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RESEARCH ARTICLE

First record of *Cheletonella* (Acariformes: Cheyletidae) in Poland, with comments on other member of the genus

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ABSTRACT: Members of the family Cheyletidae are generally free-living predators, and have a worldwide distribution. The genus *Cheletonella* Womersley within the family Cheyletidae comprises four species. This study presents the first record of the *Cheletonella* and *C. vespertilionis* Womersley for the fauna of Poland, and is based on mite specimens found in litter and detritus samples collected from the foot of wall of a tunnel used as shelter by bats, and found in litter and soil samples located close to the bat boxes in the city park. *Cheletonella summersi* Chatterjee and Gupta is considered here as a *species inquirenda.* It is also provided an updated list of cheyletid mites recorded from Poland.

Keywords: Acari, *Cheletonella*, Cheyletidae, fauna, *species inquirenda.*
Zoobank: http://zoobank.org/CC44E52E-646B-4E58-B6C8-88DEDC9E8904

INTRODUCTION

The family Cheyletidae with around 500 described species in 77 genera (Fuangarworn and Lekprayoon, 2010; Doğan et al., 2011; Zhang et al., 2011; Negm and Mesbah, 2014; Bochkov and Abramov, 2016; Salarzehi et al., 2018, 2019) contains mainly free-living predators, and has a worldwide distribution. The genus *Cheletonella* Womersley is recognized within the family by the following traits: its body ovoid, a single shield on the propodosoma, eyes absent, palp tarsus with two comb-like setae and two sickle-like setae, palp claw with basal teeth, and all legs with claws.

Mites of the family Cheyletidae in Poland are still poorly known. A total of 16 species of the family have been recorded from Poland until present (Table 1). The current paper aimed to contribute to the knowledge on mite diversity in Poland, and it presents new distribution data on *Cheletonella vespertilionis* Womersley. The present finding of *C. vespertilionis*, based on the specimens collected in Nowogród Bobrzański and Wrocław, constitutes a new country record. The identity of *Cheletonella summersi* Chatterjee and Gupta is doubtful, and it is considered here as a *species inquirenda*.

MATERIAL AND METHODS

Mite specimens were extracted in Berlese-Tullgren funnels from litter and soil samples collected in the city park (Wrocław, Poland) and samples of litter and detritus taken from the foot of tunnel wall (Nowogród Bobrzański, Poland) in 2010. The specimens were mounted on microscopic slides in Hoyer's medium using by the standard method (Walter and Krantz, 2009). The material is deposited in the Acarology Laboratory of Erzincan Binali Yıldırım University, Erzincan, Turkey. Measurements were taken in micrometers (μm) using Leica Application Suite (LAS) Software Version 3.8. Mean values are followed by the range (given in parentheses). Body length measurements represent the distance between the base of the gnathosoma and the posterior part of the idiosoma, width was measured at the broadest point of the idiosoma. Leg length was measured from the tip of the claws to the trochanter base. Dorsal setal and leg setal designations follow Kethley (1990) and Grandjean (1944), respectively.

RESULTS

Genus: *Cheletonella* Womersley

Species: *Cheletonella vespertilionis* Womersley

Female

Body ovoid, length (including gnathosoma) 556 (478-600), width 306 (246-339).

Length of gnathosoma 180 (169-193), width 145 (139-148) (Fig. 1). Rostrum pointed, with two pairs of adoral setae ($or_{1,2}$). Longitudinal apodeme on midventral line of subcapitulum, between one pair of subcapitular setae (*m*). Protegmen conical, dorsal surface with faint broken striae. Tegmen with broken striae and small punctations scattered over its surface. Peritremes with nine chambers on each side (Fig. 2A). Palps short and thick. Palp tarsus with two comb-like and two sickle-like setae. Palp tibia striated, bearing one dorsal, one ventral and one inner ventral acicular setae, palp claw bearing three basal teeth

Table 1. Cheyletid mite species hitherto recorded from Poland

Species	Related references
Acaropsellina docta (Berlese, 1886)	Hagstrum et al. (2013)
Acaropsellina sollers (Kuzin, 1940)	Hagstrum et al. (2013)
Cheletonella vespertilionis Womersley, 1941	Current paper
Cheyletia papillifera Volgin, 1955	Solarz (1989), Skoracki (2008)
Cheyletiella blakei Smiley, 1970	Kaźmierski and Magowski (2008)
Cheyletiella yasguri Smiley, 1965	Kaźmierski and Magowski (2008)
Cheyletiella parasitivorax (Mégnin, 1878)	Kaźmierski and Magowski (2008)
Cheyletus eruditus Schrank, 1781	Chmielewski (1971, 1991), Skoracki (2008), OConnor and Klimov (2012)
Cheyletus portentosus Koch and Berendt, 1854	Koch and Berendt (1854)
Cheyletus trouessarti Oudemans, 1902	Haitlinger (1982), Fain and Bochkov (2001b), Skoracki (2008)
Cheletopsis basilica Oudemans, 1904	Bochkov et al. (2002), Skoracki (2008)
Cheletopsis daberti Kivganov and Bochkov, 1994	Bochkov et al. (2002), Skoracki (2008)
Cheletopsis impavida Oudemans, 1904	Bochkov et al. (2002), Skoracki (2008)
Cheletopsis mariae Mironov, Bochkov and Chirov, 1991	Bochkov et al. (2002), Skoracki (2008)
Cheletopsis norneri (Poppe, 1888)	Bochkov et al. (2002), Skoracki (2008)
Eucheyletia flabellifera (Michael, 1878)	Haitlinger (1982), Fain and Bochkov (2001a), Skoracki (2008), Hagstrum et al. (2013)
Ornithocheyletia dubinini Volgin, 1964	Skoracki et al. (2004), Skoracki (2008)

(Fig. 2B). Palp genu short, with outer ventral acicular seta and one dorsal seta similar in form to dorsal body setae. Outwardly bulged femur striated, elbow-like in the middle of segments, with one dorsal seta similar in form to dorsal body setae, and two ventral acicular setae.

Dorsum (Figs 3-4) with 15 pairs of fan-like setae including humerals, dorsal body setae homeomorphic. Dorsal idiosoma covered by only one prodorsal shield, sculptured like that of stylophore, with four pairs of setae (Fig. 3). Eyes absent. Venter striated; intercoxal setae *1a, 3a* and *4a* piliform. Anogenital setae three pairs (ag_{1-3}), two pairs of genital setae (g_{1-2}) and three pairs of pseudanal setae (ps_{1-3}), ps_{1-2} bifurcate, ps_3 smooth (Fig. 5).

Leg I 304 (283-325), leg II 254 (209-283), leg III 271 (234-297), leg IV 314 (297-323). Chaetotaxy of leg segments as follows: coxae 2–1–2–2, trochanters 1–1–2–1, femora 2–2–2–1, genua 2(+1κ)–2–2–2, tibiae 4(+1φ)–4–4–4, tarsi 9(+1 ω)–8(+1 ω)–7–7.

Figure 1. *Cheletonella vespertilionis* Womersley (Female) – Gnathosoma in dorsal view.

Figure 2. *Cheletonella vespertilionis* Womersley (Female) – A) Stylophore, B) Right palpal tibia and tarsus in dorsal view.

Male

Length of body (including gnathosoma) 472 (463-482), width 245 (237-263). Length of gnathosoma 167 (165-169), width 135 (128-140). Leg I 307 (300-318), leg II 217 (209-225), leg III 245 (240-254), leg IV 284 (273-297).

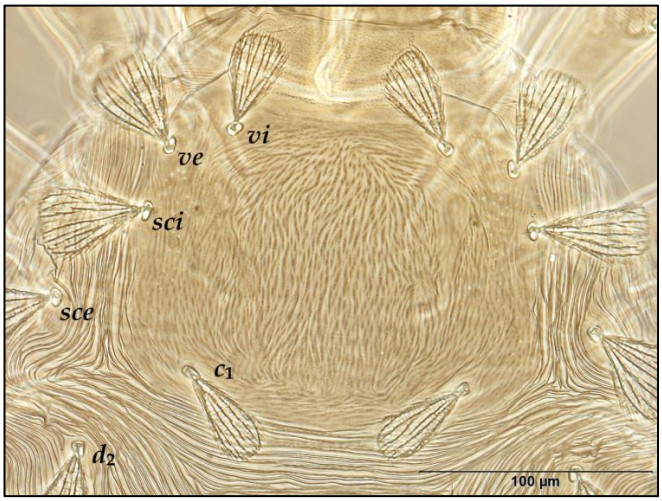

Figure 3. *Cheletonella vespertilionis* Womersley (Female) – Prodorsal region.

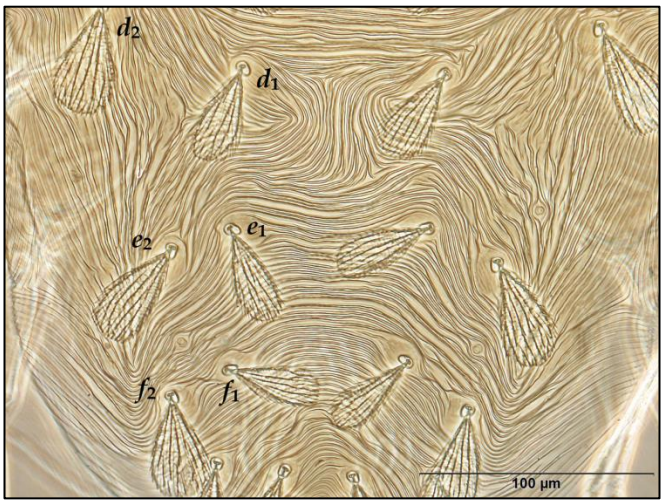

Figure 4. *Cheletonella vespertilionis* Womersley (Female) – Dorsum of hysterosoma.

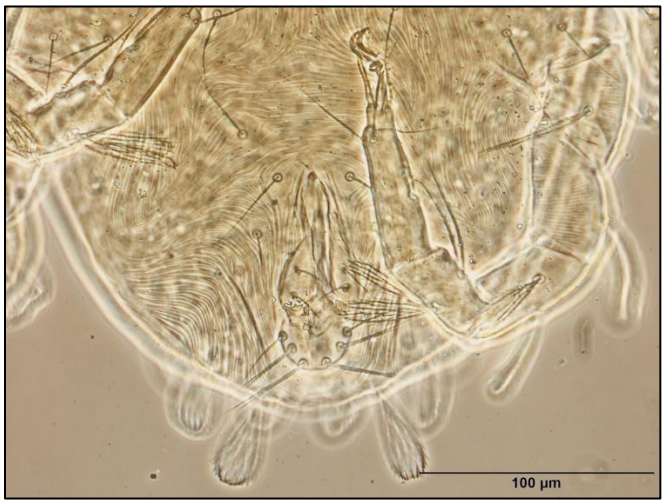

Figure 5. *Cheletonella vespertilionis* Womersley (Female) – Anogenital region.

Resembles female in general appearance, but: dorsal body setae 13 pairs, each tibiae II-IV bearing extra one dorsal solenidion and each tarsi II-IV bearing extra one ventral solenidion, anogenital shields situated posteriorly (Fig. 6)

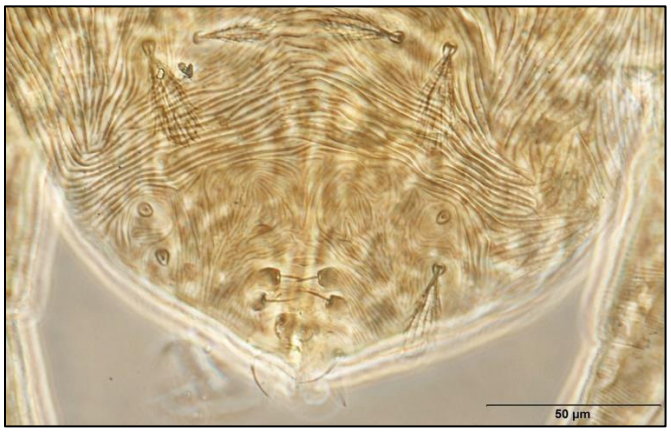

Figure 6. *Cheletonella vespertilionis* Womersley (Male) – Anogenital region.

Material examined

Poland: close to the entrance of Mopkowy Tunnel, Nowogród Bobrzański, May 2010, 3 ♀♀, from litter and detritus samples, 51°48' N 15°13' E (the seconds were not given as there were few collecting sites), 81 m a.s.l., coll. D. Łupicki. Poland: Szczytnicki Park, Wrocław, May 2010, 20 ♀♀ and 14 ♂♂, from litter and soil samples, 51°06'52''N 17°04'51''E, 120 m a.s.l., coll. the students research group.

Distribution

Algeria, Armenia, Australia, Belgium, Brazil, Egypt, Iran, Malaysia, Tajikistan, Ukraine, USA (Womersley, 1941; Baker, 1949; Volgin, 1955, 1969; Summers and Price, 1970; Fain and Nadchatram, 1980; Gerson, 1994; Halliday, 1998; Fain and Bochkov, 2001a; da Silva Ezequiel et al., 2001; Webster and Whitaker, Jr., 2005; Whitaker, Jr. et

al., 2009; Doğan et al., 2011; Negm and Mesbah, 2014; Salarzehi et al., 2018) and Poland (current paper).

DISCUSSION

Cheletonella vespertilionis Womersley was collected in birds' nest, in bumblebees' nest, on gray hamster, on bats, in guano of some bats, in forest soil, some kind of orchard soil, and in house dust (Doğan et al., 2011; Negm and Mesbah, 2014). The Polish specimens were found in litter, close to the entrance of Mopkowy Tunnel [an area protected within the Natura 2000 network (Centrepiece of EU Nature and Biodiversity Policy)] used by bats as a shelter but also in litter and soil samples located close to (underneath) the bat boxes in the city park in Wrocław. Therefore, in both cases the affinity of the species to microhabitats occupied by bats cannot be excluded. *Cheletonella vespertilionis* is newly recorded species for the Polish fauna. This is the first reported occurrence of the genus *Cheletonella* Womersley from Poland.

Polish specimens closely resemble the type and other known specimens of *Cheletonella vespertilionis* in general features, and their body sizes are within the range of the size variation (Womersley, 1941; Volgin, 1969; Summers and Price, 1970; Fain and Bochkov, 2001a).

By now seven species have been described in this genus: *Cheletonella caucasica* Volgin, *C. hoffmannae* Smiley, *C. iraniensis* Salerzehi, Hajizadeh and Ueckermann, *C. juglandis* Xia, Zhu and Ye, *C. pilosa* Tseng, *C. summersi* Chatterjee and Gupta and *C. vespertilionis* Womersley (Table 2). Gerson et al. (1999) suggested that *C. pilosa* and *C. juglandis* should be placed elsewhere by having the M-shaped peritremes, lanceolate-barbed dorsal setae and ultralong humerals, dissimilar to the dorsal ones. *Cheletonella caucasica* was considered as synonym of *C. vespertilionis* by Fain and Bochkov (2001a). Also *C. juglandis* was regarded a *species inquirenda* by the same authors as based on teleonymph stage (Fain and Bochkov, 2001a).

Cheletonella summersi represented by a single male specimen was inadequately described by Gupta (2002). Anogenital region in the original figures provided by Gupta (2002) was absent, and the author referred to the female in the figure caption. The identity of this species is doubtful, and it is considered here as a *species inquirenda* (Table 2). Further examination based on more specimens is necessary in order to ascertain the species identity.

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Table 2. Species list of the genus *Cheletonella* Womersley

Cheletonella hoffmannae Smiley, 1996: 241 [USA (Indiana)]
Cheletonella iraniensis Salerzehi, Hajizadeh and Ueckermann, 2019: 189 [Iran]
Cheletonella pilosa Tseng, 1977: 240 [Taiwan]
Cheletonella vespertilionis Womersley, 1941: 61 [Australia, by monotypy] TYPE-SPECIES [=*Cheletonella caucasica* Volgin, 1955: 168]
SPECIES INQUIRENDAE
Cheletonella juglandis Xia, Zhu and Ye, 1999: 150 [China]
Cheletonella summersi Chatterjee and Gupta, 2002 *in*: Gupta, 2002: 46 [India]

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