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***Allochernes solarii* (Pseudoscorpiones: Chernetidae) newly recorded from ant nests in Slovakia**

Martina Červená, Jana Christophoryová, Adrián Purkart & Katarína Krajčovičová



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Abstract. *Allochernes solarii* (Simon, 1898) is recorded for the first time from Slovakia. Six adults and two tritonymphs were found in two nests of *Formica gagates* Latreille, 1798. A description of the species is provided based on Slovakian specimens and the holotype from Italy.

Keywords: Central Europe, faunistics, *Formica gagates*, myrmecophily, taxonomy

Zusammenfassung. *Allochernes solarii* (Pseudoscorpiones: Chernetidae) erstmals in Ameisenbauten in der Slowakei nachgewiesen. *Allochernes solarii* (Simon, 1898) wird das erste Mal für die Slowakei nachgewiesen. Sechs Adulte und drei Tritonymphen wurden in zwei Ameisenbauten von *Formica gagates* Latreille, 1798 gefunden. Die Art wird auf Basis slowakischer Tiere und des Holotypus aus Italien beschrieben.

The genus *Allochernes* Beier, 1932 includes 33 species and one subspecies distributed mainly in the northern hemisphere. So far, 15 of them have been discovered in Europe (Harvey 2013). *Allochernes solarii* (Simon, 1898) can be considered as a rare species, since it has been found, until the current study, only in the north of Italy, Sardinia and in the south of France (Gestro 1904, Leclerc 1979, Gardini 2000, 2004) (Fig. 1). The species was originally described as *Chelifer solarii* by Simon (1898) from Monte Capraro near Tortona, Piedmont, Italy and subsequently transferred to the genus *Allochernes* by Beier (1932). Gestro (1904) mentioned its occurrence in Sardinia which was questioned by Lazzeroni (1969a). Lazzeroni (1969a) recorded *A. solarii* from Montecchio near Verona, Venetia, under a stone next to a mountain station. Leclerc (1979) published a record from a small cave with colony of bats located in Ruoms à Labeaument, Ardèche, France. However, Leclerc's (1979) identification of *A. solarii* is doubtful since the author indicated differences in characters between the French specimens and the description in Beier (1932). Records of the species



Fig. 2: One individual of *Allochernes solarii* crawling on a stone in a *Formica gagates* nest in Slovakia (photo: A. Purkart)



Fig. 1: Distribution of *Allochernes solarii*. Abbreviations: Blue triangle – the type locality of the species in Italy (IT), green circle – localities in Italy, Sardinia and France (FR), yellow star – newly discovered locality in Slovakia (SK)

from Riva Valdobbia near Vercelli (Piedmont) and Mt. Pastello near Verona (Venetia), both from ant nests (*Formica* sp., *Lasius* sp.), were mentioned by Gardini (2004). In Slovakia, three *Allochernes* species are known: *A. peregrinus* Lohmander, 1939, *A. powelli* (Kew, 1916) and *A. wideri* (C.L. Koch, 1843) (Christophoryová et al. 2011, 2012). The aim of the present paper is to describe the newly found specimens of *A. solarii* from Slovakia and re-describe the holotype from Italy.

Material and methods

Slovakian specimens were collected from two nests of *Formica gagates* Latreille, 1798 (det. Adrián Purkart) (Fig. 2). Both ant nests (distance from each other was at most four meters) were situated under stones and consisted mainly of soil and leaf litter. After rolling the stone, two pseudoscorpions were observed crawling on the stone and on the surface of the ant nest. Two more expeditions were carried out at the study locality. The specimens were collected individually and in addition samples from the centre of ant nests were taken and heat extracted in Tullgren funnels. Collected specimens were studied as temporary slide mounts using lactic acid and photographed using a Canon EOS 1100D camera connected to a Zeiss Stemi 2000-C stereomicroscope. Measurements were taken from the photographs using the AxioVision 40LE application (v. 4.5). Nomenclature follows Harvey (2013). Taken measurements and terminology largely follow Chamberlin (1931). The use of the terms rallum, antiaxial and paraxial fol-

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lows Judson (2007). Figures were drawn using a Leica drawing tube. The species was identified using the keys of Beier (1932, 1963) and was compared with the holotype (MSNG 60888) from Museo Civico di Storia Naturale “Giacomo Doria”, Genoa, Italy. The new pseudoscorpion material is deposited in the collection of the Department of Zoology in Faculty of Natural Science, Comenius University in Bratislava.

Faunistic data

Three males, three females and two tritonymphs of *A. solarii* were found in an oak-hornbeam forest, in ant nests of *F. gagates* in Vajnorská Hora (Malé Karpaty Mts., district Bratislava–Vajnory), Slovakia (48.23209°N, 17.17698°E, 280 m a.s.l.) (Fig. 1):

11.IV.2018: 2 ♂♂, individual sampling (ant nest 1), leg. A. Purkart; 3.V.2018: 1 ♂, 3 ♀♀, 1 tritonymph, individual sampling and heat extraction in Tullgren funnels (ant nest 1), leg. M. Červená, K. Krajčovičová, A. Purkart; 26.VI.2018: 1 tritonymph, heat extraction in Tullgren funnels (ant nest 2), leg. J. Christophoryová, M. Červená, A. Purkart.

Holotype female from Italy (Museo Civico di Storia Naturale “Giacomo Doria”, Genoa, 60888), Montecaprarò near Tortona, Fabbrica Curone, Piemonte, 44.733°N, 9.167°E, ca. 780 m a.s.l. (Simon 1898, Harvey 2013).

Results

Allochernes solarii (Simon, 1898)

Chelifer Solarii Simon 1898: 23–24; Gestro (1904): 14.

Allochernes (Allochernes) solarii (Simon): Beier (1932): 150, Fig. 160a.

Allochernes solarii (Simon): Roewer (1937): 297; Vachon (1938): Fig. 56g; Beier (1963): 267–268, Fig. 268; Lazzeroni (1969a): 409; Lazzeroni (1969b): 244; Leclerc (1979): 62; Harvey (1991): 538; Gardini (1995): 7; Gardini (2000): 132; Gardini (2004): 131.

Re-description of the holotype from Italy

Female (Tab. 1)

Body and palpal setae short, clavate and dentate. Carapace finely granular with two narrow transverse furrows, eyes absent. Tergite XI without tactile setae. Cheliceral hand with five setae – two acuminate and three dentate, cheliceral movable finger with one seta, rallum with three blades – first two blades denticulate anteriorly. Chelal palps slender, movable chelal finger with venom apparatus, standard number of trichobothria (eight on fixed and four on movable chelal finger), chelal fingers with paraxial and antiaxial teeth on dorsal and ventral side. Tarsus of leg IV without tactile or pseudotactile setae. Claws simple, without dentation. Body measurements as in Tab. 1.

Chaetotaxy of carapace: 57 setae, 29 of which on anterior disk, 17 on medial disk and 11 behind posterior transverse furrow. Chaetotaxy of tergites (right + left hemitergite): I: 5+4, II: 6+4, III: 5+5, IV: 6+6, V: 6+6, VI: 6+6, VII: 6+6, VIII: 8+7, IX: 6+7, X: 6+5, XI: 4+4. Chaetotaxy of sternites (right + left hemisternite): IV: 4+3, V: 10+9, VI: 8+9, VII: 9+10, VIII: 9+9, IX: 7+7, X: 8+7, XI: 3+3.

Anterior genital operculum with 19 acuminate setae. Serrula exterior with 20 blades. Palps: fixed chelal finger with 53 marginal teeth, 7 antiaxial accessory teeth and 3 paraxial accessory teeth; movable chelal finger with 61 marginal teeth, 6 antiaxial accessory teeth and 2 paraxial accessory teeth.

Remarks: Cheliceral galea, chaetotaxy of posterior genital operculum and lyrifissures of anterior and posterior genital operculum not visible.

Description of adults from Slovakia (Figs 3–4): with the same general characters as the holotype. Body measurements as in Tab. 1.

Females (3 specimens; Tab. 1; Fig. 3a)

Chaetotaxy of carapace: 66–75 setae, 32–40 of which on anterior disk, 17–22 on medial disk and 12–16 behind posterior transverse furrow. Chaetotaxy of tergites (right + left hemitergite): I: 4–5 + 4–5, II: 5 + 5–6, III: 5–6 + 5, IV: 6–8 + 6–7, V: 7 + 7–8, VI: 7–8 + 7, VII: 7–9 + 7–10, VIII: 7–8 + 7–8, IX: 6–7 + 6–7, X: 6–7 + 6–7, XI: 4–5 + 4–5. Chaetotaxy of sternites (right + left hemisternite): IV: 3–4 + 3–5, V: 9–12 + 10–11, VI: 10–23 + 11–12, VII: 11–12 + 9–10, VIII: 10–12 + 9–11, IX: 8–9 + 8–9, X: 7–9 + 7–8, XI: 4–5 + 4–5.

Anterior genital operculum with 18–20 acuminate setae and 2 lyrifissures, posterior with 10–14 acuminate setae and 13–15 lyrifissures (Fig. 4a). Cheliceral galea with 6 terminal rami (Fig. 4b); serrula exterior with 18–19 blades. Palps: fixed chelal finger with 59–62 marginal teeth, 6–7 antiaxial accessory teeth and 2–3 paraxial accessory teeth; movable chelal finger with 62–64 marginal teeth, 6 antiaxial accessory teeth and 1–2 paraxial accessory teeth.

Males (3 specimens; Tab. 1; Fig. 3b)

Chaetotaxy of carapace: 72–80 setae, 37–43 of which on anterior disk, 19–22 on medial disk and 15–16 behind posterior transverse furrow. Chaetotaxy of tergites (right + left hemitergite): I: 4–5 + 4–5, II: 5–6 + 5–6, III: 5–7 + 5–6, IV: 7–8 + 7, V: 7–8 + 7–8, VI: 7 + 7–8, VII: 7–8 + 7–8, VIII: 6–8 + 7–8, IX: 6–7 + 7–8, X: 6–7 + 6–7, XI: 5–6 + 5–7. Chaetotaxy of sternites (right + left hemisternite): IV: 3–4 + 4–5, V: 11–12 + 11–12, VI: 10–12 + 10–11, VII: 11 + 10–12, VIII: 9–10 + 9–10, IX: 9 + 8–9, X: 7–9 + 7–8, XI: 5 + 5–6.

Anterior genital operculum with 25–27 acuminate setae, posterior with 12–13 acuminate setae. Cheliceral galea with 4 terminal rami; serrula exterior with 18 blades. Palps: fixed chelal finger with 59–64 marginal teeth, 6 antiaxial accessory teeth and 2 paraxial accessory teeth; movable chelal finger with 62–65 marginal teeth, 6 antiaxial accessory teeth and 1 paraxial accessory tooth (Fig. 4c).

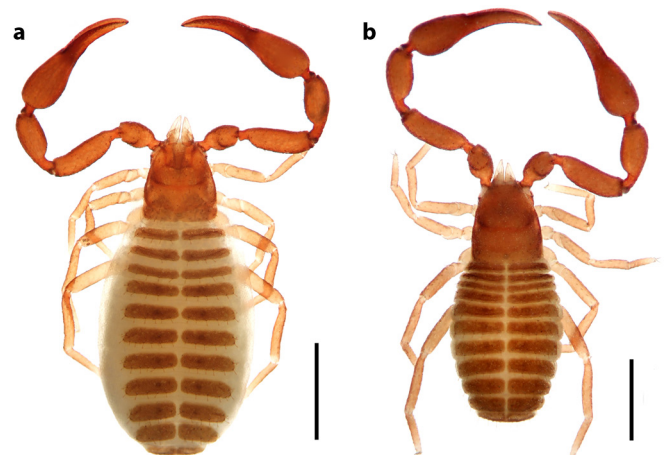


Fig. 3: *Allochernes solarii*, newly discovered specimens from Slovakia. **a.** Female; **b.** Male. Scale lines: 1 mm

Tab. 1: Morphometric data of *Allochernes solarii* for the type specimen from Italy and newly found specimens from Slovakia (in mm). Abbreviations: M – median, Max – maximum, Min – minimum, n – number of measured specimens, x – average

Characteristics	Type, Italy		Newly discovered specimens, Slovakia				
	♀ (n = 1)	♂♂ (n = 3)		♀♀ (n = 3)		Tritonymphs (n = 2)	
		Min–Max	M/x	Min–Max	M/x	Min–Max	M/x
Body, length	2.59	2.68–2.92	2.90/2.83	3.17–3.31	3.22/3.23	2.18–2.47	2.33/2.33
Carapace, length	0.85	0.80–0.82	0.81/0.81	0.82–0.84	0.84/0.83	0.64–0.66	0.65/0.65
Carapace, posterior width	0.82	0.77–0.83	0.81/0.80	0.79–0.80	0.80/0.80	0.60–0.67	0.64/0.64
Carapace, length/posterior width ratio	1.04	0.98–1.04	1.01/1.01	1.03–1.06	1.05/1.05	0.99–1.07	1.03/1.03
Chelicera, length	0.28	0.30–0.33	0.31/0.31	0.28–0.34	0.28/0.30	0.22–0.25	0.24/0.24
Chelicera, width	0.14	0.15–0.15	0.15/0.15	0.14–0.14	0.14/0.14	0.11–0.11	0.11/0.11
Chelicera, length/width ratio	2.00	2.00–2.20	2.07/2.09	2.00–2.43	2.00/2.14	2.00–2.27	2.14/2.14
Cheliceral movable finger, length	0.21	0.23–0.24	0.24/0.24	0.21–0.24	0.24/0.23	0.18–0.19	0.19/0.19
Palpal trochanter, length	0.47	0.42–0.47	0.44/0.44	0.40–0.40	0.40/0.40	0.32–0.35	0.34/0.34
Palpal trochanter, width	0.26	0.23–0.26	0.25/0.25	0.21–0.23	0.23/0.22	0.19–0.19	0.19/0.19
Palpal trochanter, length/width ratio	1.81	1.62–2.04	1.76/1.81	1.74–1.90	1.74/1.79	1.68–1.84	1.76/1.76
Palpal femur, length	0.82	0.78–0.83	0.82/0.81	0.71–0.75	0.71/0.72	0.47–0.50	0.49/0.49
Palpal femur, width	0.24	0.24–0.26	0.26/0.25	0.20–0.23	0.21/0.21	0.20–0.20	0.20/0.20
Palpal femur, length/width ratio	3.42	3.15–3.25	3.19/3.20	3.26–3.55	3.38/3.40	2.35–2.50	2.43/2.43
Palpal patella, length	0.74	0.69–0.76	0.76/0.74	0.63–0.70	0.66/0.66	0.46–0.48	0.47/0.47
Palpal patella, width	0.26	0.28–0.29	0.29/0.29	0.24–0.25	0.25/0.25	0.21–0.21	0.21/0.21
Palpal patella, length/width ratio	2.85	2.46–2.62	2.62/2.57	2.52–2.80	2.75/2.69	2.19–2.29	2.24/2.24
Palpal hand, length with pedicel	0.75	0.72–0.78	0.77/0.76	0.64–0.69	0.67/0.67	0.54–0.56	0.55/0.55
Palpal hand, length without pedicel	0.65	0.64–0.71	0.68/0.68	0.56–0.59	0.59/0.58	0.46–0.50	0.48/0.48
Palpal hand, width	0.35	0.36–0.37	0.36/0.36	0.32–0.36	0.32/0.33	0.27–0.27	0.27/0.27
Palpal hand, length/width ratio	2.14	2.00–2.17	2.08/2.08	1.92–2.09	2.00/2.00	2.00–2.07	2.04/2.04
Palpal finger, length	0.83	0.77–0.84	0.77/0.79	0.69–0.73	0.71/0.71	0.52–0.52	0.52/0.52
Palpal finger, length/palpal hand length	1.11	0.92–1.01	0.94/0.95	0.93–0.95	0.94/0.94	1.04–1.08	1.06/1.06
Palpal chela, length	1.51	1.40–1.52	1.51/1.48	1.27–1.43	1.34/1.35	0.97–1.00	0.99/0.99
Palpal chela, width	0.35	0.36–0.37	0.36/0.36	0.32–0.36	0.32/0.33	0.27–0.27	0.27/0.27
Palpal chela, length/width ratio	4.31	3.89–4.22	4.08/4.06	3.97–4.19	3.97/4.04	3.59–3.70	3.65/3.65
Leg I trochanter, length	0.19	0.19–0.19	0.19/0.19	0.19–0.21	0.20/0.20	0.14–0.14	0.14/0.14
Leg I trochanter, depth	0.14	0.13–0.13	0.13/0.13	0.13–0.14	0.14/0.14	0.11–0.11	0.11/0.11
Leg I trochanter, length/depth ratio	1.36	1.46–1.46	1.46/1.46	1.43–1.50	1.46/1.46	1.27–1.27	1.27/1.27
Leg I femur, length	0.23	0.20–0.21	0.21/0.21	0.19–0.25	0.20/0.21	0.15–0.16	0.16/0.16
Leg I femur, depth	0.14	0.14–0.14	0.14/0.14	0.14–0.16	0.14/0.15	0.11–0.11	0.11/0.11
Leg I femur, length/depth ratio	1.64	1.43–1.50	1.50/1.48	1.36–1.56	1.43/1.45	1.36–1.45	1.41/1.41
Leg I patella, length	0.49	0.42–0.47	0.43/0.44	0.43–0.49	0.45/0.46	0.27–0.27	0.27/0.27
Leg I patella, depth	0.13	0.12–0.12	0.12/0.12	0.11–0.13	0.11/0.12	0.10–0.10	0.10/0.10
Leg I patella, length/depth ratio	3.77	3.50–3.92	3.58/3.67	3.77–4.09	3.91/3.92	2.70–2.70	2.70/2.70
Leg I tibia, length	0.45	0.44–0.46	0.46/0.45	0.44–0.48	0.45/0.46	0.26–0.28	0.27/0.27
Leg I tibia, depth	0.10	0.09–0.09	0.09/0.09	0.09–0.10	0.09/0.09	0.08–0.08	0.08/0.08
Leg I tibia, length/depth ratio	4.50	4.89–5.11	5.11/5.04	4.80–5.00	4.89/4.90	3.25–3.50	3.38/3.38
Leg I tarsus, length	0.46	0.46–0.48	0.46/0.47	0.46–0.48	0.47/0.47	0.30–0.33	0.32/0.32
Leg I tarsus, depth	0.08	0.07–0.07	0.07/0.07	0.07–0.08	0.08/0.08	0.07–0.07	0.07/0.07
Leg I tarsus, length/depth ratio	5.75	6.57–6.86	6.57/6.67	5.75–6.71	6.00/6.15	4.29–4.71	4.50/4.50
Leg IV trochanter, length	0.34	0.28–0.32	0.29/0.30	0.30–0.34	0.30/0.31	0.20–0.23	0.22/0.22
Leg IV trochanter, depth	0.16	0.16–0.16	0.16/0.16	0.14–0.16	0.15/0.15	0.14–0.14	0.14/0.14
Leg IV trochanter, length/depth ratio	2.13	1.75–2.00	1.81/1.85	2.00–2.14	2.13/2.09	1.43–1.64	1.54/1.54
Leg IV femoropatella, length	0.80	0.78–0.78	0.78/0.78	0.63–0.80	0.79/0.74	0.46–0.50	0.48/0.48
Leg IV femoropatella, depth	0.14	0.15–0.15	0.15/0.15	0.12–0.14	0.14/0.13	0.10–0.10	0.10/0.10
Leg IV femoropatella, length/depth ratio	5.71	5.20–5.20	5.20/5.20	5.25–5.71	5.64/5.54	4.60–5.00	4.80/4.80
Leg IV tibia, length	0.68	0.63–0.69	0.69/0.67	0.54–0.65	0.63/0.61	0.38–0.41	0.40/0.40
Leg IV tibia, depth	0.10	0.10–0.10	0.10/0.10	0.10–0.11	0.10/0.10	0.09–0.09	0.09/0.09
Leg IV tibia, length/depth ratio	6.80	6.30–6.90	6.90/6.70	5.40–6.30	5.91/5.87	4.22–4.56	4.39/4.39
Leg IV tarsus, length	0.53	0.52–0.59	0.59/0.57	0.43–0.55	0.51/0.50	0.32–0.35	0.34/0.34
Leg IV tarsus, depth	0.08	0.09–0.09	0.09/0.09	0.08–0.08	0.08/0.08	0.08–0.08	0.08/0.08
Leg IV tarsus, length/depth ratio	6.63	5.78–6.56	6.56/6.30	5.38–6.88	6.38/6.21	4.00–4.38	4.19/4.19

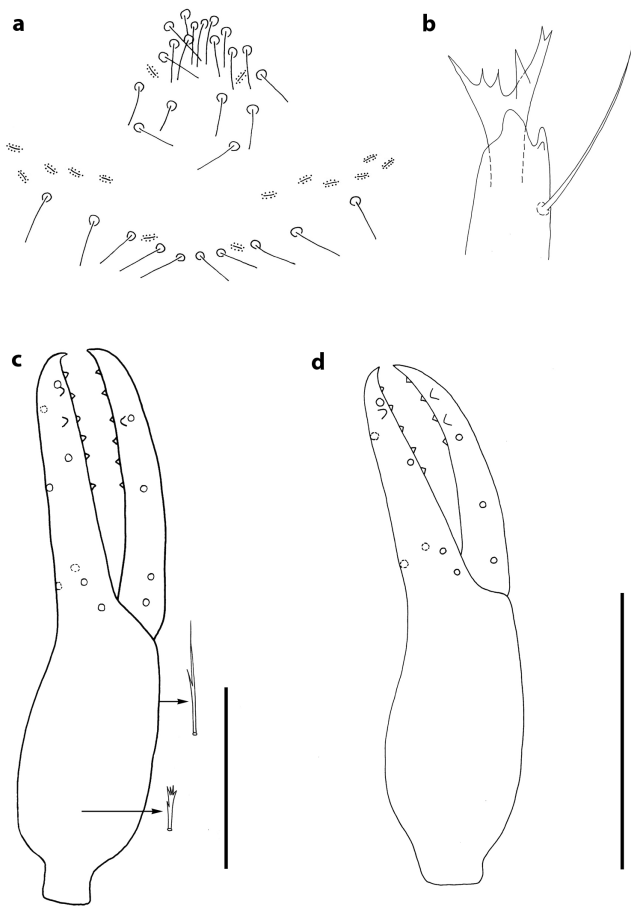


Fig. 4: *Allochernes solarii*, details of newly discovered specimens from Slovakia. **a.** Chaetotaxy of genital operculum, female; **b.** Galea, female; **c.** Palpal chela with trichobothrial pattern, accessory teeth and setae details, male; **d.** Palpal chela with trichobothrial pattern and accessory teeth, tritonymph. Scale lines: 0.5 mm

Description of tritonymphs

Tritonymphs share the following characters with adults: morphology of setae on body and palps, granulation of carapace, absence of a pair of tactile setae on tergite XI, cheliceral hand with five setae, movable cheliceral finger with one seta, cheliceral rallum of three blades, presence of venom apparatus in movable chelal finger, tarsus of leg IV without tactile or pseudotactile setae. Body measurements are given in Tab. 1.

Tritonymphs (2 specimens; Tab. 1)

Chaetotaxy of carapace: 59–60 setae, 31 of which on anterior disk, 18 on medial disk and 10–11 behind posterior transverse furrow. Chaetotaxy of tergites (right + left hemitergite): I: 4–5 + 4, II: 4–5 + 4, III: 5 + 5, IV: 5–6 + 6–7, V: 6–7 + 6–7, VI: 6–7 + 7–8, VII: 6 + 6, VIII: 6–7 + 6–7, IX: 6 + 6–7, X: 6–7 + 6, XI: 4–5 + 4–5. Chaetotaxy of sternites (right + left hemisternite): IV: 2–3 + 4, V: 8 + 9, VI: 8–10 + 10–11, VII: 9 + 7–9, VIII: 8–9 + 7–9, IX: 6–8 + 8, X: 6 + 7, XI: 4 + 4–5. Cheliceral galea with 6 terminal rami; serrula exterior with 15–18 blades. Palps: six trichobothria on fixed and three on movable chelal finger; fixed chelal finger with 46–49 marginal teeth, 5 antiaxial accessory teeth and 1–2 paraxial accessory teeth; movable chelal finger with 47–49 marginal teeth, 4 antiaxial accessory teeth and 1–2 paraxial accessory teeth (Fig. 4d).

Identification key to the *Allochernes* species from Slovakia

- 1 Tergite XI with a pair of relative long tactile setae *Allochernes peregrinus*
- Tergite XI without long tactile setae 2
- 2 Pedal tarsus IV with subdistal pseudotactile seta *Allochernes powelli*
- Pedal tarsus IV without subdistal pseudotactile seta 3
- 3 Chelal finger shorter than hand with pedicel, palpal chela 1.06–1.23 mm long. *Allochernes wideri*
- Chelal finger of same length as or longer than hand with pedicel, palpal chela 1.27–1.52 mm long *Allochernes solarii*

Discussion

The first proper redescription of *A. solarii* was carried out by Beier (1932, repeated in 1963) based on the holotype specimen from Piedmont, Italy. With respect to the previous descriptions (Simon 1898, Beier 1932, 1963), the following characters are added in the present paper based on the holotype and newly found specimens from Slovakia: chaetotaxy of the carapace, tergites, sternites and genital area, description of galea and complete body measurements.

A few differences are notable between our measurement values of the holotype and that published in Beier (1932, 1963). Beier (1932, 1963) recorded values: “length of palpal hand with pedicel – 0.83 mm” and “length of chelal finger – 0.77 mm”. Our measurements showed values of palpal hand with pedicel – 0.75 mm and of chelal finger – 0.83 mm. According to our observations, the measurement values of palpal length hand with pedicel and chelal finger length in Beier (1932, 1963) seem to have been inverted by mistake. The type specimen was to certain extent damaged and lightened; only one chelicera with no evident galea was present.

Specimens of *A. solarii* from Slovakia were compared with the female holotype from Italy reported in Beier (1932, 1963). The main taxonomic characters of the Slovakian specimens correspond with those observed on the holotype, although a few differences were observed. The number of setae on the carapace in the Slovakian specimens was significantly higher than that of the holotype. Only one specimen from Slovakia shows seven antiaxial teeth and the two studied specimens show three paraxial teeth on the fixed chelal fingers as were present on the holotype. Compared to the holotype, the body length of females found in Slovakia was higher. According to our current knowledge it seems that *A. solarii* is a rare species whose ecology is unknown. Gardini (2004) assumed that it could be myrmecophilous, which corresponds to the new findings in nests of *Formica gagates* in Slovakia.

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