

A new species of *Eutarsopolipus* (Acari: Podapolipidae)
from *Chlaenius tomentosus* (Coleoptera: Carabidae)
from Rome, Georgia, U.S.A.

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(With 3 figures)

A b s t r a c t

Eutarsopolipus tomentosi sp. n. (Acari: Podapolipidae) is described from *Chlaenius tomentosus* (Coleoptera: Carabidae) from Rome, Georgia (U.S.A.) and compared with related *Eutarsopolipus* in the *myzus*-group of *Eutarsopolipus*. Keys to species in the *myzus*-group are included.

I n t r o d u c t i o n

Mites in the family Podapolipidae (Acari: Tarsonemini) are all highly specialized ecto- and endoparasites of insects of the orders Blattaria, Orthoptera, Heteroptera, Hymenoptera and especially Coleoptera. All mites in the genus *Eutarsopolipus* are ectoparasites of carabid beetles.

A survey of insects in the collection of the University of Georgia by the senior author in 1971-1972 yielded many podapolipid mites from carabid beetles and other insects. Mites from carabid beetles were sent to Hans Regenfuss, then of the University of Freiburg, Germany. He described two species of *Eutarsopolipus* from Georgia (Regenfuss, 1974). Hans Regenfuss died in 1979 and left a number of unfinished projects. Gisela Rack, Zoological Museum, University of Hamburg, acquired the Regenfuss Collection in 1985. *E. pungens* from Georgia was described from *Chlaenius sericeus* Frost by Husband and Dastych (1998). The purpose of this paper is to describe a new species of mite from the Regenfuss Collection from the carabid beetle, *Chlaenius tomentosus* (Say), collected in Rome, Georgia, provide a key to groups of *Eutarsopolipus*, and provide a key to the ten species in the *myzus*-group as modified from Regenfuss (1968).

M a t e r i a l s a n d M e t h o d s

The technique for removing mites from beetles is described in Husband and Dastych (1998). Measurements were taken with the aid of a Zeiss phase contrast microscope with a drawing tube and stage micrometer. All measurements are in micrometers (μm). Setae no

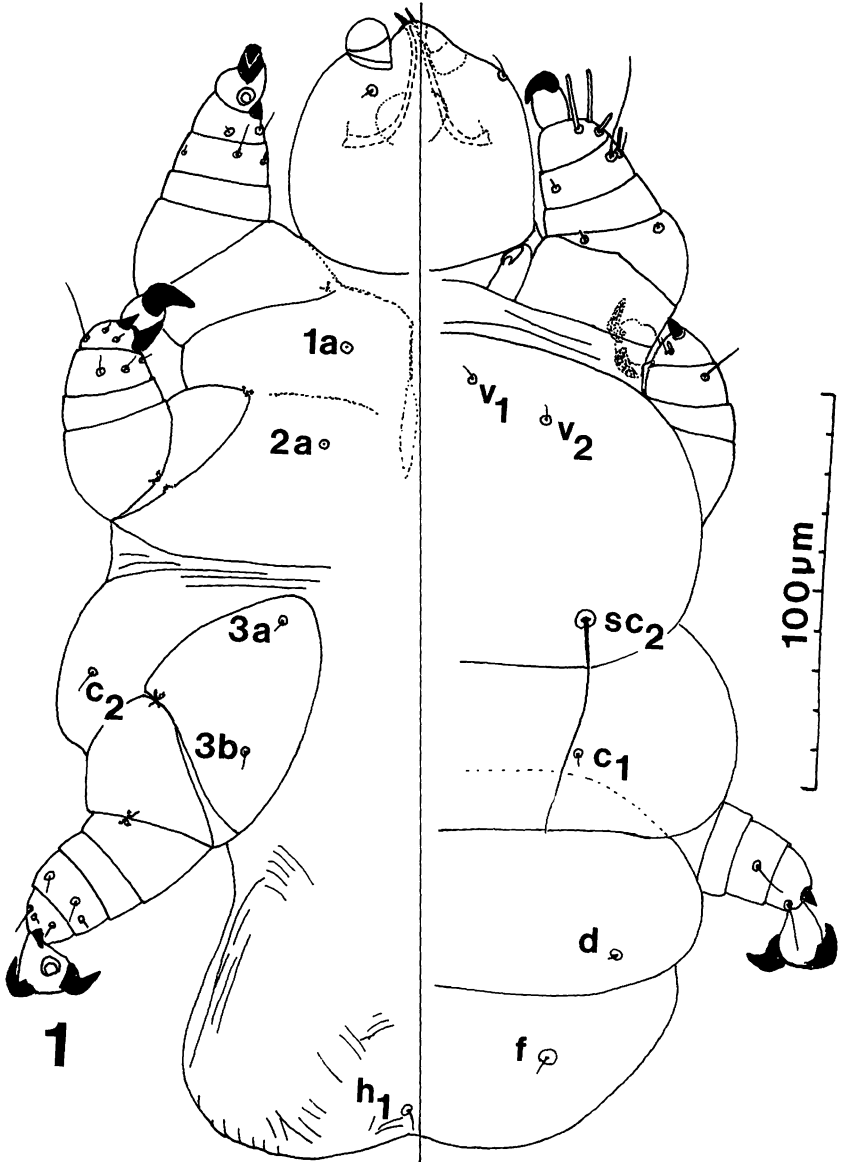


Fig. 1. *Eutarsopolipus tomentosi* sp. n., adult female: ventral and dorsal aspects.

longer than the diameter of their setal sockets are listed as microsetae (*m*). Often long setae are obscured, bent, broken or at an angle which makes measurement difficult. Setae are at least as long as indicated. Terminology is based on Lindquist (1986). Type material is deposited in the Zoological Museum Hamburg (ZMH) and in the collection of the senior author, Adrian (RWH).

Systematics

Family Podapolipidae Ewing, 1922
Genus *Eutarsopolipus* Berlese, 1913

Eutarsopolipus tomentosus sp. n.
(Figs 1-3)

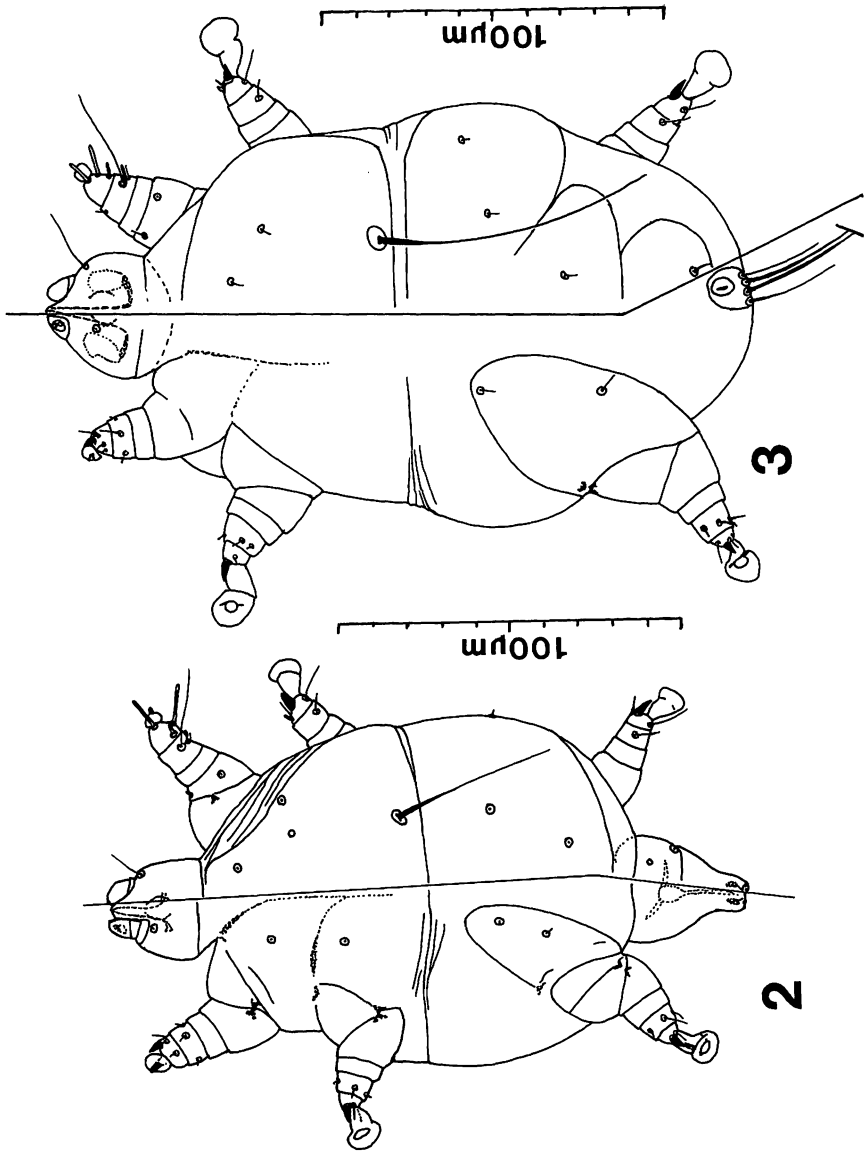
TYPE DATA: H o l o t y p e; Male, 15 April 1937. ZMH, Reg. No. A30/1985-637; collected by P. W. Fattig at Rome, Georgia, U.S.A., collected from *Chlaenius tomentosus* (Say) (Coleoptera: Carabidae).

P a r a t y p e s (same data as holotype): allotype female, ZMH, Reg. No. A30/1985-641; 1 female, 2 males, 1 larval female (exoskeleton), 1 egg; 1 female (with associated larval female exoskeleton), 1 male, 1 egg with the holotype: ZMH; 1 male, RWH.

ETYMOLOGY. *Eutarsopolipus tomentosus* sp. n. is named for the host species *Chlaenius tomentosus*.

DIAGNOSIS: Adult females of *Eutarsopolipus tomentosus* sp. n. are distinguished from other members of the *myzus*-group of *Eutarsopolipus* by a wider pharynx, from *E. regenfussi* Husband & Swihart, 1986 and *E. quebecensis* Husband, 1968 by shorter dorsal gnathosomal setae and from *E. quebecensis* and *E. latus* Regenfuss, 1974 by longer setae *h*₁ (7) (Table 1). Setae *v*₁, *v*₂ are at least 4 µm long in female *E. tomentosus* while these setae are microsetae in *E. latus*. Adult females of *E. regenfussi* and *E. tomentosus* have cheliceral stylets 45-46 compared to cheliceral stylets 35-36 for *E. latus* and *E. quebecensis*. Femur I *l'* varies from 3 in *E. tomentosus* to 5 µm in *E. latus* to 12-14 in *E. quebecensis* and *E. regenfussi*. Cheliceral stylets of larval female *E. tomentosus* are 37 compared to 25-27 in *E. regenfussi* and *E. latus*. The width of the genital capsule of male *E. tomentosus* sp. n. is 22-25, in contrast to capsules with widths of 31-35 in *E. regenfussi* and *E. latus*.

DESCRIPTION: ADULT FEMALE (Fig. 1). Gnathosoma length 52, width 53. Cheliceral stylet length 46. Pharynx width 21, dorsal gnathosomal seta 7, ventral seta 3. Stigmata prominent, at posterolateral margin of gnathosoma. Idiosoma: prodorsal plate wider than long, setae *v*₁, *v*₂ 4, *sc*₂ 50. Setae *v*₂ lateral to a line connecting *v*₁ and *sc*₂. Plate C length 55, setae *c*₁ 3, *c*₂ 7; plate D length 62, seta *d* 4. Plate EF length 65, seta *f* 5. Venter with apodemes 1 moderately developed, meeting sternal apodeme medially. Coxal setae *1a m*, *2a m*, *3a* 2, *3b* 6. Distance between setae *3a* and *3b* 32. Setae *h*₁ 7, no setae *h*₂. Legs: leg setation as in Table 2. Ambulacrum I, II, III with prominent claws. Femur I seta *l'* 3. Single tarsus I spine, two terminal spines on each



Figs 2-3. *Eutarsopolipus tomentosus* sp. n., ventral and dorsal aspects: 2 - male, 3 - larval female.

of tarsi II, III. Tarsus I solenidion ω 6. Tibia I solenidion ϕ 6. Seta *k* 5. Setae *d* tibia I 24, tibia II 11, tibia III 8.

MALE (Fig. 2). Gnathosoma length 30-32, width 31-32. Cheliceral stylet length 22-23, palp length 8-10; pharynx width 7-8, dorsal gnathosomal seta 8-9, ventral seta *m*, distance between ventral setae 12. Idiosoma: length 154-162, width 103-115. Prodorsal plate setae v_1 , v_2 , *m*, sc_2 42. Setae c_1 , c_2 , *d*, *m*. Venter with apodemes 1 and 2 moderately developed, meeting sternal apodeme medially. Coxal setae *1a*, *2a*, *3a m*. Coxal setae *3b* 2. Legs: leg setation as in Table 2. Ambulacrum I with one claw, ambulacra II, III with minute thin claws. Single tarsus I spine, two terminal spines on each of tarsi II, III. Tarsus I solenidion ω 3-4. Tibia I solenidion ϕ 4. Seta *k* 2-3. Tibia I seta *d* 25, tibia II seta *d* 12, tibia III setae *d* 6. Femur I setae *l' m*. Genital capsule length 19-22, width 22-25, with concave lateral margins.

LARVAL FEMALE (Fig. 3). Gnathosoma length 35, width 37. Cheliceral stylet length 37. Palp length 10; dorsal gnathosomal seta 17, ventral seta *m*. Idiosoma: setae v_1 4, v_2 3, sc_2 long (broken). Distance between setae v_1 22; distance between setae sc_2 47. Setae c_1 4, c_2 5, *d* 6, *f* 5. Venter with apodemes 1 and 2 weakly developed, meeting sternal apodeme medially. Coxal setae *1a m*, *2a m*; *3a* 7, *3b* 7. Distance between setae *3a* and *3b* 20. Setae h_1 130, h_2 28. Distance between setae h_1 2. Legs: setation pattern as in the male. Ambulacrum I with small claws; ambulacra II, III without claws. Single tarsus I spine, two terminal spines on each of tarsi II, III. Femur I seta *l' m*. Tarsus I solenidion ω 3. Tibia I solenidion ϕ , seta *k* 3. Tibia I seta *d* 23, tibia II, III setae *d* 8.

EGGS. Oval, length 205-265, width 125-129.

Discussion

Regenfuss (1968) was correct in creating the *desani*-group of *Eutarsopolipus* for the single species *E. desani* Cooreman, 1952 found in Central Africa. Recent discoveries of male and larval female *E. desani* reveal additional characters for the group (Husband, in review). Male *E. desani* have genital capsules which are rectangular, with straight lateral margins. The species with this and other characters of the *desani* group are *E. desani* and *E. pungens*. Regenfuss (1974) placed *E. latus* from Georgia with the *desani* group. However, the genital capsule of the male stage has concave lateral margins which are characteristic of *E. myzus* Regenfuss, 1968. It is inevitable with the discovery of many more species of *Eutarsopolipus* that changes in perspective will occur. Based on current knowledge, *E. latus*, *E. caudatus* Regenfuss, 1974, *E. regenfussi* and *E. tomentosus* sp. n., all males with genital capsules with concave lateral margins, are in the *myzus*-group.

Regenfuss (1968) defined the *myzus*-group of *Eutarsopolipus* in part as follows: females with claws on legs I, II, III well developed, stigmata and trachea evident, plates *C*, *D* evident, without genu III setae and femur *l'* long. He noted that larval females have trochanteral extensions beneath the gnathosoma. We have not found this character in species in the *myzus*-group yet. We note that ambulacral claws I of

males and larval females in the *myzus*-group are relatively small. Ambulacral claws II, III, if present, are small in males and larval females.

Regenfuss (1972) discusses the concept of microhabitats as related to adult female podapolipid mites on carabids. Shapes and cheliceral stylet lengths of adult female mites are related to spaces occupied. Different species of parasitic mites occupy different spaces on carabid hosts. Regenfuss (1968) noted that adult females in the *myzus*-group may be distinguished by shape but larvae and males of *E. myzus*, *E. abdominis* Regenfuss, 1968, *E. squamarum* Regenfuss, 1968, *E. thoracis* Regenfuss, 1968 and *E. poecili* Regenfuss, 1968 are very similar and can not be distinguished. We found the same difficulty with American and European species in the *myzus*-group. Cheliceral stylets of larval *E. caudatus* and *E. tomentosi* sp. n. are longer (37-38) than stylets of other species (24-30) but other variations are less obvious. Likewise, the width of male genital capsules of *E. tomentosi* sp. n. (22-25) are narrower than that of capsules of *E. regenfussi* (32-35) but other variations are less obvious.

The following key to groups of *Eutarsopolipus* is based on adult female characters established by Regenfuss (1968).

Key to the species groups of *Eutarsopolipus*

- | | |
|---|----------------------|
| 1. With setae on each of genera I, II, III | 2 |
| Without setae on each of genera I, II, III | 4 |
| 2. Plates C, D present, with femur I seta <i>v</i> " | 3 |
| Plates C, D not present, without femur I seta <i>v</i> " | <i>stammeri</i> |
| 3. Prodorsal setae <i>v</i> ₁ , <i>v</i> ₂ at most 5 µm, seta <i>c</i> ₂ at most vestigial | <i>acanthomus</i> |
| Prodorsal setae <i>v</i> ₁ , <i>v</i> ₂ 14-23 µm, seta <i>c</i> ₂ 6-8 µm | <i>ochoi</i> |
| 4. Genu I with 2 setae | 5 |
| Genu I without setae | 6 |
| 5. Femur I seta <i>v</i> " present | <i>catadromi</i> |
| Femur I seta <i>v</i> " not present | <i>encoreus</i> |
| 6. Stigmata and trachea conspicuous | 7 |
| Stigmata and trachea not conspicuous or not present | <i>pterostichi</i> |
| 7. Tarsus II solenidion present, cheliceral stylets less than 140 µm | 8 |
| Tarsus II solenidion not present, chel. stylets 140-145 µm | <i>lagenaeformis</i> |
| 8. Coxal setae 1a, 2a at most 3 µm | 9 |
| Coxal setae 1a, 2a 7-10 µm | <i>desani</i> |
| 9. Either ambulacrum I or II with a strong claw | <i>myzus</i> |
| All ambulacra without claws | <i>biunguis</i> |

Included in the *myzus*-group are: *E. myzus*, *E. abdominis*, *E. squamarum*, *E. thoracis*, *E. poecili*, *E. latus*, *E. caudatus*, *E. regenfussi*, *E. quebecensis*, *E. sp. n.* (Husband, in review) and *E. tomentosi* n. sp. Regenfuss illustrated male and larval *E. myzus* but we were unable to find males or larvae in the collection. In the keys to species of the *myzus*-group, we follow Regenfuss, in part, in using characteristic shapes of adult females to distinguish species.

Table 1. Maximum measurements of some American *Eutarsopolipus* in the *myzus*-group.

Character	<i>E. tomentosus</i> sp. n.	<i>E. latus</i>	<i>E. regenfussi</i>	<i>E. quebecensis</i>
FEMALE				
Idiosomal length	233	400	590	630
Idiosomal width	170	350	398	570
Cheliceral stylets	46	35	48	36
Pharynx width	21	13	14	17
Setae:				
Dorsal gnathosoma	7	5	16	24
Ventral gnathosoma	3	<i>m</i>	5	9
V_1, V_2	4,4	<i>m, m</i>	3,4	8,9
c_2	7	3	4	10
h_1	8	<i>m</i>	11	0
Femur I I'	3	5	12	14
Coxa 3a, 3b	3,6	2,4	<i>m, 5</i>	7,7
MALE				
Idiosomal length	162	190	136	no male
Idiosomal width	115	100	99	-
Cheliceral stylets	23	21	14	-
Gen. capsule length	22	30	33	-
Gen. capsule width	25	31	35	-
Dorsal gnath. setae	9	10	7	-
LARVAL FEMALE				
Idiosomal length	290	165	144	no larva
Idiosomal width	190	93	108	-
Cheliceral stylets	37	25	27	-
Pharynx width	10	8	7	-
Dorsal gnath. setae	17	17	19	-
Setae sc_2	82	34	4	-
Setae h_2	28	29	25	-
Setae femur I I'	<i>m</i>	5	<i>m</i>	-

Recently, specimens of *Eutarsopolipus* in the *myzus*-group from Vermont, Minnesota, and Wyoming, U.S.A. have been found on *Chlaenius* species. Investigations of these podapolipid mites are in progress.

Table 2. Leg setation for femora (F), genua (G), tibiae (Ti), tarsi (Ta) for *Eutarsopolipus myzus*, *E. latus* and *E. tomentosus* sp. n. A vestige of setae *ft*" is present on tarsus I. Seta *pl*" is present on tarsus III of *E. myzus*. *Dorsipes evarthrusi* Husband & Rack, 1991, from a carabid host, is included to contrast with reduction of femoral and genual setation in species in the *myzus*-group.

Species	Leg I				Leg II				Leg III			
	F	G	Ti	Ta	F	G	Ti	Ta	F	G	Ti	Ta
<i>myzus</i> - group												
<i>E. myzus</i>	2	0	7	9	0	0	4	7	0	0	4	7
<i>E. latus</i>	2	0	7	9	0	0	4	7	0	0	4	6
<i>E. tomentosus</i> sp. n.	2	0	7	9	0	0	4	7	0	0	4	6
<i>platysmae</i> - group of <i>Dorsipes</i>												
<i>D. evarthrusi</i>	3	3	7	9	1	2	4	6	1	1	4	5

Key to adult females in the *myzus*-group of *Eutarsopolipus*

1. Propodosoma does not cover the gnathosoma 2
 Propodosoma covers the gnathosoma *E. poecilii*
2. Without wrinkled opisthosomal lobes; if lobes, then lobes not equal to size of gnathosoma 3
 With wrinkled opisthosomal lobes, lobes equal to size of gnathosoma
 *E. quebecensis*
3. Plate C entire 4
 Plate C divided *E. latus*
4. Idiosoma not teardrop-shaped 5
 Idiosoma teardrop-shaped *E. thoracis*
5. Idiosoma elongate, oval, without lateral bulges beyond plate C 6
 Idiosoma elongate, with lateral bulges near plate C 9
6. Lengths of femur I I', *h*₁ exceed 10µm 7
 Lengths of femur I I', *h*₁ less than 10µm *E. tomentosus* n. sp.
7. Setae *h*₁ shorter than 20µm 8
 Setae *h*₁ longer than 30µm *E. caudatus*
8. Ventral gnathosomal setae, setae *v*₂ microsetae *E. regenfussi*
 Ventral gnathosomal setae, setae *v*₂ at least 5µm
 *E. sp. n.* (Husband, in review)
9. Idiosoma broadest anterior to the plane of plate D 10
 Idiosoma broadest near the plane of plate D *E. squamarum*

10. Caudal to the posterior margin of plate *EF*, the idiosoma expands laterally. *E. myzus*
 Caudal to the posterior margin of plate *D*, lateral margins of the idiosoma are parallel *E. abdominalis*

A c k n o w l e d g m e n t s

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