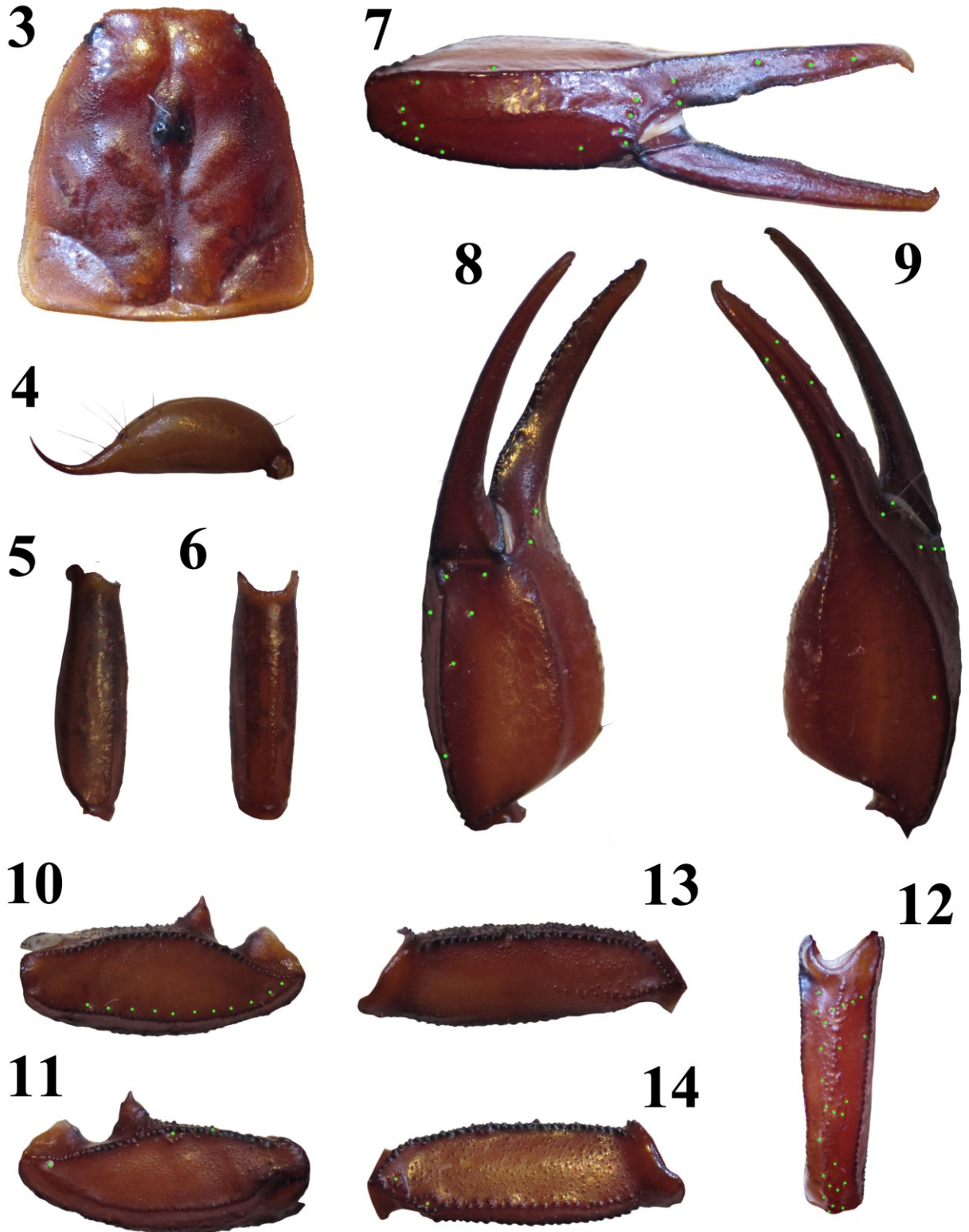
tenegro, near the border with Croatia; Ragusa refers to Dubrovnik, in southern Croatia; while Dricno is misspelled Drieno, an old Turkish fort in Bosnia & Herzegovina, on the road to Trebinje. Unfortunately, Reitter (1881) did not mention where exactly these scorpions were collected. The three localities are all quite close, thus all specimens NHMW 13289 (including *E. tergestinus* and *E. hadzii*) could come from any of these places.

Geographic distribution: Western Balkans: Bosnia & Herzegovina (west), Croatia (south), ?Montenegro (northwest) (see map in Fig. 17).

Etymology: The specific epithet in honor of the scorpologist Victor Fet, who has provided and continues to provide a great contribution to the knowledge of the genus *Euscorpius*, and for his willingness to help his colleagues.

Diagnosis: A medium-large *Euscorpius* species, total length 35–38 mm. Color of adults light brown-reddish, carapace and pedipalps darker reddish. More or less expressed reticulation or marbling on carapace, metasoma and chelicerae is present. The number of trichobothria on the pedipalp manus ventral surface is 4 ($3 V + Et_1$); the number of trichobothria on the pedipalp patella ventral surface is 11 to 12 (11 in 71.43% and 12 in 28.57% of pedipalps examined); the number of trichobothria on pedipalp patella external surface is usually: $eb = 4$, $eba = 4$, $esb = 2$, $em = 4$, $est = 4$, $et = 8$ (series $et = 8$ in 85.71 % and $et = 7$ in 14.29 % of pedipalps examined). Trichobothria et_2 and est_2 on pedipalp patella external surface are located in a very proximal position; trichobothrium et_2 is proximal to est_3 . The pectinal teeth count is 9 in males and usually 7 in females (7 in 80 % and 8 in 20 % of pectines examined). Metasomal segment I usually longer than wide or as long as wide; average *L/W* ratio 1.029. *Lchel/Wchel* ratio is 3.294 in females. Dorsal patellar spur highly developed. Femur longer than patella; *Lfem/Lpat* ratio is 1.077. Carapace usually longer than wide; average ratio *Lcar/Wcar* 1.053; average distance from center of median eyes to anterior margin of the carapace is 38.80 % of the carapace length. Average distance from center of median eyes to posterior margin of the carapace is 61.20 % of the carapace length. Average ratio of *Lmet/Lcar* is 2.226.

Trichobothrial and pectinal teeth count variation: The variation observed in 7 studied specimens (2 males, 5 females) is given below (left/right asymmetry not specified). Pectinal teeth in males (n=2): 9/9 (2). Pectinal teeth in females (n=5): 7/7 (4), 8/8 (1); in total, 7 in 80.00 % and 8 in 20.00 %; mean = 7.20, SD = 0.40. Pedipalp patella trichobothria *Pv* (n=7): 11/11 (3), 11/12



Figures 3–14: *Euscorpium feti* sp. n. (female). 3. Carapace. 4. Telson. 5. Lateral view of the metasomal segment V. 6. Ventral view of the metasomal segment V. 7. External view of the chela. 8. Ventral view of the chela. 9. Dorsal view of the chela. 10. Ventral view of pedipalp patella. 11. Dorsal view of pedipalp patella. 12. External view of pedipalp patella. 13. Ventral view of pedipalp femur. 14. Dorsal view of pedipalp femur.

(4); in total, 11 in 71.42 % and 12 in 28.58 %; mean = 11.28, SD = 0.45. Pedipalp patella trichobothria Pe ($n=7$): $et = 7/7$ (1), $8/8$ (6), in total, 7 in 14.29 % and 8 in 85.71 %; mean = 7.86, SD = 0.35; $est = 4/4$ (7); $em = 4/4$ (7); $esb = 2/2$ (7); $eb_a = 4/4$ (7); $eb = 4/4$ (7).

Description of the female holotype

Coloration: Whole color light orange-brown with carapace darker, reddish; marbling on chelicerae, metasoma and patella of legs; tergites outline lighter; sternites grayish/brownish with outline and lateral area very lighter, whitish/light brownish; pectines and genital operculum whitish; chelicerae very yellowish/light brownish with darker fingers and fingers' teeth very darker, area distal with dark marbling; telson yellowish with traces of dark pigmentation, longitudinal dark line and dark reddish aculeus tip; darker carinae, specially the internal carinae of pedipalps, blackish.

Carapace: Length 5.64, posterior width 5.27; fine granulation on whole surface but it becomes gradually larger toward the lateral area, especially in anterior lateral area, from median eyes to half than carapace length; anterior edge from slight granulate to granulate in lateral area and more or less straight, with a slight prominence at the center; very deep posterior median and posterior lateral furrows, the latter two combine to form two protuberances at the posterior margin; two pairs of lateral eyes (with a larger anterior eye), and a pair of median eyes, situated anteriorly of the middle; length from center of median eyes to anterior margin is 39.36% of carapace length; length from center of median eyes to posterior margin is 60.64% of the carapace length.

Mesosoma: Tergites very finely granulated to rough with lighter outline; sternites glossy and finely punctated; small spiracles inclined to about 45° downward towards outside; area of overlap between sternites very pale.

Metasoma: Dorsal carinae on segments I–IV granulated, the last two or three distal granules are more pronounced; dorsolateral carinae on segments I–III barely traceable for 1/3 to 2/5 of the length, on segments IV–V absent or obsolete; ventrolateral carinae absent on segment I, smooth or obsolete on segments II–IV, slightly and finely serrulate and spaced on segment V; ventromedian carina absent on segments I–IV, finely granulate on segment V; intercarinal spaces mostly smooth, only the dorsal surface of segments I and II has very small scattered granules; marbling on metasomal segments II–V.

Telson: Vesicle with a few scattered, very small granules to rough, with ventral setae of different size, especially near the vesicle/aculeus juncture; L/H ratio of the vesicle 2.143.

Pectines: tooth count 7/7; middle lamellae count 5/4; several microsetae on marginal lamellae, middle lamellae and fulcra.

Genital operculum: The genital operculum is formed by two sclerites united; a few microsetae are present.

Sternum: Pentagonal shape, type 2; longer than wide, with a deep posterior emargination.

Pedipalps: Coxa and trochanter with tuberculate carinae. Femur: dorsal internal carinae tuberculate; dorsal external carinae formed by tubercles slightly spaced; external median carinae serrulate; ventral internal carinae tuberculate; ventral external carinae formed by spaced tubercles, well formed only in the proximal half; anterior median formed by spaced, nearly conical tubercles, varying in size, of which three bear a macroseta each; dorsal intercarinal spaces uniformly granulated; ventral intercarinal spaces not uniformly granulated, with larger granules near ventral internal carinae. Patella: dorsal internal carinae tuberculate to slightly crenulate; dorsal external carinae lightly crenulate to rough; ventral external carinae crenulate; ventral internal carinae tuberculate to lightly serrulate; dorsal intercarinal surface finely granulated, with larger granules in distal area; ventral intercarinal surface with few scattered minute granules, especially near ventral internal carinae. Dorsal patellar spur highly developed. Chelal carina $D1$ is distinct, strong, dark and from smooth to rough; $D4$ is rounded and smooth; $V1$ is distinct, strong, dark and rough to lightly crenulate; $V3$ rounded, dark and lightly and finely granulated; external carina granulated; intercarinal tegument rough to finely granulated with very minute scattered granules. Typical *Euscorpius* chela finger dentition; L/W ratio of the chela 3.43; $Lfem/Lpat$ ratio is 1.09.

Trichobothria: Chela: trichobothria on the pedipalp manus ventral surface is 4/4 ($V_{1,3} + Et_1$). Patella: ventral (Pv): 12/11; patella external (Pe): $et = 7/7$, $est = 4/4$, $em = 4/4$, $esb = 2/2$, $eb_a = 4/4$, $eb = 4/4$. Trichobothria et_2 and est_2 on pedipalp patella external surface are located in a very proximal position; trichobothrium et_2 is proximal to est_3 . Femur: trichobothrium d is slightly proximal to i , while trichobothrium e is distal to both d and i ; it is situated on dorsal external carina but is shifted toward its dorsal surface.

Legs: Legs with two pedal spurs; no tarsal spur; ventral row of tarsus III with a total of 8 spinules, of increasing size from proximal to distal, ending with a decentralized spinule; 3 flanking pairs of tarsal setae adjacent to the ventral spinules row. Granulation present on dorsal and ventral surface of leg femora, it is mostly marked and dark ventrally; patella with dark marbling.

Chelicerae: Smooth, with dark marbling on anterior part, with darker apical portion of denticles. Movable finger: the dorsal distal denticle is very smaller than the ventral distal denticle; ventral edge is smooth with

		<i>E. feti</i> sp. n. Croatia Holotype ♀	<i>E. balearicus</i> Mallorca, Spain Paralectotype ♀ (MSNG 2847)	<i>E. aquilejensis</i> Trieste, Italy ♀ (MSNT)
Total	Length	34.89	29.29	37.82
Carapace	Length	5.64	4.89	5.28
	Post. width	5.27	4.62	4.60
Metasoma	Length	12.77	9.47	11.98
Segment I	Length	1.61	1.29	1.56
	Width	1.53	1.46	1.68
Segment II	Length	1.92	1.47	1.80
	Width	1.37	1.20	1.46
Segment III	Length	2.22	1.68	2.02
	Width	1.26	1.14	1.41
Segment IV	Length	2.64	1.91	2.40
	Width	1.21	1.04	1.38
Segment V	Length	4.38	3.12	4.20
	Width	1.20	1.02	1.35
Telson	Length	4.52	3.41	4.56
Vesicle	Length	2.96	2.33	3.15
	Width	1.23	1.08	1.68
	Depth	1.38	1.02	1.56
Aculeus	Length	1.56	1.08	1.41
Femur	Length	5.69	4.38	4.74
	Width	1.86	1.59	1.68
Patella	Length	5.22	4.21	4.68
	Width	1.92	1.80	1.86
Chela	Length	10.50	8.82	9.36
	Width	3.06	2.88	3.12
Movable finger	Length	6.30	5.04	5.46
Ratio	CarA-CarP %	39.36 – 60.64	39.26 – 60.74	39.39 – 60.61
	Lcar/Wcar	1.070	1.058	1.147
	Lcar/Lpat	1.080	1.162	1.128
	Lcar/Ltel	1.248	1.435	1.158
	Lchel/Wchel	3.431	3.062	3.000
	L/W met.seg I	1.055	0.885	0.928
	L/W met.seg II	1.403	1.225	1.233
	L/W met.seg III	1.753	1.474	1.432
	L/W met.seg IV	2.189	1.838	1.740
	L/W met.seg V	3.650	3.059	3.111
	Lmet/met.seg V	2.916	3.036	2.852
	Lmet/Lcar	2.265	1.937	2.269
	Lfem/Lpat	1.089	1.041	1.013

Table 1: Measurements (mm) and ratios of *E. feti* sp. n., *E. balearicus*, and *E. aquilejensis*.



Figures 15–16: *Euscorpius feti* sp. n. 15. Lateral view of tarsus of leg III. 16. Ventral view of tarsus of leg III.

brush-like setae on the inner part; dorsal edge has five denticles: one large distal, one medium and one small subdistal, one large median and a small basal. Fixed finger: it 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.

Comparisons

As specified below, *E. feti* sp. n. is very distinct from two sympatric species of the subgenus *Euscorpius* s.str., *E. hadzii* and *E. tergestinus*. In addition, *E. feti* sp. n. is compared with two species that appear to be relatively closer in morphology, *E. balearicus* and *E. aquilejensis*. The proportions refer only to female specimens.

It is possible to distinguish *E. feti* sp. n. from *E. hadzii* by the following features: (1) the number of trichobothria on pedipalp patella external surface which usually are $em = 4-5$, $eb_a = 7$, $eb = 5$ in *E. hadzii* versus $em = 4$, $eb_a = 4$, $eb = 4$ in *E. feti* sp. n.; (2) *E. feti* sp. n. is generally more slender, with all segments of the pedipalps and the carapace proportionally longer than in *E. hadzii*; (3) *E. feti* sp. n. has the spinule series on tarsus ending with a decentralized distal spinule, while in *E. tergestinus* it ends with distal paired spinules; (4) *E. hadzii* has a higher Dp in females, which usually is 8 versus 7 in females of *E. feti* sp. n.

Recently redescribed *Euscorpius tergestinus* differs from *E. feti* sp. n. in the following features: (1) a Pv and $Pe-et$ on average lower, respectively 10.39 and 7.55 in *E. tergestinus* versus 11.28 and 7.86 in *E. feti* sp. n.; (2) *E. feti* sp. n. has general habitus more slender, with all segments of the pedipalps and the carapace proportionally longer than in *E. tergestinus*; (3) in *E. feti* sp. n., because of the elongated chela and more proximal position of the base of fixed finger, the trichobothria db and dsb occur in more distal position than in *E. ter-*

gestinus, which has the trichobothrium db in basal position and dsb more proximally; (4) *E. feti* sp. n. has a proportionally longer pedipalp femur that is usually longer than pedipalp patella, while *E. tergestinus* has a more stocky femur which is usually shorter than patella and sometime as long as it; (5) *E. feti* sp. n. has a particularly elongated carapace compared with *E. tergestinus*; its posterior part is on average 61.20% of the total length of carapace, so the eyes occur in more distal position, while *E. tergestinus* has more stocky carapace, its posterior part is on average 56.79% of the total length of carapace; (6) *E. feti* sp. n. has the metasomal segment I usually longer than wide while in *E. tergestinus* it is wider than long; (7) *E. feti* sp. n. has the spinule series on tarsus ending with a decentralized distal spinule, while in *E. tergestinus* it ends with distal paired spinules.

E. feti sp. n. is more morphologically similar to *E. balearicus* and *E. aquilejensis*. These three species share a generally long-limbed habitus, with femur usually longer than the patella, long-limbed chela with the trichobothria db in not basal position, a very well developed DPS (dorsal patellar spur), and a particularly elongated carapace with the rear part usually > 60% of the total length.

E. feti sp. n. differs from *E. aquilejensis* in the following features: (1) a higher trichobothrial count with $Pv = 11$ to 12 and usually $Pe-et = 8$ in *E. feti* sp. n. compared to $Pv = 9$ and $Pe-et = 6$ in *E. aquilejensis*; (2) *E. feti* sp. n. has more slender chelae, with $Lchel/Wchel$ ratio in females of 3.29 versus 2.89 in females of *E. aquilejensis*; (3) *E. feti* sp. n. has the metasomal segment I usually longer than wide while *E. aquilejensis* has it wider than long; (4) *E. feti* sp. n. has marbling on chelicerae, metasoma and patella of legs, while *E. aquilejensis* has no marbling.

E. feti sp. n. differs from *E. balearicus* in the following features: (1) *E. feti* sp. n. has the metasomal segment I usually longer than wide while *E. balearicus* has it wider than long; (2) in *E. feti* sp. n. all the seg-



Figure 17: Localities of the studied specimens of *Euscorpius feti* sp. n. (red circles; map was downloaded from: <http://d-maps.com>).

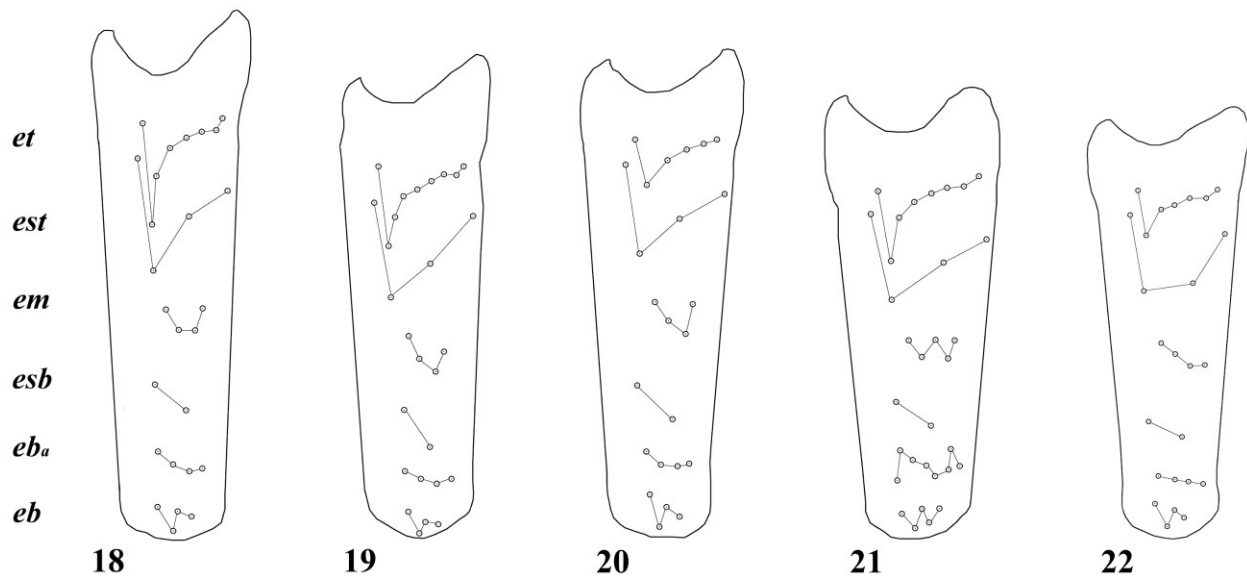
ments of the metasoma are more elongated than in *E. balearicus*; (3) *E. feti* sp. n. has L_{chel}/W_{chel} ratio higher than *E. balearicus*; (4) *E. feti* sp. n. has both L_{car}/L_{fer} and L_{car}/L_{pat} ratios higher than *E. balearicus*.

Discussion

Taxonomy of the genus *Euscorpius* is complicated, and for many geographic territories and species complexes still remains unresolved throughout its range. The Balkan region hosts a number of *Euscorpius* populations that need to be studied; probably in the near future, several new species will be described from this area. Continuous changes in the taxonomy of this genus has further contributed to the confusion between the various species and populations. Populations of the subgenus *Euscorpius* s.str., or related to it, which occur in the distribution area of *E. feti* sp. n. in the past have been called: *E. carpathicus mesotrichus* and *E. c. polytrichus* after Hadži (1929); *E. c. tergestinus* and *E. c. hadzii*

after Di Caporiacco (1950); *E. carpathicus* and *E. mesotrichus* after Kinzelbach (1975); and *E. tergestinus* and *E. hadzii* after Fet & Soleglad (2002). In addition, all populations and species belonging to the subgenus *Euscorpius* and/or related to it, have been addressed as “*E. carpathicus* complex”. Furthermore, specimens of many populations are hard to find both in nature and in the collection of the museums, where the labeling often does not help for the reasons mentioned above. It appears that *E. feti* sp. n. has been “obscured” by unclear labeling and by the fact that the specialists too often looked only at the variable number of trichobothria neglecting other important morphological characters.

E. feti sp. n. is sympatric with *E. tergestinus* and *E. hadzii*; all three species were found in the area of Dubrovnik, Croatia. However, specimens of *E. feti* sp. n. are not common in the collections, while it is quite easy to find specimens of *E. tergestinus* and *E. hadzii*. These two species are easily separated from *E. feti* sp. n., as explained above. At the same time, *E. feti* sp. n. seems



Figures 18–22: Pedipalp patella external surface, schematized trichobothrial patterns. **18.** *E. feti* sp. n. **19.** *E. balearicus*. **20.** *E. aquilejensis*. **21.** *E. hadzii*. **22.** *E. tergestinus*.

closer to geographically more distant species, such as *E. aquilejensis* (Italy; western Slovenia and northern Croatia), recently redescribed and elevated to species status (Tropea, 2013), and even *E. balearicus* (Balearic islands, Spain). In fact, these three species share the following features: all segments of pedipalps particularly long and thin; elongated carapace with its rear part >60% of the total length; distally located trichobothrium *db* on the fixed finger; and may have two unpaired distal spinules on ventral aspect of the tarsus, as well as other, partially similar characters such as carination and granulation.

Tropea (2013) pointed out that some species, including *E. aquilejensis* and *E. balearicus*, do not appear to belong within the subgenus *Euscorpius* s.str. Parmakelis et al. (2013) arrived at the same conclusion (paraphyletic nature of the subgenus *Euscorpius* s.str.) as a result of a multiple genetic marker study. Currently, the subgeneric composition of the genus *Euscorpius* is unclear. Three old subgenera introduced by Birula (*Euscorpius* Thorell, 1876; *Polytrichobothrius* Birula, 1917; *Tetratrachobothrius* Birula, 1917), with the more recent addition of *Alpiscorpius* Gantenbein et al., 1999, are not sufficient to explain the phylogenetic position of some valid species, including *E. aquilejensis*, *E. avcii* Tropea et al., 2012, *E. balearicus*, and *E. tauricus* (C.L. Koch, 1837) as well as a number of undetermined populations (Tropea, 2013; Parmakelis et al., 2013).

Since its many similarities with *E. aquilejensis* and *E. balearicus*, *E. feti* sp. n. is not considered as belonging to the subgenus *Euscorpius* s.str., and therefore, it is not assigned to any subgenus for the moment. This new species should be subjected to further studies, including genetic analysis, in order to understand its relationships with other species and populations of genus *Euscorpius*,

as well as its distribution and ecology. Additional morphological data on males is also required.

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References

- DI CAPORIACCO, L. 1950. Le specie e sottospecie del genere “*Euscorpius*” viventi in Italia ed in alcune zone confinanti. *Memorie/Atti della Accademia Nazionale dei Lincei*, serie VIII, vol. II, sez. III, fasc. 4: 159–230.
- FET, V. & M.E. SOLEGLAD. 2002. Morphology analysis supports presence of more than one species in the “*Euscorpius carpathicus*” complex (Scorpiones: Euscorpidae). *Euscorpius*, 3: 1–51.
- HADŽI, J. 1929. Skorprije Schmidtove zbirke. *Euscorpius italicus polytrichus* n. ssp. i ostale nove rase (Die Skorpione der Schmidt’schen Sammlung: *Euscorpius italicus polytrichus* n. ssp. und andere neue Rassen). *Glasnik Muzejskega Društva za Slovenijo*, (B), 10(1–4): 30–41 (in Serbo-Croatian).
- KINZELBACH, R. 1975. Die Skorpione der Ägäis. Beiträge zur Systematik, Phylogenie und Biogeographie.

- graphie. *Zoologische Jahrbücher, Abteilung für Systematik*, 102: 12–50.
- PARMAKELIS, A., I. STATHI, P. KOTSAKIOZI, 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* (first published online 16 October 2013).
- REITTER, E. 1881. Neue und seltene Coleopteren, im Jahre 1880 in Süddalmatien und Montenegro gesammelt und beschrieben. *Deutsche Entomologische Zeitschrift*, 25: 177–228.
- TROPEA, G. 2013. Reconsideration of the taxonomy of *Euscorpius tergestinus* (Scorpiones: Euscorpiidae). *Euscorpius*, 162: 1–23.
- TROPEA, G., E.A. YAĞMUR, H. KOÇ, F. YEŞILYURT & A. ROSSI. 2012. A new species of *Euscorpius* Thorell, 1876 (Scorpiones, Euscorpiidae) from Turkey. *ZooKeys*, 219: 63–80.