

**Four species of the podapolipid mites (Acari: Podapolipidae)
parasitising the carabid beetles (Coleoptera: Carabidae) new to the
fauna of Poland**

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ABSTRACT. Upon the examination of carabid beetles collected in Poland, four podapolipid mite species were found new for Polish fauna: *Eutarsopolipus pterostichi* REGENFUSS, 1968, *E. stammeri* REGENFUSS, 1968, *Dorsipes platysmae* REGENFUSS, 1968 and *D. carabi* REGENFUSS, 1968. Brief description of morphology and localities are given.

KEY WORDS: mites, parasites, carabids, new localities, geographic ranges.

INTRODUCTION

Mites of the family Podapolipidae EWING, 1922 (Acari: Heterostigmata) are highly specialized ecto- and endoparasites of the insect orders Blattaria, Orthoptera, Heteroptera, Hymenoptera and, especially, Coleoptera (HUSBAND, 2000). Four genera of podapolipid mites are exclusive parasites of carabid beetles: *Regenpolipus* HUSBAND, 1986, *Ovacarus* STANNARD & VAISHAMPAYAN, 1971, *Dorsipes* REGENFUSS, 1968 and *Eutarsopolipus* BERLESE, 1913. Only the latter two are known in Europe.

Most of the species of *Eutarsopolipus* are ectoparasites of carabids, one, *E. stammeri* is endoparasitic, and lives in haemocoel of the *Pterostichus melanarius* (Ill.). All species are highly host-specific and generally limited to one, or few closely related hosts. Ectoparasitic mites live under elytra and feed upon exudates of insect's integument. All stages (females, males and larval females) have three pairs of legs. Male copulatory apparatus is located terminally. The first species of *Eutarsopolipus* in Poland, *E. acanthomus* was reported by HAITLINGER (1985).

Mites of the genus *Dorsipes* are ectoparasites living under elytra of carabid beetles. All of them parasitise one, or few closely related species of hosts. Females and larval females

have three pairs of legs, while males have fourth pair nearby copulatory apparatus on the idiosomal dorsum. Again HAITLINGER (1988) found undetermined *Dorsipes* on *Carabus hortensis* L. in Poland.

MATERIALS AND METHODS

Specimens of carabid beetles were collected mainly by means of pitfall traps. Some dried insect specimens were received from other collections.

Beetles were heated in hot water for ca. 1/2 hour in order to lift elytra without damaging pinned specimens. Mites were usually removed or washed out from the beetles with 70% ethanol and thereafter mounted on slides in Hoyer's medium (as described in HUSBAND & DASTYCH, 1998). Subsequently mites were examined with a phase-contrast microscope (Olympus BX 20) and photographed with camera attachment (SC 35).

The nomenclature of morphology is derived from LINDQUIST (1986) and HUSBAND (1998), while specific diagnoses are basing on HUSBAND & DASTYCH (2000).

RESULTS

Podapolipidae EWING, 1922.

Eutarsopolipus BERLESE, 1913.

Eutarsopolipus pterostichi REGENFUSS, 1968

Diagnosis

Female: cheliceral stylets shorter than 50 μm , located in anterior part of gnathosoma. Stigmata and tracheae not conspicuous or absent. Ambulacra I and II with claws. Genu I without setae. Male: length of cheliceral stylets about 28 μm . Genua II and III without setae. Ambulacrum I with one claw, ambulacra II and III without claws. Larval female: length of cheliceral stylets about 33 μm . Genua II and III without setae.

Type host and locality: *Pterostichus melanarius* (Ill.) (Coleoptera, Carabidae) – Germany.

Distribution

Germany, Hungary, Russia (Tuva), Poland.

Material examined

1 male, 1 larval female and 1 larval female: on two *Pterostichus melanarius*, Stuposiany, Subcarpatia region, 27. 07. - 05. 08. 1996; leg J. Siekierski; 14 females, 3 males, 11 larval females and 3 females, 1 male: on two *Pterostichus oblongopunctatus*, (new host), Obrzycko, Wielkopolska region, 8- 16. 06. 2002; leg. E. Baraniak.

Eutarsopolipus stammeri* REGENFUSS, 1968*Diagnosis**

Female: cheliceral stylets- length about 28 μm . Ambulacra I and II without claws. Plates C, D absent, femur I without seta v'' . Stigmata and tracheae not evident. Male: dorsal body setae (except sc_2) very short, no vestiges of setae c_2 preserved. All ventral body setae formed as microsetae, epimeres III absent. Femora I and genua II and III without setae, genu I with one seta. Ambulacrum I with one slender claw, ambulacra II and III without claws. Larval female: cheliceral stylets about 19 μm long. Idiosoma almost round; all ventral body setae thickened. Femora I without setae, genua II and III with one seta each.

Type host and locality: *Pterostichus melanarius* (Ill.) - Germany.

Distribution

Germany, Poland.

Material examined

150 larval females on *Pterostichus melanarius*, Jachranka, Mazovia region, 19. 08. 1995; leg. J. Siekierski.

Dorsipes* REGENFUSS, 1968**Dorsipes platysmae* REGENFUSS, 1968****Diagnosis**

Females: length of chelicerae over 64 μm . Length of dorsal setae c_1 and d : 16-22 μm . No vestiges of v_2 setae present, setae on genua I, II and III absent. Males: length of cheliceral stylets about 22 μm . Tarsus II with solenidia. Ambulacrum I with one claw, ambulacra II and III each with two claws. Larval females: cheliceral stylets 41-48 μm long. Genua II and III each with 0-2 setae. Tarsus II with solenidion ω . Femoral setae II and III present, genu III with 2 setae.

Type host and locality: *Pterostichus niger* (Schall.) - Germany.

Distribution

Germany, Russia, Italy, Poland.

Material examined

1 male, 6 larval females; 11 females, 1 male, 23 larval females; 2 larval females and 1 male, 12 larval females (respectively on each of four beetle specimens) *Pterostichus niger*, Mchy, Wielkopolska region, 06. 08. 2000; leg. A. Szczepańska; 4 females, 3 males, 3 larval females on *P. niger*, Mchy, Wielkopolska region, 30. 08. 2001; leg. A. Szczepańska; 1 larval female on *P. niger*, Jachranka, Mazovia region, 23. 08. 1995; leg. J. Siekierski; 5 females, 2 larval females on *P. niger*, Podkowa Leśna, Mazovia region, 25. 09. 1995; leg. J. Siekierski; 1 female, 2 males, 5 larval females and 7 males on two *P. niger*, Obrzycko, Wielkopolska region, 8-16. 06. 2002; leg. E. Baraniak; 1 female, 3 males, 2 larval females on *P. niger*, Mosina, Wielkopolska region, 11. 05. 2002; leg. A. Szczepańska; 3 females, 5 males, 3 larval females and 4 females, 5 males, 10 larval females on two *P. niger*, Liż, Wielkopolska region, 13. 09. 2002; leg. A. Szczepańska.

Dorsipes carabi* REGENFUSS, 1968*Diagnosis**

Females: length of chelicerae about 49 μm . Dorsal setae *e* present, tarsus II with a very long seta *tc''* and much shorter *pl'* dorsally; both not extended beyond ambulacrum II. Males: leg setation as in females. Ambulacrum I with one small claw, ambulacra II and III each with two claws. Larval females: cheliceral stylets about 49 μm . Dorsal seta *e* present. Tarsus II with setae *tc''* and *pl'* as in adult females.

Type host and locality: *Carabus hortensis* L - Germany.

Distribution

Germany, Belgium, Hungary, Poland.

Material examined

1 male, 33 larval females on *Carabus hortensis*, Podkowa Leśna, Mazovia region, 06. 10. 1995; leg. J. SIEKIEFSKI; 3 females; 3 females, 15 larval females; 6 females, 14 larval females; 30 females, 4 males, 5 larval females and 5 females, 1 male, 1 larval female on five *Carabus hortensis*, Obrzycko, Wielkopolska region, 8-16. 06. 2002; leg. E. Baraniak.

DISCUSSION

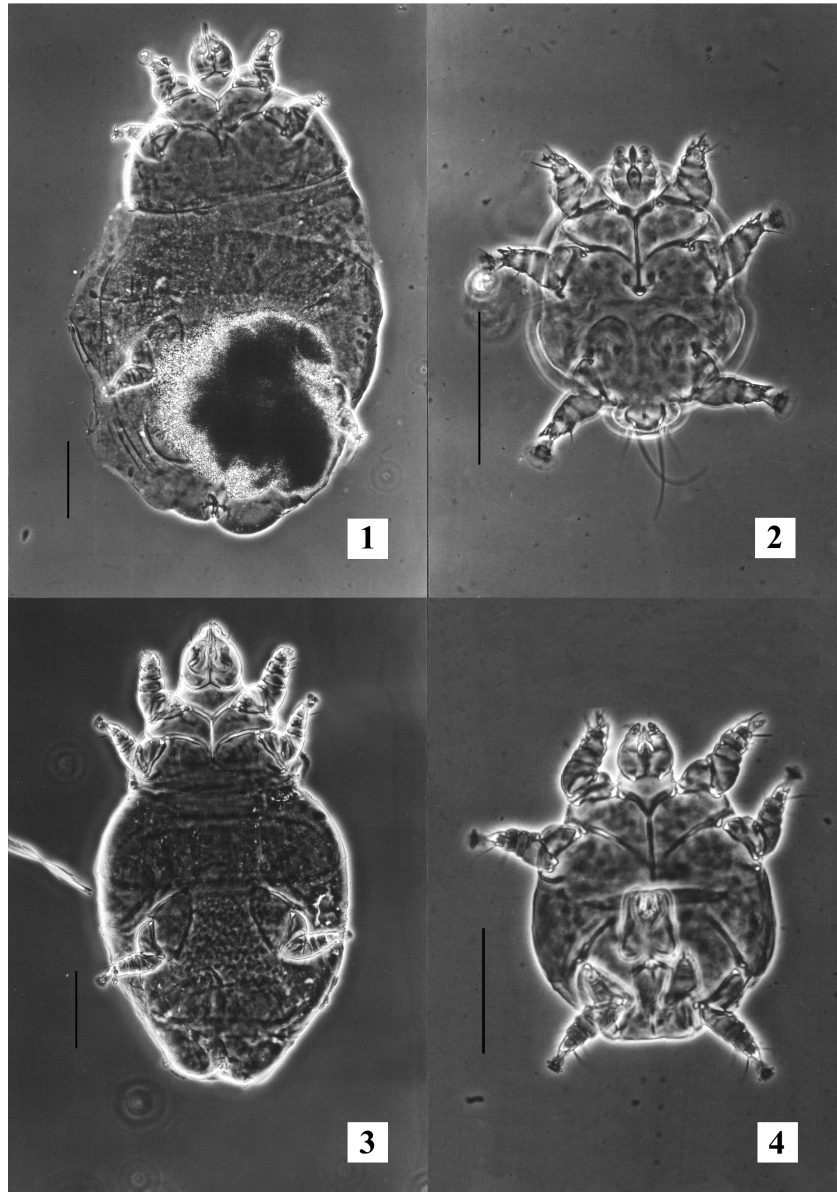
The mite family Podapolipidae is still inadequately studied in Poland. Only seven species (including five of genera *Dorsipes* and *Eutarsopolipus*) are known from the Polish territory at present (SZCZEPAŃSKA 2003). Both fauna and biotopes of carabid beetles are similar in Poland and Germany (where the majority of European species have been described by REGENFUSS 1968, 1974), thus, the probable number of podapolipid species is approximate in the two countries.

Species of *Eutarsopolipus* Berlese, 1913 are parasitic of carabid beetles and recorded from all continents but Antarctica, including 20 species in Europe. REGENFUSS (1968, 1974) described 17 species from carabid beetles in Germany, while EIDELBERG & HUSBAND (1993) and EIDELBERG (1994a, 1994b) three more from Russia and Ukraine. Both Polish species of *Eutarsopolipus* were found on *Pterostichus*. Literature record cover *E. pterostichi* on *P. melanarius* (Germany) and *P. adstrictus* (Russia). Finding *E. pterostichi* on *P. oblongopunctatus* (new host) indicates that it can parasitize several closely related hosts. As the above mentioned *Pterostichus* beetles live in similar habitats widespread across Palearctic (from Spain, throughout Italy, Germany, Bulgaria, Ukraine and Caucasus to Siberia), it is probable that the range of their parasite, *E. pterostichi*, is continuous. *Eutarsopolipus stammeri* is only known in Germany and Poland (new record). Because of its endoparasitic way of life, its detection is more difficult, but also still probable within the geographic distribution of *P. melanarius*.

Nine species of *Dorsipes* REGENFUSS, 1968 were described in Europe: seven by REGENFUSS (1968) and two by HUSBAND & DASTYCH (2000), all from carabids in Germany. The genus is also known from Africa and North America (REGENFUSS 1974, HUSBAND & RACK 1991, HUSBAND 2000). *Dorsipes platysmae* has only one host, *P. niger*, which is widespread in Europe and sparsely recorded from Caucasus, Asia Minor and Siberia. *Dorsipes platysmae* is known in four countries, and its range seems to cover that of its host. Similarly, *D. carabi* ectoparasitic on *Carabus hortensis* may occur along its host range from France to Ural range, reaching northmost to the subpolar zone. *D. carabi* however, has been recorded only in central and southern parts of Europe so far.

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Figs 1-4. 1- *Eutarsopolipus pterostichi* REGENFUSS, 1968, female; 2- *E. stammeri* REGENFUSS, 1968 larva; 3- *Dorsipes platysmae* REGENFUSS, 1968, female; 4- *D. carabi* REGENFUSS, 1968, male. Scalebars represent 100 μ m.

REFERENCES

- BERLESE, A., 1913. Acari Nuovi. Redia **9**: 27- 87.
- EIDELBERG, M. M., 1994a. Mites of the family Podapolipidae (Heterostigmata, Tarsonemina) of Ukraine and adjacent areas with description of a new species. Vestn. Zool., **1**: 37- 43.
- EIDELBERG, M. M., 1994b. A new and little-know mite species of the genus *Eutarsopolipus* (Tarsonemina: Podapolipidae) from carabid beetles. Vestn. Zool., **3**: 25- 32.
- EIDELBERG, M. M., HUSBAND R. W., 1993. A new species of *Eutarsopolipus* from *Bembidion saxatile* (Coleoptera: Carabidae). Internat. J. Acarol., **19** (3): 267-272.
- HAILLINGER, R., 1985. Roztocze (Acari: Podapolipidae, Parasitidae, Eviphididae, Macrochelidae, Ascidae) nowe lub rzadkie dla fauny Polski, zebrane z chrząszczy (Coleoptera) i gryzoni (Rodentia). Pol. Pismo Entomol., **55**: 611-614.
- HAILLINGER, R., 1988. Roztocze (Acari) występujące w Polsce na chrząszczach z rodzaju *Carabus* Linnaeus, 1758 (Insecta, Coleoptera, Carabidae). Wiad. Parazytol., **34** (3): 329- 346.
- HUSBAND, R. W., 2000. Two new species of *Dorsipes* (Acari: Podapolipidae) from *Tefflus zebulianus reichardi* (Coleoptera: Carabidae) from the Democratic Republic of the Congo, including a key to *Dorsipes* species. Ann. Entomol. Soc. Am., **93** (1): 7- 14.
- HUSBAND, R. W., DASTYCH, D., 2000. Two new species of *Dorsipes* (Acari: Podapolipidae) from *Pterostichus niger* (Schall.) (Coleoptera: Carabidae) from Germany, including a key to *Dorsipes* species. Entomol. Mitt. Zool. Mus. Hamburg, **13** (162): 205- 218.
- HUSBAND, R. W., RACK, G., 1991. *Dorsipes evarthrusi* sp. n. (Acari: Podapolipidae), ectoparasite of *Evarthrus americanus* (Carabidae) from Georgia U.S.A. Entomol. Mitt. zool. Mus. Hamburg Bd., **10** (141/142): 127- 136.
- HUSBAND, R. W., 1998. Two new species of *Eutarsopolipus* (Acari: Podapolipidae) from *Agonum extensicole* and *Pterostichus lucublandus* (Coleoptera: Carabidae) from Canada including taxonomic keys of the 13 American species of Podapolipidae from carabid beetles. Ann. Entomol. Soc. Amer., **91** (3): 279- 287.
- LINDQUIST, E. E., 1986. The world genera of Tarsonemidae (Acari: Heterostigmata): a morphological, phylogenetic, and systematic revision with reclassification of family group taxa in Heterostigmata. Mem. Ent. Soc. Canada, **136**: 1- 517.
- REGENFUSS, H., 1968. Untersuchungen zur Morphologie, Systematik und Oekologie der Podapolipidae (Acarina: Tarsonemini). Zeitsch. f. Wiss. Zool., **177**(3/4): 184- 281.
- REGENFUSS, H., 1974. Neue ektoparasitische Arten der Familie Podapolipidae (Acari: Tarsonemina) von Carabiden. Mitt. Hamburg zool. Mus. Inst., **71**: 147- 163.
- SZCZEPAŃSKA, A., 2003. Roztocze epizoiczne występujące na chrząszczach z rodziny biegaczowatych (Coleoptera: Carabidae) w Polsce (Epizoic mites on carabid beetles (Coleoptera: Carabidae) in Poland). Unpublished MSc theses, A. Mickiewicz University, Poznań, 28 pp.

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