

Description of all developmental stages of *Allochernes peregrinus* Lohmander, 1939 (Pseudoscorpiones, Chernetidae)

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Abstract. An illustrated description of all developmental stages of the pseudoscorpion species *Allochernes peregrinus* Lohmander, 1939 is provided based on morphology and morphometrics. During the research, 48 specimens of *Allochernes peregrinus* were studied, with 46 of them collected in the Czech Republic and two in Slovakia. The analysis of female materials updated the known variability of morphological and morphometric characters, and the first descriptions of males and nymphs are given here. The main determination characters of the species are compared with those of other species in the genus *Allochernes* occurring mainly in neighbouring European countries. Habitat distribution of *A. peregrinus* is briefly discussed.

Keywords: Pseudoscorpiones, *Allochernes peregrinus*, Czech Republic, Slovakia,
morphology, morphometric analysis, taxonomy.

Introduction

Pseudoscorpions represent an arachnid order of a medium diversity. Europe represents the best documented continent, with a known pseudoscorpion fauna of about 760 species (Harvey 2007). The genus *Allochernes* Beier, 1932 includes 31 species and 2 subspecies, and it is spread in North Africa and widespread in Asia and Europe (Harvey 2009). The pseudoscorpion *Allochernes peregrinus* Lohmander, 1939 is distributed across several countries of Central and Northern Europe (Fig. 1A) – Austria, Czech Republic, Germany, Hungary, Poland, Slovakia, Switzerland and Sweden, and in the USA (DeVore-Scribante 1999, Harvey 2009). The species was described by Lohmander (1939) from Sweden based on one phoretic female attached to the leg of the fly *Delia floralis* (Fallén, 1824) (syn. *Hylemyia floralis*). Almost 30 years later, Rafalski (1967) recorded specimens of this species in Poland in deeper soil layers and under the stones sunken into soil, but he did not specify which developmental stages were found. Mahnert (1983) gave more data on morphological and morphometric characteristics of one female specimen sampled in Hungary. The first male of *A. peregrinus* was found by Muchmore (1972, 1990) in beech leaf litter in New Hampshire, USA. Muchmore

(1972) noted that a single specimen was not sufficient for indisputable assignment to this species. Some adults were later recorded in Central Europe without any notes concerning their determination characters – in Germany (Droglá 1983, Platen et al. 1995, Droglá & Lippold 2004), Slovakia (Krupálová & Krumpál 1993, Christophoryová & Krumpál 2007, 2010), Czech Republic (Ducháč 1995, 1999) and Austria (Mahnert 2004). Several morphological and morphometric features of adults and tritonymphs were presented in the unpublished theses of DeVore-Scribante (1999) and Ducháč (2002). Two females of *Allochernes* aff. *peregrinus* were collected in Azerbaijan by Dashdamirov (1999). Until present only isolated records of *A. peregrinus* were known from the Czech Republic and Slovakia (Krupálová & Krumpál 1993, Ducháč 1995, 2002, Christophoryová & Krumpál 2007, 2010). Therefore this species was listed in the Red Data Book of the Czech Republic as vulnerable (Štáhlavský & Ducháč 2005).

Incomplete (and unpublished) description of males of *A. peregrinus*, together with the description of females based only on a few specimens poorly reflecting intraspecific variability and missing description of nymphs, led us to elaborate these materials in more detail including i) description of all developmental stages of *A. peregrinus* in

detail, ii) variability of morphological and morphometric characteristics, and iii) summarization of all available data concerning distribution and habitat preferences in Europe.

Materials and Methods

In total 48 specimens of *Allochernes peregrinus* were examined (15 females, 15 males, 10 tritonymphs, 6 deutonymphs, 2 protonymphs). Forty-six of them were sampled in the Czech Republic in fragmented forest landscape of the Český kras Protected Landscape Area in Central Bohemia (Fig. 1B). During 2008–2009 soil sampling and pitfall trapping were used as methods in a set of selected forest fragments. Individual sampling sites repre-

sented seven forest plant associations characteristic for the given area: thermophilous oak (TO), mesophilous oak-hornbeam (MOH), thermophilous oak-hornbeam (TOH), acidophilous oak (AO), basiphilous oak (BO), plantations of deciduous (DP) and coniferous (CP) trees. At each site, five soil samples (area of each 625 cm², depth ca 10 cm) were taken in spring and autumn and specimens were heat extracted from samples in modified Kempson apparatus. Five pitfall traps (each with diameter 9 cm and formaldehyde killing-preserving solution) with a year continual exposition and monthly sampling intervals were used at each study site. Two adults from Slovakia (Fig. 1B) were included to the morphological and morphometric analysis, findings of which were already published (Christophoryová & Krumpál 2007, 2010).

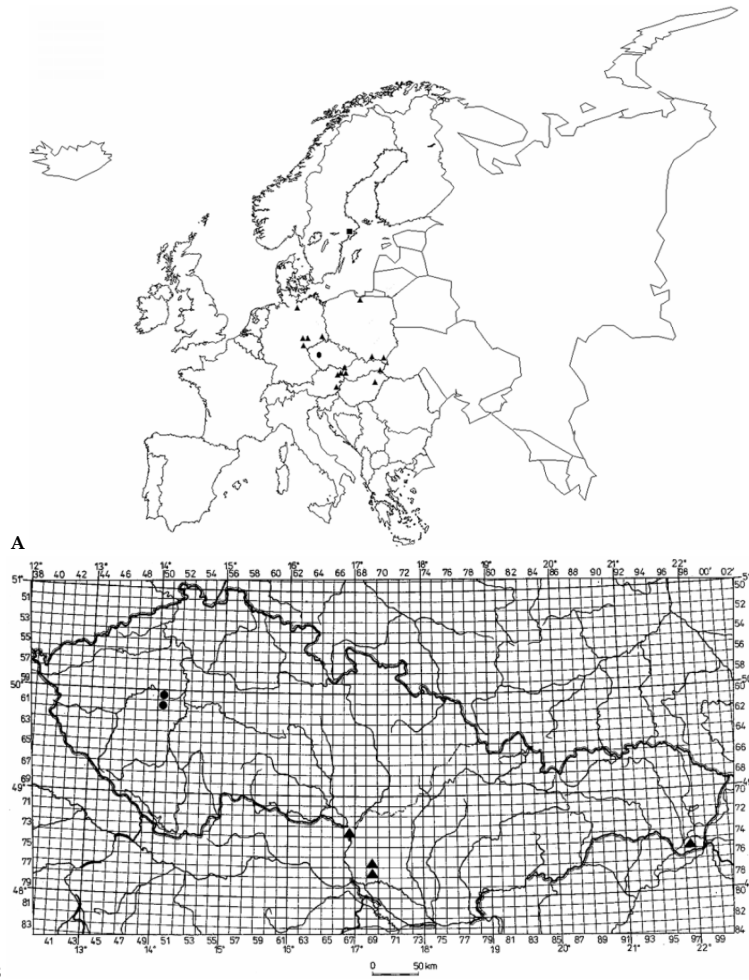


Figure 1. Distribution of *Allochernes peregrinus* in Europe (A) with the detail of distribution in the Czech Republic and Slovakia (B). Square indicates the type locality (Lohmander 1939), triangles indicate known and published records (Mahnert in litt., Rafalski 1967, Droglá 1983, Mahnert 1983, Krumpálová & Krumpál 1993, Ducháč 1995, Droglá & Lippold 2004, Christophoryová & Krumpál 2007, 2010) and circles indicate new records of species distribution.

The faunistic data: Czech Republic, Český Kras, locality Strážište (leg. K. Tajovský, A. Tenčík) – formaldehyde traps situated in: MOH (49°92'N, 14°12'E, 422 m a.s.l.), 30.4.–28.5.2008, 1 female; BO (49°92'N, 14°11'E, 432 m a.s.l.), 30.4.–28.5.2008, 2 females; BO (49°92'N, 14°11'E, 432 m a.s.l.), 28.5.–25.6.2008, 1 female; soil samples from: DP (49°91'N, 14°09'E, 234 m a.s.l.), 5.5.2009, 2 deutonymphs; DP (49°91'N, 14°12'E, 352 m a.s.l.), 5.5.2009, 1 deutonymph; MOH (49°91'N, 14°12'E, 415 m a.s.l.), 5.5.2009, 5 males; MOH (49°92'N, 14°12'E, 422 m a.s.l.), 5.5.2009, 2 males, 5 tritonymphs; TOH (49°92'N, 14°12'E, 405 m a.s.l.), 5.5.2009, 2 males; AO (49°91'N, 14°11'E, 358 m a.s.l.), 8.9.2009, 1 deutonymph; MOH (49°91'N, 14°11'E, 415 m a.s.l.), 8.9.2009, 3 tritonymphs; MOH (49°91'N, 14°09'E, 419 m a.s.l.), 8.9.2009, 2 tritonymphs, 1 protonymph; TOH (49°91'N, 14°10'E, 401 m a.s.l.), 8.9.2009, 1 deutonymph; TOH (49°91'N, 14°09'E, 426 m a.s.l.), 8.9.2009, 5 males, 1 deutonymph, 1 protonymph.

Czech Republic, Český Kras, the Šamor-Mramor forest complex (leg. A. Tenčík) – formaldehyde traps situated in: TO (49.89'N, 14.12'E, 462 m a.s.l.), 30.4.–28.5.2008, 1 female; TO (49.90'N, 14.13'E, 466 m a.s.l.), 30.4.–28.5.2008, 3 females; CP (49.89'N, 14.12'E, 452 m a.s.l.), 28.5.–25.6.2008, 3 females; CP (49.89'N, 14.12'E, 452 m a.s.l.), 25.6.–23.7.2008, 1 female; TO (49.90'N, 14.12'E, 444 m a.s.l.), 23.7.–19.8.2008, 1 female; TO (49.90'N, 14.13'E, 466 m a.s.l.), 23.7.–19.8.2008, 1 female.

Slovakia, Malé Karpaty Mts., Cajla (leg. M. Holecová) – sifted from leaf litter in oak-hornbeam forest (48°20'N, 17°16'E, 270 m a.s.l.), 25.5.1999, 1 female (Christophoryová & Krumpál 2007).

Slovakia, Svätý Jur, Šúr Nature Reserve, Panónsky háj (leg. O. Majzlan, L. Vidlička) – Malaise trap situated in thermophilous old oak forest (48°13'N, 17°12'E, 130 m a.s.l.), 7.6.2008, 1 male (Christophoryová & Krumpál 2010).

All specimens were determined by J. Christophoryová and K. Krajčovičová using the identification key of Christophoryová et al. (2011b). Morphological terminology follows Beier (1963), Harvey (1992) and Judson (2007), with trichobothrial terminology following Chamberlin (1931) and taken measurements following Beier (1963). Specimens were studied as temporary slide mounts, photographed using a Leica DM1000 compound microscope with ICC50 Camera Module (LAS EZ application, 1.8.0). Measurements were taken from photographs using the AxioVision 40LE application (v. 4.5). The material is deposited in the zoological collections of the Comenius University, Bratislava.

Results

Adults (Fig. 2, Table 1): Vestitural setae on body relatively short, dentate and clavate (Fig. 2A); carapace (Fig. 2A): granulate and rectangular without cucullus, epistome absent, anterior margin of carapace straight, carapace scarcely longer than broad; eyes absent; anterior transverse fur-

row distinct, posterior furrow indistinct and situated close to posterior margin of carapace. Chelicerae (Fig. 2B): small, slightly sclerotized, 5 setae on cheliceral hand, one on cheliceral movable finger; movable cheliceral finger with slender well-developed galea, main stalk with approximately 5–6 short terminal rami; cheliceral rallum of 3 blades, first distal blade of cheliceral rallum denticulate anteriorly; small, largely unsclerotized teeth situated on both movable and fixed finger of chelicera (Fig. 2B). Palps (Fig. 2C): slender, with marked granulation mainly on base of chelal hand and fixed chelal finger, the rest of hand finely granulate (Fig. 2C); chelal fingers with normal number of trichobothria (8 on fixed and 4 on movable chelal finger), venom apparatus developed only in movable chelal finger, nodus ramosus close and distal to subterminal trichobothria; movable chelal finger medially with only 1 accessory tooth and fixed chelal finger medially with 2 accessory teeth (Fig. 2C). Legs: tarsus IV distally with a denticulate seta of highly varying length. Abdominal tergites I–X divided, tergite XI undivided, tergite XI with a pair of relatively long tactile setae (Fig. 2E). Both sexes of species were measured; body measurements are given in Table 1.

Female (Fig. 2, Table 1): Chaetotaxy of carapace: carapace with 64–80 setae, 30–37 of them situated in front of anterior transverse furrow, posterior margin with 10–14 setae; 2–4 slitlike lyrifissures present in anterior part of carapace, 7–15 lyrifissures behind anterior furrow. Palps (Fig. 2C): fixed chelal finger with 35–43 and movable chelal finger with 40–51 equally long teeth; fixed chelal finger laterally with 6–8 accessory teeth and movable chelal finger laterally with 5–7 teeth. Chaetotaxy of tergites I–X: 10–13 (right tergite half 4–7: left tergite half 5–6): 10–14 (5–7: 5–8): 10–13 (5–7: 5–6): 10–16 (5–8: 5–8): 13–17 (6–8: 6–9): 12–16 (6–9: 6–8): 13–17 (6–10: 6–8): 13–16 (7–8: 6–9): 12–16 (6–9: 6–8): 11–15 (5–7: 5–8), tergite XI with 7–8 setae and with a pair of relatively long tactile setae (Fig. 2E); number of lyrifissures on tergites I–XI: 2–9: 3–9: 4–9: 4–8: 4–7: 4–8: 5–12: 5–11: 4–7: 2–7: 2. Female spermatheca unpaired (Fig. 2D), T- or mushroom-like (apically divided into 2 tubes not exceeding length of the common stem), female genital operculum anterior with 14–17 setae and 2 lyrifissures, operculum posterior with 7–10 setae and 2 lyrifissures.

Male (Fig. 2, Table 1): Chaetotaxy of carapace (Fig. 2A): carapace with 67–87 setae, 32–40 of them

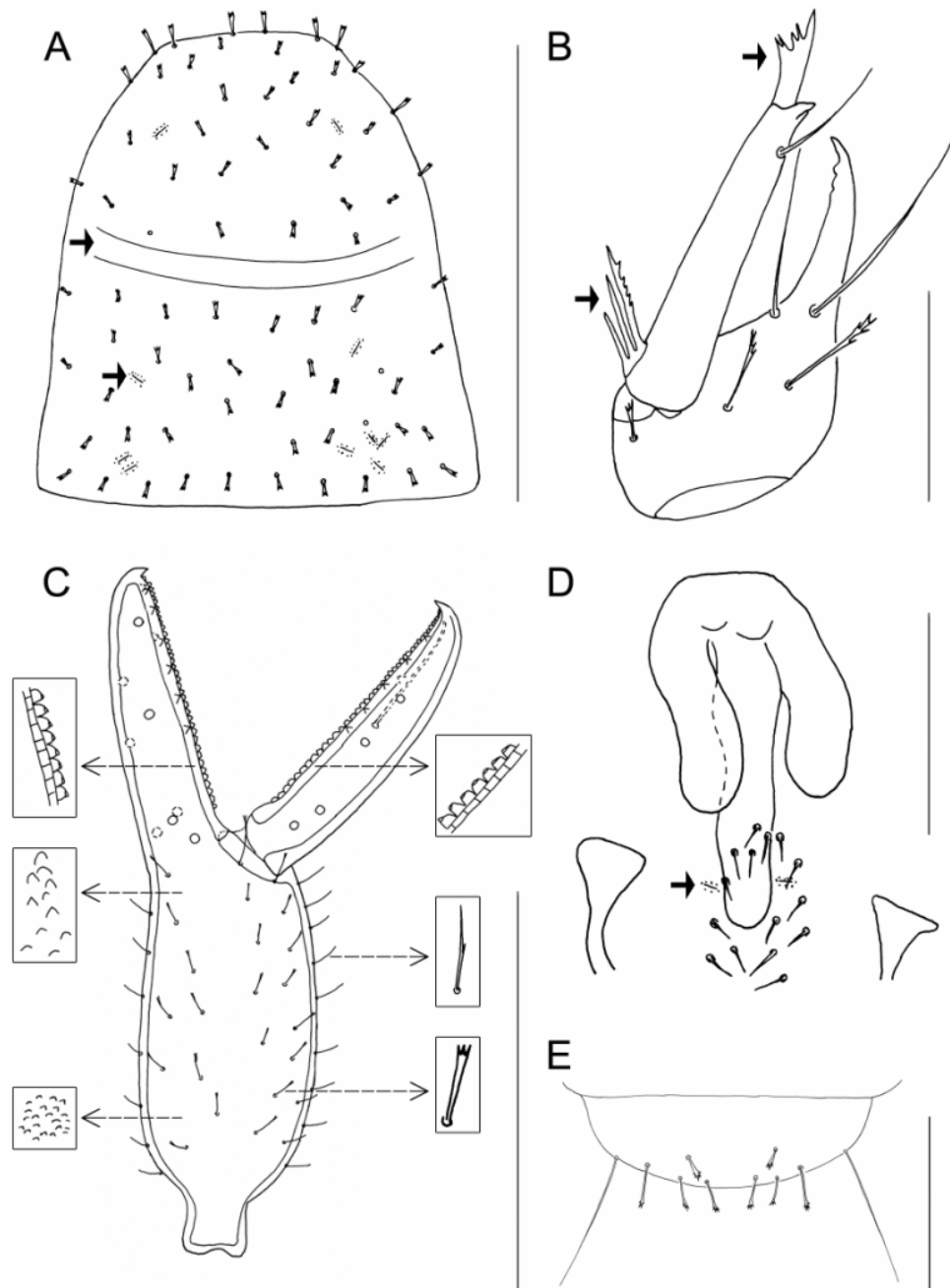


Figure 2. Adult of *Allochernes peregrinus*. **A.** Carapace with anterior transverse furrow (male, dorsal view). Arrows point to the anterior transverse furrow and one lyrifissure. **B.** Left chelicera (female, dorsal view). Arrows point to the galea and rallum. **C.** Left palpal chela with the trichobothrial pattern (female, lateral view). Arrows point to the details of dentition of chelal fingers, granulation of palpal hand and fixed chelal finger and setae. **D.** Female spermatheca (ventral view). Arrow points to one lyrifissure. **E.** Tergit XI (female, dorsal view). Scales: 0.1 (B, D), 0.2 (E) and 0.5 (A, C) mm.

Table 1. Morphometric data for all developmental stages of *Allochermes peregrinus* (measurements in mm).

Abbreviations: M: median, Min: minimum, Max: maximum, n: number of individuals measured, SD: standard deviation, x: arithmetic mean.

Characteristics	Females (n=15)			Males (n=15)			Tritonymphs (n=10)			Deutonymphs (n=6)			Protonymphs (n=2)		
	Min-Max	M/x±SD	M/Min-Max	Min-Max	M/x±SD	M/Min-Max	Min-Max	M/x±SD	M/Min-Max	Min-Max	M/x±SD	M/Min-Max	Min-Max	M/x±SD	M/Min-Max
Body, length	1.36-1.97	1.60/1.61±0.14	1.35-1.66	1.47/1.48±0.10	1.15-1.53	1.26/1.29±0.11	1.03-1.24	1.11/1.12±0.08	0.95-0.96	0.96/0.96±0.01					
Carapace, length	0.51-0.61	0.56/0.56±0.03	0.50-0.57	0.51/0.52±0.02	0.43-0.49	0.46/0.46±0.02	0.35-0.38	0.37/0.37±0.01	0.32-0.32	0.32/0.32±0.00					
Carapace, anterior width	0.31-0.39	0.35/0.35±0.02	0.32-0.35	0.34/0.34±0.01	0.29-0.31	0.30/0.30±0.01	0.23-0.24	0.24/0.24±0.01	0.18-0.18	0.18/0.18±0.00					
Carapace, posterior width	0.50-0.61	0.55/0.55±0.03	0.42-0.55	0.45/0.46±0.04	0.36-0.42	0.38/0.38±0.02	0.33-0.36	0.36/0.35±0.01	0.31-0.31	0.31/0.31±0.00					
Carapace, length/posterior width ratio	0.98-1.07	1.02/1.03±0.03	1.02-1.21	1.13/1.12±0.05	1.10-1.26	1.20/1.20±0.05	1.00-1.12	1.06/1.05±0.04	1.03-1.03	1.03/1.03±0.00					
Chelicera, length	0.19-0.21	0.20/0.20±0.01	0.18-0.21	0.19/0.19±0.01	0.16-0.18	0.17/0.17±0.01	0.13-0.14	0.14/0.14±0.01	0.12-0.12	0.12/0.12±0.00					
Chelicera, width	0.08-0.09	0.08/0.08±0.00	0.08-0.09	0.08/0.08±0.00	0.07-0.07	0.07/0.07±0.00	0.06-0.06	0.06/0.06±0.00	0.05-0.05	0.05/0.05±0.00					
Chelicera, length/width ratio	2.22-2.63	2.38/2.38±0.11	2.25-2.63	2.38/2.38±0.09	2.29-2.57	2.43/2.40±0.11	2.17-2.33	2.25/2.25±0.09	2.40-2.40	2.40/2.40±0.00					
Cheliceral movable finger, length	0.16-0.17	0.16/0.16±0.00	0.15-0.17	0.16/0.16±0.01	0.12-0.14	0.13/0.13±0.01	0.09-0.11	0.10/0.10±0.01	0.08-0.08	0.08/0.08±0.00					
Palpal femur, length	0.45-0.52	0.47/0.47±0.02	0.42-0.51	0.43/0.44±0.03	0.28-0.34	0.33/0.32±0.02	0.22-0.24	0.23/0.23±0.01	0.17-0.17	0.17/0.17±0.00					
Palpal femur, width	0.14-0.17	0.15/0.15±0.01	0.14-0.16	0.14/0.14±0.01	0.10-0.13	0.12/0.12±0.01	0.09-0.10	0.10/0.10±0.01	0.08-0.08	0.08/0.08±0.00					
Palpal femur, length/width ratio	2.76-3.33	3.13/3.12±0.13	2.80-3.40	3.00/3.03±0.14	2.58-2.83	2.75/2.73±0.09	2.30-2.67	2.42/2.43±0.13	2.13-2.13	2.13/2.13±0.00					
Palpal patella, length	0.43-0.49	0.45/0.45±0.02	0.39-0.45	0.40/0.41±0.02	0.26-0.31	0.31/0.30±0.02	0.20-0.21	0.21/0.21±0.00	0.17-0.17	0.17/0.17±0.00					
Palpal patella, width	0.17-0.20	0.18/0.18±0.01	0.17-0.19	0.18/0.18±0.01	0.13-0.15	0.15/0.15±0.01	0.11-0.11	0.11/0.11±0.00	0.09-0.09	0.09/0.09±0.00					
Palpal patella, length/width ratio	2.26-2.67	2.50/2.47±0.12	2.16-2.53	2.35/2.31±0.11	2.00-2.07	2.07/2.05±0.03	1.82-1.91	1.91/1.89±0.04	1.89-1.89	1.89/1.89±0.00					
Palpal hand with pedicel, length	0.49-0.57	0.50/0.52±0.03	0.43-0.51	0.45/0.45±0.02	0.33-0.39	0.37/0.37±0.02	0.27-0.29	0.28/0.28±0.01	0.20-0.20	0.20/0.20±0.00					
Palpal hand without pedicel, length	0.43-0.50	0.45/0.46±0.02	0.37-0.44	0.38/0.39±0.02	0.30-0.35	0.33/0.33±0.02	0.24-0.26	0.25/0.25±0.01	0.18-0.18	0.18/0.18±0.00					
Palpal hand, width	0.23-0.27	0.24/0.24±0.01	0.20-0.24	0.21/0.21±0.01	0.17-0.20	0.19/0.19±0.01	0.14-0.15	0.14/0.14±0.00	0.11-0.11	0.11/0.11±0.00					
Palpal hand, length/width ratio	2.04-2.26	2.13/2.14±0.06	2.00-2.20	2.09/2.09±0.07	1.89-2.06	1.95/1.96±0.05	1.71-1.79	1.76/1.75±0.04	1.82-1.82	1.82/1.82±0.00					
Palpal (chela) finger, length	0.38-0.45	0.41/0.41±0.02	0.35-0.38	0.37/0.37±0.01	0.28-0.31	0.30/0.30±0.01	0.22-0.26	0.24/0.24±0.01	0.19-0.20	0.20/0.20±0.01					
Palpal chela, length	0.83-0.96	0.87/0.88±0.04	0.76-0.85	0.78/0.78±0.02	0.58-0.67	0.65/0.64±0.03	0.48-0.52	0.49/0.49±0.02	0.38-0.39	0.39/0.39±0.01					
Palpal chela, length/palpal hand width	3.41-3.83	3.65/3.63±0.12	3.45-3.95	3.67/3.65±0.15	3.30-3.67	3.38/3.41±0.11	3.43-3.57	3.45/3.47±0.06	3.45-3.55	3.50/3.50±0.07					
Leg I femur, length	0.10-0.13	0.11/0.11±0.01	0.09-0.11	0.10/0.10±0.01	0.08-0.09	0.08/0.08±0.01	0.07-0.08	0.07/0.07±0.01	0.06-0.06	0.06/0.06±0.00					
Leg I femur, width	0.07-0.09	0.08/0.08±0.01	0.07-0.09	0.08/0.08±0.01	0.06-0.08	0.07/0.07±0.01	0.06-0.06	0.06/0.06±0.00	0.05-0.05	0.05/0.05±0.00					
Leg I femur, length/width ratio	1.11-1.57	1.38/1.37±0.13	1.11-1.43	1.25/1.22±0.09	1.13-1.33	1.14/1.19±0.08	1.17-1.33	1.17/1.22±0.09	1.20-1.20	1.20/1.20±0.00					
Leg I patella, length	0.19-0.22	0.20/0.20±0.01	0.16-0.19	0.17/0.18±0.01	0.13-0.15	0.14/0.14±0.01	0.11-0.11	0.11/0.11±0.00	0.09-0.09	0.09/0.09±0.00					
Leg I patella, width	0.07-0.09	0.08/0.08±0.01	0.07-0.08	0.08/0.08±0.01	0.06-0.07	0.06/0.06±0.00	0.05-0.06	0.06/0.06±0.00	0.04-0.05	0.05/0.05±0.01					
Leg I patella, length/width ratio	2.22-2.75	2.50/2.49±0.15	2.13-2.71	2.25/2.32±0.18	2.00-2.33	2.17/2.20±0.13	1.83-2.20	1.83/1.89±0.15	1.80-2.25	2.03/2.03±0.32					
Leg I tibia, length	0.19-0.21	0.20/0.20±0.01	0.17-0.20	0.17/0.17±0.01	0.13-0.14	0.14/0.14±0.01	0.10-0.11	0.11/0.11±0.01	0.08-0.08	0.08/0.08±0.00					
Leg I tibia, width	0.06-0.07	0.06/0.06±0.00	0.06-0.07	0.06/0.06±0.00	0.05-0.06	0.05/0.05±0.01	0.05-0.05	0.05/0.05±0.00	0.04-0.04	0.04/0.04±0.00					
Leg I tibia, length/width ratio	3.00-3.50	3.17/3.19±0.15	2.43-3.33	2.83/2.88±0.19	2.33-2.80	2.60/2.51±0.17	2.00-2.20	2.10/2.10±0.11	2.00-2.00	2.00/2.00±0.00					
Leg I tarsus, length	0.20-0.23	0.21/0.21±0.01	0.19-0.22	0.20/0.20±0.01	0.16-0.17	0.17/0.17±0.01	0.13-0.14	0.14/0.14±0.01	0.11-0.12	0.12/0.12±0.01					
Leg I tarsus, width	0.05-0.05	0.05/0.05±0.00	0.04-0.06	0.05/0.05±0.00	0.05-0.05	0.05/0.05±0.00	0.04-0.05	0.05/0.05±0.01	0.04-0.04	0.04/0.04±0.00					
Leg I tarsus, length/width ratio	4.00-4.60	4.20/4.29±0.24	3.67-5.00	4.00/4.03±0.30	3.20-3.40	3.40/3.32±0.10	2.60-3.50	2.80/2.97±0.42	2.75-3.00	2.88/2.88±0.18					

Table 1. (continued)

Characteristics	Females (n=15)		Males (n=15)		Tritonymphs (n=10)		Deutonymphs (n=6)		Protonymphs (n=2)	
	Min-Max	M/x±SD	Min-Max	M/x±SD	Min-Max	M/x±SD	Min-Max	M/x±SD	Min-Max	M/x±SD
Leg IV femur+patella, length	0.37-0.44	0.39/0.39±0.02	0.33-0.37	0.34/0.34±0.01	0.25-0.29	0.28/0.28±0.01	0.20-0.22	0.21/0.21±0.01	0.15-0.16	0.16/0.16±0.01
Leg IV femur+patella, width	0.09-0.11	0.09/0.10±0.01	0.08-0.10	0.09/0.09±0.01	0.07-0.08	0.08/0.08±0.01	0.06-0.07	0.06/0.06±0.00	0.05-0.05	0.05/0.05±0.00
Leg IV femur+patella, length/width ratio	3.73-4.56	4.11/4.11±0.23	3.40-4.25	3.89/3.91±0.27	3.50-3.71	3.54/3.57±0.08	3.14-3.50	3.33/3.36±0.13	3.00-3.20	3.10/3.10±0.14
Leg IV tibia, length	0.25-0.31	0.27/0.27±0.02	0.22-0.27	0.24/0.24±0.01	0.16-0.19	0.19/0.18±0.01	0.13-0.15	0.14/0.14±0.01	0.09-0.10	0.10/0.10±0.01
Leg IV tibia, width	0.06-0.07	0.07/0.07±0.00	0.06-0.07	0.06/0.06±0.01	0.05-0.06	0.06/0.06±0.00	0.05-0.06	0.06/0.06±0.01	0.05-0.05	0.05/0.05±0.00
Leg IV tibia, length/width ratio	3.57-4.43	3.86/3.96±0.26	3.29-4.17	3.83/3.75±0.28	3.00-3.20	3.17/3.12±0.08	2.33-2.80	2.50/2.51±0.18	1.80-2.00	1.90/1.90±0.14
Leg IV tarsus, length	0.25-0.28	0.25/0.26±0.01	0.23-0.24	0.24/0.24±0.01	0.17-0.20	0.20/0.19±0.01	0.15-0.16	0.15/0.15±0.01	0.12-0.12	0.12/0.12±0.00
Leg IV tarsus, width	0.06-0.06	0.06/0.06±0.00	0.05-0.06	0.05/0.05±0.00	0.05-0.06	0.06/0.06±0.00	0.04-0.05	0.04/0.04±0.01	0.04-0.04	0.04/0.04±0.00
Leg IV tarsus, length/width ratio	4.17-4.67	4.17/4.28±0.16	4.00-4.80	4.60/4.49±0.32	3.17-3.40	3.33/3.27±0.09	3.20-3.75	3.75/3.57±0.28	3.00-3.00	3.00/3.00±0.00

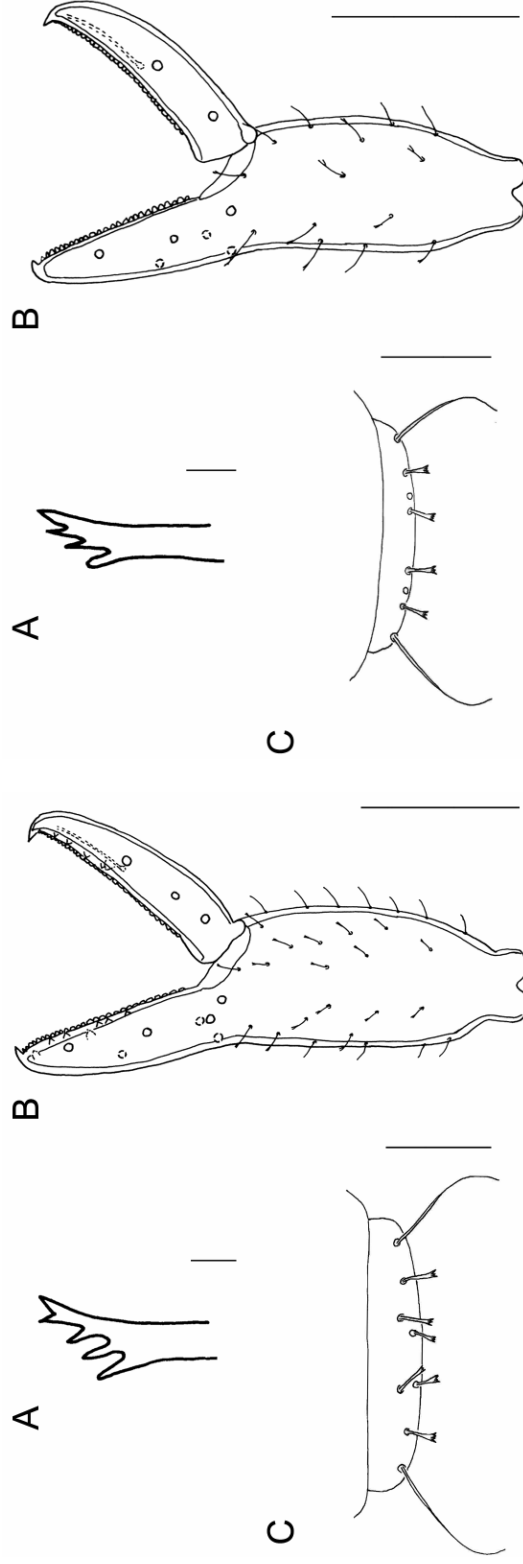


Figure 3. Tritonymph of *Allothierres peregrinus*. **A.** Detail of cheliceral galea (dorsal view). **B.** Left palpal chela with the trichobothrial pattern (lateral view). **C.** Tergit XI (dorsal view). Scales: 0.01 (A), 0.1 (C) and 0.2 (B) mm.

Figure 4. Deutonymph of *Allothierres peregrinus*. **A.** Detail of cheliceral galea (dorsal view). **B.** Left palpal chela with the trichobothrial pattern (lateral view). **C.** Tergit XI (dorsal view). Scales: 0.01 (A), 0.1 (C) and 0.2 (B) mm.

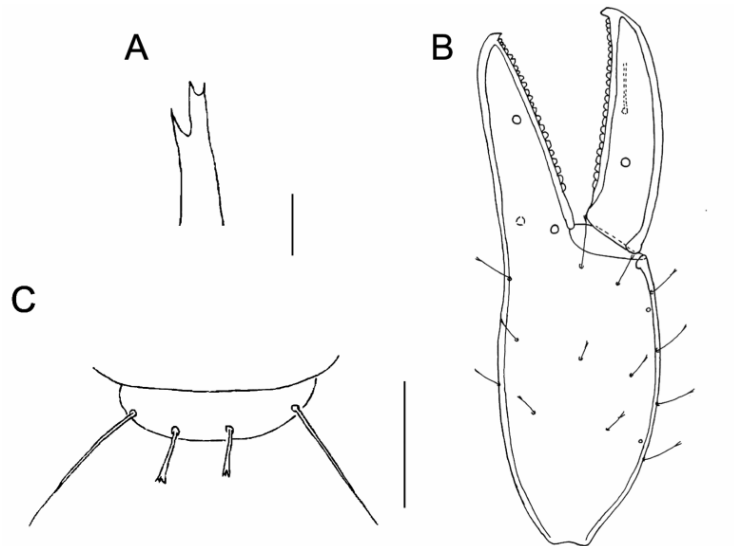


Figure 5. Protonymph of *Allochernes peregrinus*. **A.** Detail of cheliceral galea (dorsal view). **B.** Left palpal chela with the trichobothrial pattern (lateral view). **C.** Tergit XI (dorsal view). Scales: 0.01 (A), 0.1 (C) and 0.2 (B) mm.

situated in front of anterior transverse furrow, posterior margin with 10–12 setae; 2 slitlike lyrifissures present in anterior part of carapace, 6–12 lyrifissures behind anterior furrow (Fig. 2A). Palps: fixed chelal finger with 33–42 and movable chelal finger with 39–44 equally long teeth; fixed chelal finger laterally with 5–9 accessory teeth and movable chelal finger laterally with 5–7 teeth. Chaetotaxy of tergites I–X: 10–13 (right tergite half 5–7: left tergite half 5–6): 10–12 (5–6: 4–7): 9–11 (5–6: 4–5): 10–14 (5–7: 5–7): 11–14 (5–8: 6–7): 12–16 (6–8: 6–8): 11–15 (6–8: 5–8): 12–15 (6–7: 6–8): 12–14 (6–7: 6–7): 9–14 (4–7: 4–8), tergite XI with 6–8 setae and with a pair of relatively long tactile setae; number of lyrifissures on tergites I–XI: 2–5: 2–6: 2–7: 3–7: 3–7: 3–6: 3–7: 3–5: 2–5: 2–4: 2. Male genital operculum anterior with 15–19 setae and 2 lyrifissures, operculum posterior with 8–9 setae.

Nymphs (Fig. 3–5, Table 1): In most aspects the morphology of tritonymphs, deutonymphs and protonymphs is similar to that of adults (e.g. morphology of vestitural setae on body, granulation of carapace, absence of epistome and eyes, morphology of chelicerae, morphology of palps, presence of venom apparatus in movable chelal finger, presence of a pair of relatively long tactile setae on tergite XI). Body measurements are given in Table 1.

Tritonymphs (Fig. 3, Table 1): Chaetotaxy of carapace: carapace with 56–64 setae, 29–33 of them situated in front of anterior transverse furrow, posterior margin with 10–12 setae; 2 slitlike lyrifissures present in anterior part of carapace, 3–7 lyrifissures behind anterior furrow. Chelicera: 5 setae on cheliceral hand, one on cheliceral movable finger; movable cheliceral finger with slender well-developed galea, main stalk with approximately 4–5 short terminal rami (Fig. 3A). Palps (Fig. 3B): 7 trichobothria on fixed chelal finger and 3 on movable chelal finger; fixed chelal finger with 27–30 and movable chelal finger with 31–35 equally long teeth; fixed chelal finger laterally with 4–6 accessory teeth and movable chelal finger laterally with 4–5 teeth (Fig. 3B). Chaetotaxy of tergites I–X: 10–11 (right tergite half 5–6: left tergite half 5–6): 9–11 (4–6: 4–6): 9–10 (4–5: 4–5): 10–12 (4–6: 5–6): 10–14 (5–8: 5–6): 10–14 (5–7: 5–7): 10–13 (5–7: 5–7): 10–15 (5–8: 5–7): 8–15 (3–8: 5–7): 8–12 (3–6: 4–6), tergite XI with 6 setae and with a pair of relatively long tactile setae (Fig. 3C); number of lyrifissures on tergites I–XI: 2–5: 2–4: 3–5: 2–4: 2–4: 3–5: 2–4: 2–4: 2–4: 2–3: 2.

Deutonymphs (Fig. 4, Table 1): Chaetotaxy of carapace: carapace with 45–53 setae, 24–28 of them situated in front of anterior transverse furrow, posterior margin with 9–10 setae; 2 slitlike lyrifissures present in anterior part of carapace, 1–3 lyri-

fissures behind anterior furrow. Chelicera: 5 setae on cheliceral hand, one on cheliceral movable finger; movable cheliceral finger with slender well-developed galea, main stalk with approximately 4 short terminal rami (Fig. 4A). Palps (Fig. 4B): 6 trichobothria on fixed chelal finger and 2 on movable chelal finger; fixed chelal finger with 25–29 and movable chelal finger with 27–32 equally long teeth. Chaetotaxy of tergites I–X: 6–10 (right tergite half 3–5: left tergite half 3–5): 7–9 (3–5: 3–5): 6–9 (3–5: 3–5): 7–9 (3–4: 4–5): 8–10 (4–5: 4–5): 8–10 (4–5: 4–5): 8–10 (4–5: 4–5): 8–9 (4–5: 3–5): 6–8 (3–4: 3–4), tergite XI with 6 setae and with a pair of relatively long tactile setae (Fig. 4C); number of lyrifissures on tergites I–XI: 2–4: 2–4: 2–4: 2–4: 2–3: 2–4: 2–4: 2–3: 2–3: 2: 2.

Protonymphs (Fig. 5, Table 1): Chaetotaxy of carapace: carapace with 27 setae, 17–18 of them situated in front of anterior transverse furrow, posterior margin with 6 setae; 2 slitlike lyrifissures present in anterior part of carapace, 2–3 lyrifissures behind anterior furrow.

Chelicera: 4 setae on cheliceral hand, cheliceral movable finger without seta; movable cheliceral finger with slender well-developed galea, main stalk with approximately 3 short terminal rami (Fig. 5A). Palps (Fig. 5B): 3 trichobothria on fixed chelal finger and 1 on movable chelal finger; fixed chelal finger with 21–23 and movable chelal finger with 24–25 equally long teeth. Chaetotaxy of all tergites from I to X: 6–6 (right tergite half 3–3: left tergite half 3–3), tergite XI with 2 setae and with a pair of relatively long tactile setae (Fig. 5C); number of lyrifissures on tergites I–XI: 2–3: 2–3: 2–4: 2–4: 2–3: 2–3: 2–3: 2–2: 2–3: 2–3: 2.

Discussion

The taxonomy and identification of pseudoscorpion species often use morphometric characters, but are frequently based on limited material, mostly on a few type specimens (especially in Beier 1963). Under these circumstances, only a poor reflection of intraspecific variability is available (Christophoryová et al. 2011b). Detailed morphological or morphometric analysis of common species are mostly rare and typical mainly for recent descriptions of new taxa. The published data about descriptions of all developmental stages of European pseudoscorpion species are mainly limited to Chthoniidae, Neobisiidae and Cheliferidae (e.g. Gabbutt & Vachon 1963, 1965, 1967, 1968,

Gabbutt 1970).

The first description of *Allochernes peregrinus* was based on the following characters of one female specimen – chaetotaxy of posterior carapace margin and pedal tarsus IV, lateral teeth of chelal fingers, cheliceral galea, rallum and palpal measurements (Lohmander 1939). Lohmander (1939) drew figures of palpal chela, leg IV and cheliceral galea. Later Mahnert (1983) gave some data of one Hungarian female specimen – measurement of palpal chela, leg I and IV, number of teeth of chelal fingers (including medial and lateral accessory teeth) and drew palpal chela with the trichobothrial pattern and female spermatheca. Further data are partly available in the theses of Ducháč (2002) and DeVore-Scribante (1999) mainly concerning females, but also chaetotaxy of male genital operculum anterior and chelicera and palps of males and tritonymphs. DeVore-Scribante (1999) added also figures of chelicera and inaccurate figure of carapace. However these data and information were not published.

The main taxonomic characters of the studied females correspond to published descriptions from Sweden (Lohmander 1939) and Hungary (Mahnert 1983), despite registering greater variability in morphometric characteristics of the body, carapace, palps, legs I and leg IV. Compared to the known description, we recorded smaller and bigger specimens as well. We registered a higher variability also in the number of marginal teeth and lateral accessory teeth. For the first time we present female chaetotaxy and number of lyrifissures of carapace, genital operculum anterior, genital operculum posterior, all tergites and cheliceral measurements.

Five *Allochernes* species and subspecies are currently known from neighbouring countries (Table 2): *A. bulgaricus* Hadži, 1939, *A. mahnerti* Georgescu & Capuse, 1996, *A. powelli* (Kew, 1916), *A. wideri phaleratus* (Simon, 1879) and *A. wideri wideri* (C.L. Koch, 1843). The species *A. peregrinus* differs from the others by presence of a pair of relatively long tactile setae on tergite XI (Table 2). From *A. mahnerti* (Georgescu & Capuse 1996), it differs by longer palpal femur, longer chelal finger, higher number of teeth on chelal fingers, higher number of lateral accessory teeth and in chaetotaxy of female genital operculum (Table 2). From other species and subspecies (Beier 1932, 1963, Hadži 1939, Helversen 1966, Legg & Jones 1988, Christophoryová et al. 2011a), *A. peregrinus* differs also in number of lateral accessory teeth

Table 2. The comparison of adults of *Allochernes* species and subspecies (measurements in mm). Abbreviations: +: presence, -: absence, ?: unknown data.

Characteristics/ taxon	<i>A. peregrinus</i>	<i>A. bulgaricus</i>	<i>A. mahnerti</i>	<i>A. powelli</i>	<i>A. waideri phaleratus</i>	<i>A. waideri waideri</i>
Presence of tactile setae on tergite XI	+	-	-	-	-	-
Length of palpal femur	0.42-0.52	0.52	0.34-0.37	0.58-0.85	0.70	0.63-0.77
Length of chelal finger	0.35-0.45	0.37	0.25-0.27	0.44-0.55	0.54	0.49-0.59
Number of teeth on fixed chelal finger	33-43	32	29	35-40	42	41
Number of teeth on movable chelal finger	39-51	37	32	31-41	39	43-44
Number of lateral accessory teeth on fixed chelal finger	5-9	4	3	3-4	4	2-4
Number of lateral accessory teeth on movable chelal finger	5-7	1	3	4-5	3	2-4
Number of setae on female genital operculum anterior	14-17	?	22	28-34	?	20-22
Number of setae on female genital operculum posterior	7-10	?	11	8	?	9-12
Number of setae on male genital operculum anterior	15-19	22+2	19+6	25	?	35-37
Number of setae on male genital operculum posterior	8-9	17	10	17-22	?	20-21

and chaetotaxy of female or male genital operculum (Table 2).

The published records of *A. peregrinus* came from specimens found (mainly individually) in the deeper soil layers under sunken stones (Rafalski 1967, Krumpálová & Krumpál 1993) or specimens were collected from soil samples and sifted from leaf and coniferous litter (Muchmore 1972, 1990, Droglá 1983, Ducháč 1995, Droglá & Lippold 2004, Christophoryová & Krumpál 2007). In the Czech Republic *A. peregrinus* was swept from vegetation (Ducháč 2002), and in Slovakia it was collected using a Malaise trap situated in an oak forest (Christophoryová & Krumpál 2010). Several specimens were phoretic and were attached to legs of a fly *Delia floralis* (Lohmander 1939) or harvestmen *Opilio canestrinii* (Thorell, 1876), *Leiobunum rupestre* (Herbst, 1799) and *L. rotundum* (Latreille, 1798) (Droglá & Lippold 2004). Adults occurred from May to October (Lohmander 1939, Muchmore 1972, Droglá 1983, Mahnert 1983, Krumpálová & Krumpál 1993, Droglá & Lippold 2004, Christophoryová & Krumpál 2010). The finding of *A. peregrinus* during our research in the Český kras Protected Landscape Area corresponds to the known ecological demands of this species. The specimens occurred in oak and oak-hornbeam forests and plantations of deciduous and coniferous trees from 234 to 466 m a.s.l. Females were collected from April to August, males in May, June and September,

tritonymphs and deutonymphs in May and September and protonymphs in September. It was remarkable that only females were present in the formaldehyde traps. Other developmental stages were found after collecting of the soil samples. Until now, only isolated findings of *A. peregrinus* were recorded in the Czech Republic (Ducháč 1995, 1999, 2002). Accordingly, the species was listed in the Red Data Book of the Czech Republic as vulnerable (Štáhlavský & Ducháč 2005). Our research refers that the Český kras Protected Landscape Area presents an appropriate locality with habitats and conditions suitable for occurrence of stable and relatively numerous populations of *A. peregrinus*.

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