

## Cave-inhabiting pseudoscorpion species of the genus *Roncus* (Pseudoscorpiones: Neobisiidae) from western Greece, including the Ionian Islands

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**Abstract.** Three new species of the genus *Roncus* L. Koch, 1873 are described and figured: *Roncus gasparoi* n.sp. from Corfu (Spilaio Anthropograva), *Roncus pieperi* n.sp. from Kefalonia (caves Fitidi and Drogarati) and *Roncus giachinoi* n.sp. from continental Greece, Arkanania (Megalo Spilio).

**Keywords:** Arkanania, Corfu, Kefalonia, new species, taxonomy

**Zusammenfassung. Höhlenbewohnende Pseudoskorpionarten der Gattung *Roncus* (Pseudoscorpiones: Neobisiidae) aus West-Griechenland, einschließlich der Ionischen Inseln.** Drei neue Arten der Gattung *Roncus* L. Koch, 1873 werden beschrieben und abgebildet: *Roncus gasparoi* n.sp. von Korfu (Spilaio Anthropograva), *Roncus pieperi* n.sp. von Kefalonia (Grotten Fitidi und Drogarati) und *Roncus giachinoi* n.sp. vom kontinentalen Griechenland, Arkanania (Megalo Spilio).

Speleological investigations of the Ionian Islands and the western part of Greece started quite recently, compared to the efforts applied to adjacent regions. Schawaller (1985) presented a list of Greek Neobisiidae including the cave-dwelling species and indicated for the region five species and subspecies of the genus *Roncus* L. Koch: *Roncus c. corcyraeus* Beier, 1963 (Corfu, cave Peristerograva; but also from the cave Megali Grava no.3553 near Loutsas: Gardini 1988); *Roncus (Parablothrus) peramae* Helversen, 1969 (Perama cave near Ioannina, Epirus, continental Greece); *Roncus corcyraeus minor* Mahnert, 1973a (Levkas, cave Karoucha); *Roncus giganteus* Mahnert, 1973b (Zakynthos, cave tou Chajoti: Mahnert 1975); *Roncus lubricus* auct. (Peloponnese, cave Ton Limnon, 20 km south Kalavrita, and Kefalonia, cave Phytidi (=Fitidi), Sami: Mahnert 1975), but this identification is doubtful and should be revised.

The results obtained during the intensive speleological investigations on the Ionian Islands and adjacent mainland regions carried out over years by Dr P. M. Giachino (Torino) and Dr F. Gasparo (Trieste) and the collections obtained by Dr and Mrs H. Pieper (Schwentinental) are filling up some gaps. They indicate, furthermore, that more fascinating discoveries are waiting to be made in the caves of this region.

### Material and methods

Specimens are conserved in 75% ethanol alcohol. Dissected parts are conserved in microvials together with the specimen. Proportions are given in length/breadth for pedipalps and carapace, in length/depth for legs; measurements are given in mm. The holotypes of the new species are deposited in the collections of the Natural History Museum Geneva (Switzerland), paratypes are in the collections of the Natural History Museum Geneva, of the Museo Civico di Scienze Naturali "E. Caffi" Bergamo and in the collection Giulio Gardini (Genova).

Arrangement of the species is in alphabetic order of their geographical origin.

### Taxonomy

*Roncus giachinoi* n.sp. (Fig. 1a-h)

### Specimens studied

Holotype, 1♀ (Mus. Geneva), GREECE, Arkanania, Oros Serekas Mt., Monastiraki, 980 m, cave Megalo Spilio (N 38°46'06.1"/E 20°57'22.3"), in cheese-baited traps, 2.VI.1992, leg. P.M. Giachino. Paratypes, 3♀ (Mus. Geneva, Bergamo, coll. Gardini), same data; 4♀ (Mus. Geneva, coll. Gardini), same cave, 1.VI.1993, leg. P.M. Giachino; 1♀ (Mus. Bergamo), same cave, 1000 m, 1.VI.1994, leg. P.M. Giachino; 1♂ (Mus. Geneva), same cave, 1000 m, 30 meters from entrance, under concretion, 1.IX.2004, leg. F. Gasparo.

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### Etymology

Named in honour of Dr Pier Mauro Giachino, entomologist and biospeleologist of the Museo regionale Torino.

### Diagnosis

Morphologically close to *R. peramae* and *R. pieperi n.sp.*, but is characterized by the combination of the following characters. Troglolobiont habitus. Carapace with an acute triangular epistome, subbasal transverse furrow indistinct, eyes absent, with 20 setae (4/8/4/4) (6 in *pieperi n.sp.* and *peramae*); tergites I-IV: 4/4-5/6/6 (I-II 6/6-7 in *pieperi n.sp.* and *peramae*); anterior process of coxa I finger-like, apex indistinctly dentate; chelicera with 5-6 setae on hand, movable finger with large triangular tooth in the tooth row, spinneret absent. Pedipalps slender, femur with a few indistinct granula in basal half, 6.9-7.6 times longer than broad, patella smooth, 5.7-6.5 times, club 1.3 times longer than pedicel, hand with pedicel 2.2-2.6 times, chela with pedicel 6.4-7.0 ( $\delta$  7.5) times longer than broad, finger 1.8-1.9 times longer than hand with pedicel (1.5-1.6 times in *pieperi n.sp.*); 1-3 fine setae distal of *eb-esb*; tibia of leg IV shorter than femur+patella.

### Description

General colouration yellowish, last abdominal segments whitish. Carapace (Fig. 1a) 1.1-1.3 times longer than broad, with a small triangular, acute epistome, subbasal transverse furrow indistinct, eyes absent, with (19)20 setae (4/(7-)8/4/4). Tergal chaetotaxy: I-IV 4/4-5/6/6-7, following ones mostly with 7(8) setae, XI 6-7 (4 tactile setae). Manducatory process: 4 setae (1♀ 3 on left side), pedipalpal coxa itself with 7-8 setae, coxa I with finger-like anterior lobe, rounded apex indistinctly dentate, medial process rounded, rectangular (Fig. 1f), smooth, 6-7 setae, II 6-8, III 4-5, IV 6-8; genital operculum with 10-11 short setae arranged in two rows in female, in male with 20 long setae arranged in two semicircular rows, median cribriform plate small, rounded, lateral plates not observed; entrance of male genital opening with 2/2 short internal setae; genital organ without particularities; sternal chaetotaxy: III 12-15 marginal setae (male with 6 medial discal setae) + 3-4 suprastigmal setae on each side, IV 8-10 + 2x2-3, IV -X mostly 12-13 setae, XI 4-6(?) (2 tactile setae). Anal conus 2+2 setae. Pleural membranes granular.

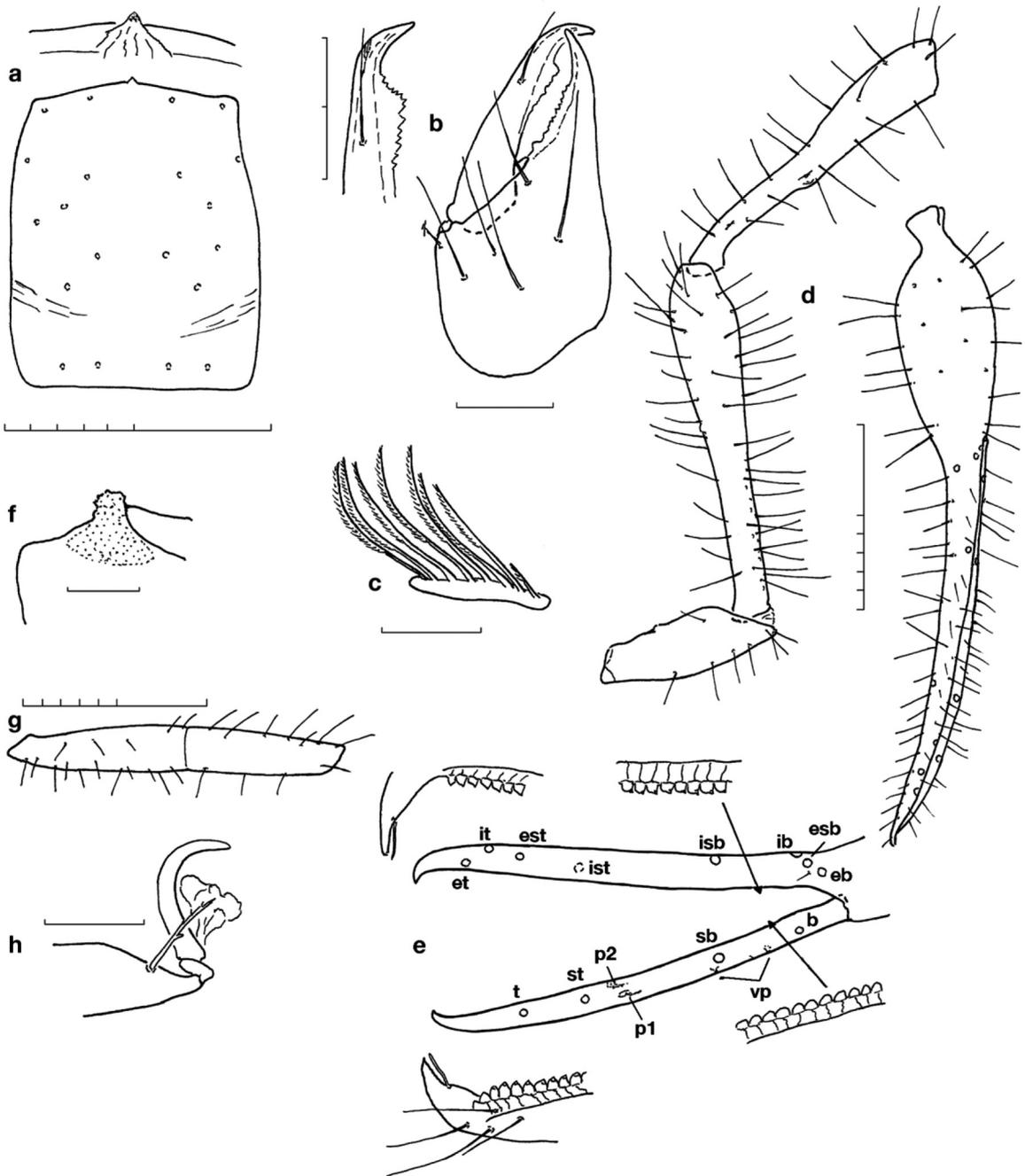
Chelicera (Fig. 1b) with 5-6 setae on hand (3 out of 12 chelicera with 5 setae), fixed finger with about

10 acute or rounded, worn teeth (partly indistinct), movable finger with a large triangular tooth (rounded or dentate) in the tooth row, with about 6 rounded teeth proximal to it, subgaleal seta reaching finger tip, spinneret absent, but three glandular ducts visible; serrula exterior with 38-40, serrula interior with 30-33 lamellae; rallum (Fig. 1c) with 8 dentate setae, the proximal one 1/4 of length of the preceding one.

Pedipalps (Fig. 1d) of female (male) slender, trochanter with an indistinct ventral hump in distal half, smooth, femur club-shaped, in basal half scarcely and indistinctly granular, 6.9-7.5 (7.6) times, patella 5.7-6.5 (6.3) times longer than broad, club 3.3-3.6 (3.6) times longer than broad and 1.3-1.4 (1.3) times longer than pedicel, hand with pedicel 2.2-2.6 (2.6) times, chela with pedicel 6.4-7.0 (7.5), without pedicel 6.1-6.7 (7.0) times longer than broad, movable finger 1.8-1.9 (1.9) times longer than hand with pedicel; fixed finger with 135-147 small cusped teeth, movable finger with 139-155 cusped teeth (but in basal third of finger rounded); sensillum  $p_2$  near trichobothrium *st* and indistinctly distal of  $p_1$ , two ventral glandular pores present between *b/sb* and below *sb*; venom ducts very short. Trichobothria (Fig. 1e): *eb-esb-ib* in a straight line, 0-3 fine setae distal of *eb/esb*; *sb* distinctly nearer *b* than *st*.

Leg I ( $\delta$ ♀): femur 6.3-6.8 times longer than deep and 1.4-1.5 times longer than patella, patella 4.8-5.4 times longer than deep, tibia 8.8-9.0 times, basitarsus 5.3-6.0, telotarsus 8.3-9.6 times longer than deep, telotarsus 1.3-1.4 times longer than basitarsus; leg IV (Fig. 1g 1h): femur+patella 6.6-7.1 times longer than deep, patella slightly shorter than femur, tibia 10.4-11.3 times, tactile seta near middle (TS=0.41-0.61), basitarsus 4.8-5.4 times, tactile seta near base (TS=0.14-0.17), telotarsus 7.5-9.5 times longer than deep, tactile seta near middle (TS=0.38-0.44), telotarsus 1.3-1.4 times longer than basitarsus; arolia short, claws smooth, subterminal seta in distal half finely dentate on both sides.

Measurements of females (holotype, paratypes) and male paratype (in brackets). Total length 3.3-4.1 (3.3). Carapace 1.15-1.19/0.87-1.07 (1.06/1.05). Pedipalps: trochanter 0.93-1.04/0.26-0.28 (0.91/0.24), femur 1.93-2.09/0.27-0.28 (1.84/0.24), patella 1.78-1.91/0.29-0.34 (1.72/0.27), length of pedicel 0.74-0.84 (0.74), hand with pedicel 1.21-1.34/0.50-0.57 (1.17/0.45), length of pedicel 0.20-0.21 (0.19), of movable finger 2.26-2.38 (2.23), of chela with pedicel 3.40-3.60 (3.33). Leg I: femur



**Fig. 1:** *Roncus giachinoi* n.sp., holotype. a: Carapace, with enlarged epistome; b: Left chelicera, dentition of movable finger of a paratype enlarged; c: Rallum; d: Left pedipalp; e: Trichobothrial pattern (without scale) (p, p<sub>2</sub>: sensilla; vp: ventral (glandular) pores); f: Coxa I, anterior corners; g: Leg IV, femur+patella; h: Telotarsus IV, claws and subterminal seta. Scale units 0.1 mm; scale 1.0 mm: figs a, d, g.

1.11-1.22/0.18 (1.03/0.16), patella 0.74-0.80/0.15-0.16 (0.73/0.15), tibia 1.01-1.06/0.12 (0.92/0.10), basitarsus 0.56-0.60/0.10-0.11 (0.54/0.09), telotarsus 0.73-0.81/0.08-0.09 (0.72/0.09); leg IV: femur+patella 1.75-1.89/0.26-0.28 (1.68/0.24), tibia 1.71-1.82/0.16-0.17 (1.64/0.14), basitarsus 0.66-0.70/0.13-0.14 (0.62/0.12), telotarsus 0.86-0.91/0.10-0.12 (0.87/0.10).

### Discussion

The species had already been recorded from this cave as *Roncus* sp. cfr *R. peramae* Helversen, det. G. Gardini (Casale et al. 2013). *Roncus giachinoi* n.sp. shares with *R. peramae* similar pedipalpal proportions and measurements, the presence of a large triangular (dentate) tooth in the tooth row on the cheliceral movable finger, a similar trichobothrial pattern (*ist* at level of *st* on movable finger, *isb* nearly at level of *sb* on movable finger), but differs mainly by the presence of only 4 setae (vs. 6) on the posterior border of carapace and on tergites I (and II) and the shape of the anterior lateral corner of coxa I being finger-like and indistinctly dentate in *giachinoi* and acute triangular in *peramae*. The pedipalpal hand seems to be more slender in *giachinoi* n.sp. than in *peramae* (2.3-2.6 vs. 2.2-2.3). It differs from *pieperi* n.sp. by a more slender pedipalpal femur (max. 6.4 vs. min. 6.9 times) and its indistinct granulation, by a more slender club of patella (3.25-3.63 vs. 2.45-2.61 times) and a relatively shorter patellar pedicel (1.28-1.39 vs. 1.09-1.16 times) compared to club length. *Roncus giachinoi* is furthermore differentiated from *R. pieperi* by relatively longer chelal fingers compared to hand length (1.77-1.91 vs. 1.53-1.58 times).

Faunistic research in the cave Megalo Spilio yielded up to now nine described species of Acari (1), Araneae (2), Orthoptera (1) and Coleoptera (6), representing an elevated number of endemic taxa (Casale et al. 2013). Our current knowledge about pseudoscorpions from Greece is too poor to elaborate interesting biogeographical models, but it is already possible to find analogies to results emphasized by Casale et al. (2013) or to results obtained for the genus *Dolichopoda* (Orthoptera) by Rampini et al. (2008).

***Roncus gasparoi* n.sp.** (Fig.2 a-f)

### Specimens studied

Holotype, 1♀, GREECE, Ionian Islands, Corfu, Klimatia, Spilaio Anthropograva n. 562, alt. 250

m, 39.7431°N, 19.7868°E; under stones 20 meters from entrance, 29.VI.2000, leg. F. Gasparo. Paratype, 1♂ (coll. Gardini), same locality, same date, leg. F. Gasparo.

### Etymology

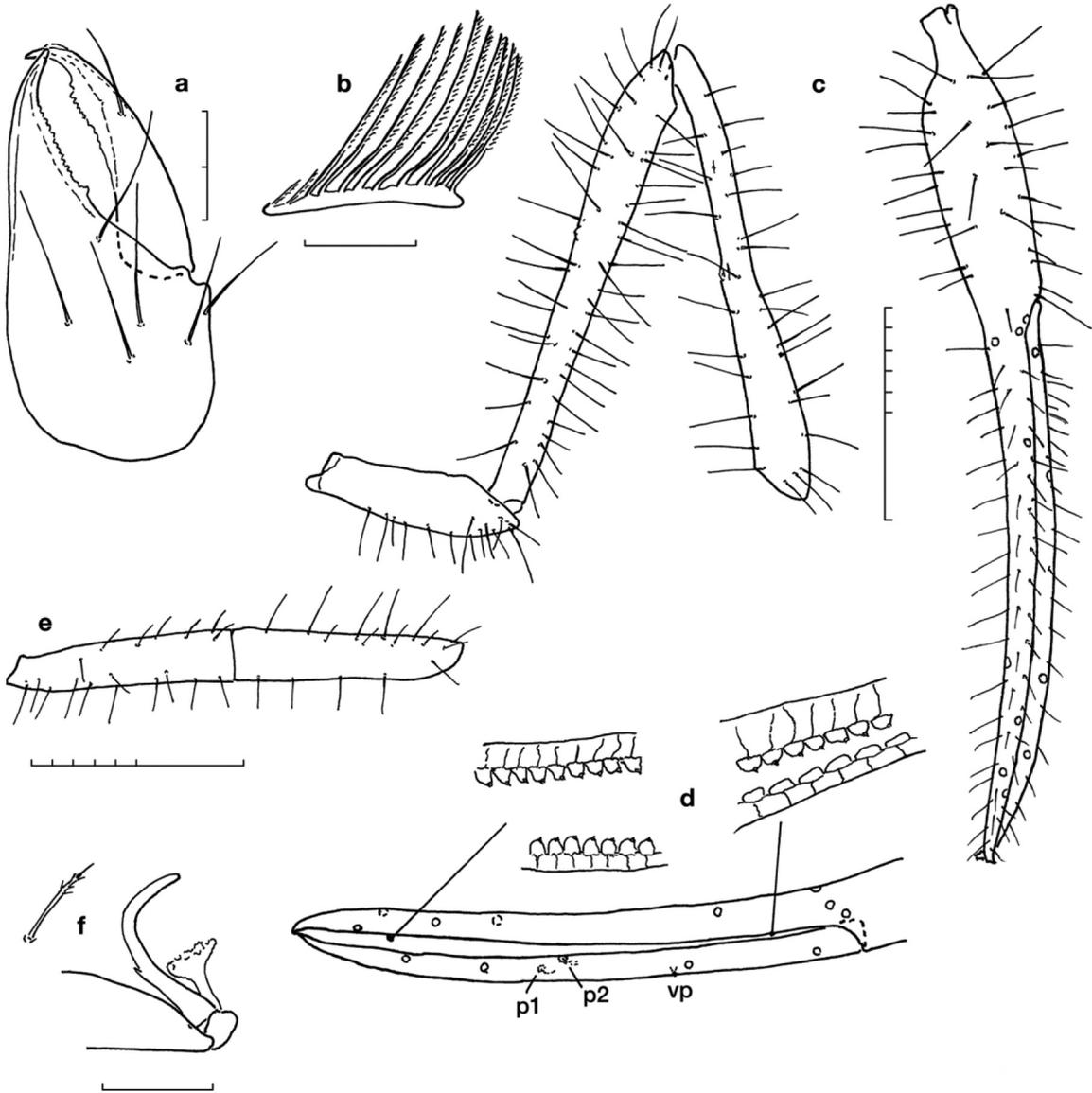
The new species is dedicated to Dr Fulvio Gasparo, who spent a life-time contributing towards a better knowledge of speleology and biospeleology in the South European region.

### Diagnosis

Morphologically near *Roncus giachinoi* n.sp. and *R. peramae*, but it is characterized by the combination of the following characters. Trogllobiont species characterized by feeble sclerotization, by the absence of eyes and by the elongated pedipalps and legs. Carapace with a small epistome with rounded apex, a subbasal transverse furrow present; with 4 or 6 setae on posterior border (4 in *giachinoi* n.sp., 6 in *peramae*); tergites I/II with 4-5/5-6 setae (4/4-5 in *giachinoi* n.sp., 6/6-7 in *peramae*); chelicera with 5 or 6 smooth setae on hand, movable finger with an enlarged triangular and dentate tooth in the tooth row, rallum with 10-11 dentate setae (7-8 setae in the other species), two proximal setae short; pedipalpal femur and hand smooth, pedipalpal femur club-shaped, 8.8-9.1 times longer than broad (length 2.29-2.40) (at most 7.6 times in *giachinoi* n.sp. and *peramae*), patella 7.9-8.2 times (length 2.20-2.31), club 1.1-1.2 times longer than pedicel, finger 1.8 times longer than hand with pedicel (length 2.68-2.82/1.46-1.53) and distinctly longer than femur, chela with pedicel 9.7-9.9 times longer than broad; 1-3 fine setae distal of trichobothria *eb-esb*; tibia of leg IV longer than femur+patella.

### Description

General colouration yellowish. Carapace 1.1-1.2 times longer than broad, epistome small with rounded apex, no subbasal transverse furrow observed, with 20 (holotype) or 23 (paratype) setae: 4/6-7/6/4 (holotype)-6. Tergites undivided, chaetotaxy: 4-5/5-6/6-7/6-7, V-X 7, XI 7 (4 tactile setae) (holotype: I 4, II 5). Manducatory process with 3-4 (holotype) or 3 (paratype) setae, pedipalpal coxa itself with 8 setae, coxa I 6-7 setae, lateral corner finger-like with apex finely dentate, medial corner rectangular, rounded, II 7-9, III 5-6, IV 8-9; genital operculum with about 20 medial discal setae, genital entrance with 2/2 smooth, slightly curved setae; genital organs not ob-



**Fig. 2:** *Roncus gasparoi* n.sp., holotype. a: Right chelicera; b: Rallum; c: Left pedipalp; d: Trichobothrial pattern (without scale) ( $p_1$ ,  $p_2$ : sensilla; vp: ventral (glandular) pore); e: Leg IV, femur+patella; f: Telotarsus IV, claw and subterminal seta. Scale units 0.1 mm; scale 1.0 mm: figs c, e.

served; sternal chaetotaxy: III with 11-12 marginal and 6 medial discal setae + 2x3-4 suprastigmal setae, IV 10+2x3, V-X 11 or 12 setae, XI 3-4 (2 tactile setae). Pleural membranes granular.

Chelicera (Fig. 2a) with 6 (holotype) or 5 (paratype) setae on hand, subgaleal seta on movable finger reaching tip of finger, fixed finger with about 15-17 rounded, partly indistinct teeth, movable finger with

6-9 basal teeth, one broad large dentate tooth and a few distal rudimentary ones, spinneret absent, serrula exterior with 39-40, s. interior with 32-33 lamellae, rallum (Fig. 2b) with 10 (holotype) or 11 dentate setae, two proximal ones short.

Pedipalps (Fig. 2c) smooth, trochanter with small, indistinct ventral hump in distal half, 3.9 (holotype) (paratype 3.9) times longer than broad, femur slen-

der club-shaped, 9.1 (8.8) times, patella 7.9 (8.2) times, club 4.2 (4.5) times longer than broad and 1.1 (1.2) times longer than pedicel, hand with pedicel 3.5 (3.6) times, chela with pedicel 9.7 (9.9) times, without pedicel 9.3 (9.3) times longer than broad; finger 1.8 (1.8) times longer than hand with pedicel; fixed finger with 175 (176) small cusped teeth, movable finger with 175 (169) teeth, those in basal finger third rounded. Trichobothria (Fig. 2d): *ib* indistinctly distal of *esb*, 1–3 fine setae distal of *eb/esb*; trichobothrium *sb* nearer to *b* than to *st*, *st* distinctly nearer to *t* than to *sb*, sensillum  $p_2$  at base of tooth lamella on movable finger nearer to *st* than to *sb*, sensillum  $p_1$  between  $p_2$  and *st*, apparently only one ventral glandular pore distal *sb*; venom ducts very short.

Leg I: femur 7.9 (7.5) times longer than deep and 1.4 times longer than patella, patella 6.7 (6.6) longer than deep, tibia 11.7 (12.1) times, basitarsus 7.6 (6.6) times, telotarsus 10.4 (9.5) times longer than deep, telotarsus 1.2 times longer than basitarsus; leg IV (Fig. 2e, 2f): femur+patella 8.8 (9.0) times longer than deep, femur as long as or indistinctly shorter than patella, tibia 14.8 (14.6) times, one tactile seta near middle (TS=0.43/0.31), basitarsus 7.0 (6.8) times, tactile seta basal (TS=0.11/0.13), telotarsus 9.9 (9.7) times longer than deep, tactile seta near middle (TS=0.49/0.51), telotarsus 1.2 (1.2) times longer than basitarsus. Subterminal seta finely dentate in distal half, claws slender, with a tiny dorsal denticle in proximal half, arolia short.

Measurements of holotype (paratype). Total length 3.67 (4.31). Carapace 1.16/1.05 (1.26/1.05). Pedipalps: trochanter 1.04/0.27 (1.10/0.28), femur 2.29/0.25 (2.40/0.27), patella 2.20/0.28 (2.31/0.28), length of pedicel 1.04 (1.03), hand with pedicel 1.46/0.41 (1.53/0.42), pedicel 0.21 (0.23), length of finger 2.68 (2.82), of chela with pedicel 4.03 (4.16). Leg I: femur 1.39/0.18 (1.41/0.19), patella 1.01/0.15 (1.04/0.16), tibia 1.33/0.11 (1.44/0.12), basitarsus 0.80/0.11 (0.77/0.12), telotarsus 0.92/0.09 (0.93/0.10); leg IV: femur+patella 2.21/0.25 (2.31/0.26), tibia 2.29/0.16 (2.44/0.17), basitarsus 0.91/0.13 (0.94/0.14), telotarsus 1.13/0.11 (1.12/0.12).

## Discussion

This new species is differentiated from all other species from this geographical region by the very slender pedipalpal segments (e.g. femur 8.8–9.1 times; patella 7.9–8.2 times longer than broad), but it sha-

res with the here recorded species the presence of a large triangular (dentate, but frequently worn) distal tooth in the tooth row on movable cheliceral finger, the general structure of the rallum (the proximal seta very short compared to the preceding one), even if the number in *gasparoi* is distinctly higher (10–11 vs 7–8) and a similar trichobothrial pattern. It shares with *R. giachinoi* **n.sp.** the presence of only 4 setae on posterior border of carapace and anterior tergites, even if some variability is observable in *R. gasparoi* **n.sp.** *Roncus gestroi* Beier, 1930 from Northern Italy is characterized by somewhat less slender pedipalps (femur 6.1–8.3 times, patella usually 6.1–6.6 times longer than broad, but in a few populations 4.7–4.9 times, e.g. from Sprugola di Campastrino, Liguria), but differs by a longer patellar pedicel (in most cases longer than club or as long as club, but in some populations the club is 1.1–1.2 times longer than pedicel: e.g. Tanna de Strie, Liguria) and measurements (e.g. femur length max. 1.93 mm vs. min. 2.29 mm) (Gardini & Rizzerio 1986, Gardini 1993: 420–421).

## *Roncus pieperi* **n.sp.** (Fig. 3a–g)

### Specimens studied

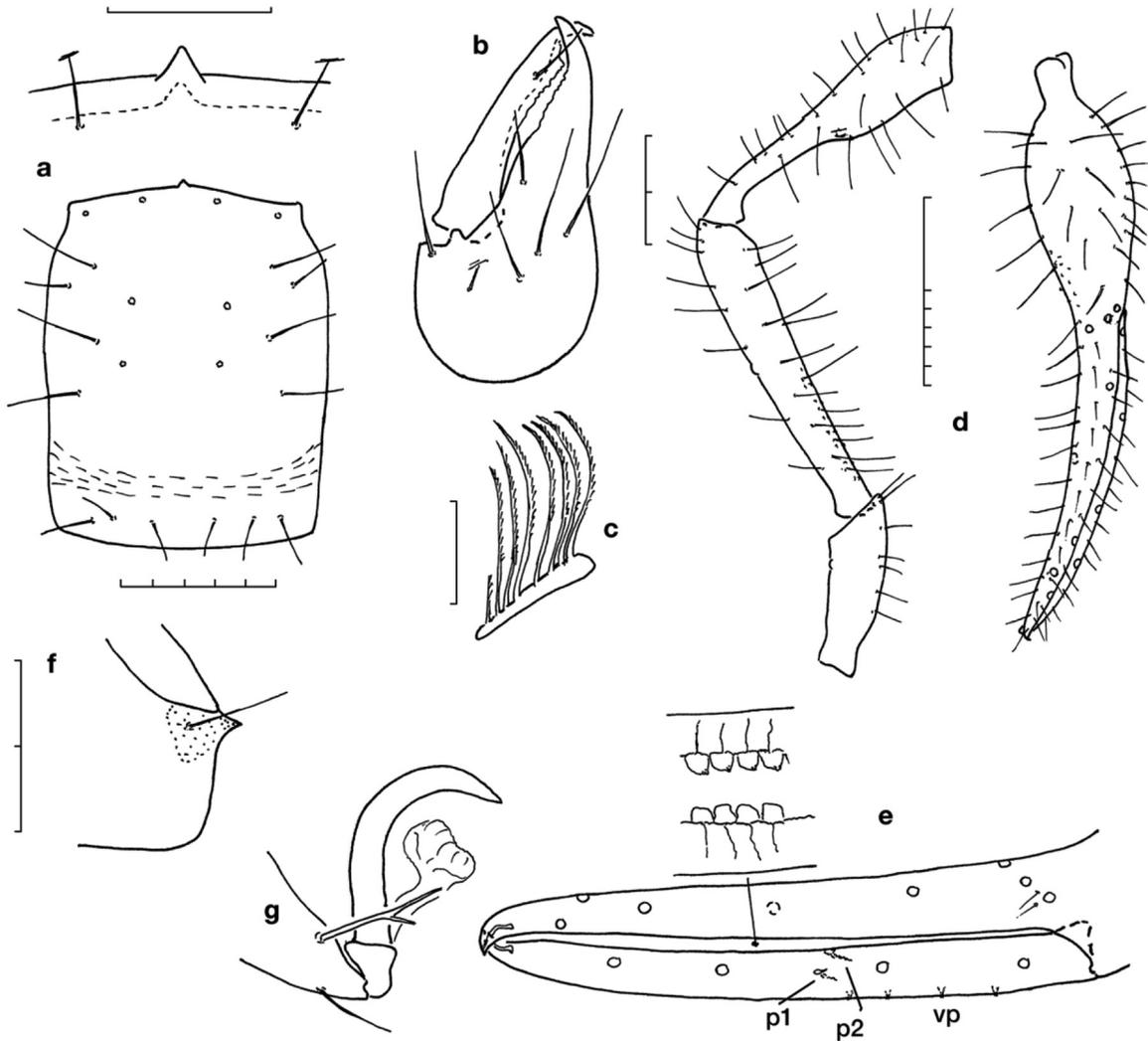
Holotype ♂, GREECE, Ionian Islands, Kefalonia, cave “Fitidi” (Phytidi) near Karavolymos near Sami, (coordinates unknown), 24. IV. 1998, leg. H. Pieper; ESE (=Hellenic Speleological Society HSS) number 3500, “grotte aux vestiges préhistoriques” (Google maps Kefalonia 83). Paratypes, 2♂ (Mus. Geneva, coll. Gardini), GREECE, Kefalonia, Sami, Spilaio Drogarati, no. 72, 38.2270°N, 20.6284°E, 40–50 meters from entrance, 15. VI. 2004, leg. F. Gasparo.

### Etymology

Named in honour of Dr Harald Pieper who first collected the species and who has been interested in pseudoscorpion taxonomy and faunistics for many years.

### Diagnosis

Morphologically near *Roncus peramae*, but it differs by the combination of the following characters. Trogl-obiont species characterized by feeble sclerotization, the absence of eyes and by the elongated pedipalps and legs; carapace with a small, but distinct triangular epistome, subbasal transverse furrow present; lateral corner of coxa I spine-like; chelicera with 6 smooth setae on hand, movable finger with a large triangular dentate tooth in the tooth row, rallum with 7–8 den-



**Fig. 3:** *Roncus pieperi* n.sp., holotype. a: Carapace, epistome enlarged; b: Left chelicera; c: Rallum; d: Left pedipalp; e: Trichobothrial pattern (without scale) ( $p_1$ ,  $p_2$ : sensilla; vp: ventral (glandular) pore); f: Coxa I, anterior corners; g: Telotarsus IV, claw and subterminal seta (without scale). Scale units 0.1 mm; scale 1.0 mm: d.

tate setae, the proximal short. Pedipalpal femur and hand partly granular, pedipalpal femur club-shaped, 5.90–6.4 times longer than broad (length 1.73–1.93), patella 4.2–4.9 times (length 1.63–1.71) (5.7–6.1 times in *R. peramae*), pedicel nearly as long as club, finger 1.5–1.6 times longer than hand with pedicel (length 1.94–2.00/1.26–1.27) and as long as or distinctly longer than femur, chela with pedicel 5.5–6.0 times longer than broad; 2 fine setae present distal of trichobothrium *eb*; tibia of leg IV shorter than femur+patella.

### Description

Carapace and pedipalps reddish brown, segments and legs yellowish. Carapace (Fig. 3a) without eyes or eye-spots, 1.1–1.2 times longer than broad, epistome distinct, small triangular, a subbasal transversal furrow present, with 22–23 setae (4/8–10/4/6). Tergites undivided, chaetotaxy: 6/6–7/8–9/8–9/9–10/8–9/10/10/11/9/6–7(4 tactile setae). Manducatory process with 4 marginal setae (1♂ with 5 on right lobe), pedipalpal coxa itself with 5–9 setae (including 1 tactile seta), coxa I smooth, with a short spine-

like lateral corner, medial corner nearly rectangular, rounded (Fig. 3f), 4-7 setae, II 6-7, III 4-5, IV 5-7; sternite II with about 16-20 setae, arranged in 2 semicircular rows; genital opening with 2-3/2-3 internal smooth setae, sternite III with 8-10 marginal and 7 medial discal setae, 3 suprastigmal setae (1♂ with 2 on left side); IV 10+ 2x3-4 suprastigmal setae, V-X: with about 12-13 setae (4 tactile setae), XI 6-8 (4 tactile setae). Pleural membranes granular.

Chelicera (Fig. 3b): hand with 6 setae, fixed finger with about 12-18 partly indistinct and worn teeth, movable finger with one larger triangular distal tooth in the tooth row and about 11 indistinct and worn teeth; spinneret absent; serrula exterior with 37-40 blades; rallum (Fig. 3c) with 8 (1♂ 7) setae, finely dentate in distal half of anterior margin, the most proximal seta one fourth of the length of the preceding one.

Pedipalps of holotype (Fig. 3d) (paratypes): trochanter 3.3 (3.3-3.5) times longer than broad, a small ventral hump present, femur club-shaped, finely granular medially in basal half (one paratype over the whole length), but without coarser granula, holotype 6.4 (5.9-6.0) times longer than broad, patella smooth, 4.2 (4.9) times longer than broad, club 1.1 (1.1-1.2) times longer than pedicel and 2.5 (2.6) times longer than broad, hand medio-distally near finger base granular, with pedicel 2.3 (2.4) times, chela with pedicel 5.5 (5.9-6.0) times, without pedicel 5.1 (5.5) times longer than broad, finger 1.5 (1.5-1.6) times longer than hand with pedicel; fixed finger with 121 (114-122), movable finger with 131 (125-129) small, uniform teeth, the basal ones on movable finger partly without cusp. Trichobothrial pattern (Fig. 3e): two fine setae distal of trichobothria *eb/esb*, *eb-esb-ib* in a straight line, *isb* slightly nearer to *ib* than to *ist*, *est-it-et* nearly equidistant near finger tip; *sb* on movable finger halfway between *b* and *st*, *st* nearer to *t* than to *sb*; sensillum  $p_2$  nearer *sb* than *st*, sensillum  $p_1$  slightly distal of it; two ventral glandular pores between *b* and *sb*, but apparently two more distal of *sb*; venom ducts very short.

Leg I: femur 4.9 (4.8-5.0) times longer than deep and 1.4 (1.4-1.5) longer than patella, patella 4.3 (4.0-4.2) times, tibia 6.9 (6.7-7.4) times, basitarsus 3.4 (4.0-4.45) times, telotarsus 6.7 (6.6-7.1) times longer than deep, basitarsus 1.1 (1.5) times longer than telotarsus; leg IV: femur+patella with vertical suture, 4.2 (4.4-5.2) times, patella indistinctly longer than femur, tibia 7.1 (8.6-10.0) times, basitarsus

3.6 (3.6-3.9) times, telotarsus 5.7 (6.9-7.0) times longer than deep, telotarsus 1.52 (1.54-1.55) times longer than basitarsus; tibia with a pseudotactile seta (TS=0.41/0.52-0.57), basitarsus with a basal tactile seta (TS=0.17/0.14-0.18), telotarsus with one tactile seta near segment middle (TS=0.41/0.37-0.39); undivided arolia shorter than smooth claws, subterminal seta smooth, forked (Fig. 3g).

Measurements of holotype (paratypes). Total length 3.6 (3.8-4.5); carapace 1.14/0.98 (1.09-1.12/0.92-0.98). Pedipalps: trochanter 0.99/0.29 (0.96-0.99/0.28-0.30), femur 1.93/0.30 (1.73-1.76/0.29-0.30), patella 1.67/0.36 (1.63-1.71/0.34-0.35), length of pedicel 0.79 (0.76-0.82), hand with pedicel 1.26/0.56 (1.26-1.27/0.53), length of pedicel 0.23 (0.24), length of chela with pedicel 3.09 (3.12-3.17), length of finger 1.94 (1.98-2.0). Leg I: femur 0.89/0.18 (0.90-0.92/0.18-0.19), patella 0.62/0.14 (0.62-0.63/0.15), tibia 0.79/0.12 (0.81-0.86/0.12), basitarsus 0.36/0.11 (0.39-0.41/0.09-0.10), telotarsus 0.68/0.10 (0.59-0.63/0.09); leg IV: femur+patella 1.45/0.35 (1.39-1.41/0.27-0.32), tibia 1.40/0.20 (1.40-1.41/0.14-0.16), basitarsus 0.47/0.13 (0.45-0.48/0.12), telotarsus 0.71/0.12 (0.70-0.74/0.10-0.11).

## Discussion

The species had been already mentioned from the Drogarati cave by Gasparo (2004) as "una nuova specie ultraevoluta del genere *Roncus* (det. G. Gardini)". *Roncus pieperi* n.sp. is morphologically near to *Roncus peramae* Helversen, 1969 described from the Perama cave near Ioannina, Epirus (Greece). The new species has a similar size, but differs from *peramae* by the presence of a distinct subbasal transversal furrow on the carapace, a stouter pedipalpal patella (4.2 times vs. 5.7-6.1 times), with stouter patellar club (2.5 times vs. 3.3-3.5 times longer than broad) and relatively longer pedicel (club 1.1 times longer than pedicel vs. 1.3-1.4 times), and relatively shorter chelal fingers (1.5 times vs. 2.0 times longer than hand with pedicel); the trochanteral hump is smaller and less distinct than in *peramae*.

The new species seems to be related to an adaptive group of species having, like *Roncus gestroi* (from caves in northern Italy), a club-shaped pedipalpal femur, granulation is present on the femur and hand, and the pedicel of the patella is nearly as long as its club. It differs clearly from *gestroi* by stouter pedipalps (e.g. femur 5.9-6.4 vs 6.1-8.3 times, patella 4.2-4.9 vs 6.1-

6.6 times (4.7-4.9 in a few populations of *R. gestroi*) and other characters. *Roncus gestroi* takes a particular position within all these species having the pedicel of patella distinctly longer than or as long as the club (ratio club length/pedicel length 0.8-1.0 times, but in a few populations 1.1-1.2 times). *Roncus insularis* Beier, 1939 (from the Dalmatian island Brazza) is smaller in size, possesses stouter pedipalps and has no distinct epistome on the carapace; *Roncus beieri* Caporiacco, 1947 from a cave near Siena (Toscana, Italy) has similar slender pedipalpal proportions, but is smaller (femur length 1.60 mm vs. 1.93 mm), the patellar pedicel is relatively shorter (Gardini & Rizzerio 1986). Some recently described species (e.g. *Roncus talason* Ćurčić et al, 1993 from Vaskova Dupka Cave, southeastern Serbia, *Roncus jarevid* Ćurčić in Ćurčić et al. 2013 from the Gornja Lenovacka Pécina Cave, Lenovac, or *R. crnobog* Ćurčić in Ćurčić et al. 2013 from the Ogorelicka Pécina Cave, Sicévo, from eastern Serbia) might also belong to this group, but differ clearly from all the new species by stouter pedipalps (femur at most 5.4 times, patella 3.42 times longer than broad vs. at least 5.9 times and 4.2 times longer than broad) and lesser size. Their affinities to *Roncus giganteus* and *R. corcyraeus* ssp. should be verified. In the last three decades about 58 species or subspecies of *Roncus* have been described from the Balkan region by Ćurčić and co-workers, most of them being of epigean morphology. Relationships of all those species must be clarified.

### Additional records

#### *Roncus giganteus* Mahnert, 1973

*Roncus (R.) giganteus* Mahnert 1973b: 32-33, Figs 25-34.

### Specimens studied

2♀ 1♂, (coll. Gardini, 1♀ Mus. Geneva), GREECE, Zakynthos, Jiri, Spilia tou Chajoti, 37.7956°N, 20.7630°E, 400m, 28.VI.1999, leg. F. Gasparo.

The species has been described from epigean habitats on Zakynthos (Mahnert 1973b) and subsequently recorded from the Spilia tou Chajoti by Mahnert (1975). The specimens correspond perfectly to the original description; two fine setae between the trichobothria *eb-esb*; sensillum  $p_2$  nearly halfway between *sb* and *st*,  $p_1$  slightly distal of it; apparently only one ventral glandular pore present, nearer to *sb* than to *b*.

### Key to the *Roncus* species recorded from caves in Western Greece

- 1 Species without troglomorphic adaptations; patella of pedipalps stout, at most 2.9 times longer than broad. . . . . 2
  - Species with distinct troglomorphic adaptations; patella of pedipalps more slender, at least 4.2 times longer than broad . . . . . 5
- 2 Small species, length of pedipalpal femur 0.73-0.93 mm, of patella 0.59-0.77 mm; femur 3.56-3.92 times, patella 2.26-2.49 times, chela with pedicel 3.19-3.52 times longer than broad; carapace without eyes . . . . . *Roncus lubricus* auct.
  - Species of larger size, length of pedipalpal femur at least 1.06 mm, of patella at least 0.85 mm, pedipalps more slender (femur at least 3.9 times longer than broad). . . . . 3
- 3 Carapace without eyes or with two small indistinct ones. . . . . 4
  - Carapace with two distinct eyes; pedipalpal femur 4.3-5.0 times (length 1.46-1.70 mm), patella 2.5-2.9 times longer than broad (length 1.10-1.20 mm) . . . . . *Roncus giganteus* Mahnert
- 4 Length of pedipalpal femur 1.28-1.44 mm, of patella 1.10-1.20 mm, of chela with pedicel 2.59-2.77 mm; serrula exterior of chelicera with 39-41 blades . . . . . *Roncus c. corcyraeus* Beier
  - Length of pedipalpal femur 1.06-1.07 mm, of patella 0.85-0.93 mm, of chela with pedicel 1.92-1.97 mm; serrula exterior of chelicera with 33-35 blades . . . . . *Roncus corcyraeus minor* Mahnert
- 5 Pedipalps very slender, pedipalpal femur at least 6.9 times, patella 5.7 times, chela with pedicel 6.4 times longer than broad . . . . . 6
  - Pedipalps less slender, femur 5.9-6.4 times (length 1.76-1.93 mm), patella 4.2-4.9 times (length 1.67-1.71 mm), chela with pedicel 5.5-6.0 times longer than broad (length 3.09-3.19 mm) . . . . . *Roncus pieperi* n.sp.
- 6 Species of large size and very slender pedipalps, femur 8.8-9.1 times (length 2.29-2.40 mm), patella 7.9-8.2 times (length 2.20-2.31 mm), chela with pedicel 9.7-9.9 times longer than broad (length 4.03-4.16 mm) . . . . . *Roncus gasparoi* n.sp.
  - Smaller species with slightly stouter pedipalps, femur at most 7.6 times (length at most 2.09 mm), patella at most 6.5 times (length at most 1.91 mm), chela with pedicel at most 7.5 times longer than broad (length at most 3.60 mm) . . 7

- 7 Posterior border of carapace and tergite I with only 4 setae, tergite II with 4-5 setae; lateral corner of coxa I finger-like and indistinctly dentate ..... *Roncus giachinoi* n.sp.
- Posterior border of carapace and tergite I with 6 setae, tergite II with 6-7 setae; lateral corner of coxa I acute, triangular ..... *Roncus peramae* Helversen

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