A NEW SPECIES OF PODAPOLIPUS AND A NEW SPECIES OF EUTARSOPOLIPUS (ACARI: PODAPOLIPIDAE) FROM THE PHILIPPINES

Robert W. Husband and L.A. Corpuz-Raros

ABSTRACT

*Podapolipus luzoni* n. sp. is described from a tenebrionid beetle collected on Luzon, Philippine Islands and *Eutarsopolipus leytei* n. sp. is described from a carabid beetle collected on Leyte, Philippine Islands. Relationships with related species are discussed. Mating position in *P. luzoni* and adaptation of male chelicerae for attachment during mating is illustrated.

**Key words:** *Podapolipus luzoni* n. sp.; *Eutarsopolipus leytei* n. sp. Acari, Podapolipidae, Podapolipus, Eutarsopolipus

INTRODUCTION

In the process of reviewing material in the University of the Philippines at Los Baños Museum of Natural History (UPLBMNH) and Department of Plant Protection, Visayas State College of Agriculture (VISCA), the junior author found undescribed species of *Podapolipus* and *Eutarsopolipus*. Although date and locality information are known, host data other than beetle are not. Feldham-Muhsam and Mumcuoglu (1981) had a similar problem when they published a species description from a “beetle” from Brazil. In the present case, it is known that *Eutarsopolipus* spp. are restricted to Carabidae and recent studies by Husband (1980 and 1986) indicate that the new *Podapolipus* is parasitic on Tenebrionidae and, most likely, on relatives of *Blaps*{{\it}}tus* spp., *Alphitobius* spp., and *Gonocephalus* spp. *Podapolipus luzoni* n. sp. is described from a beetle from Villarica, Pantabangan, Nueva Ecija, Luzon Is., Philippines and *Eutarsopolipus leytei* is described from a beetle from Baybay, Leyte Is., Philippines.

Measurements were taken with the aid of a Wild phase contrast microscope with a drawing tube calibrated with a stage micrometer. Terminology is based on that used by Lindquist (1986). All measurements are in microns.

*Podapolipus luzoni* Husband and Corpuz-Raros, n.sp. Figs. 1 — 8

**Female.** (Fig. 1,2). Gnathosoma longer than wide; length 61, width

Received 12 July 1988; accepted September 1988

1 Biology Department, Adrian College, Adrian Michigan, 49221, U.S.A. and Department of Plant Protection, Visayas State College of Agriculture, Baybay, Leyte, Philippines, respectively.

Idiosoma smooth, lightly sclerotized, two anterior bulges; length 250-1035, width 262-599. As many as 27 larval females in various stages of development may be observed inside. Fig. 1 is a newly molted female.

Legs — one pair; with a single well developed terminal claw, dorsal femoral seta 13.

Male (Figs. 3, 4, 5, 6). Gnathosoma length 22, width 30; dorsal and ventral setae 7. Palps 2 — segmented, distal segment truncate, basal segment with short seta. Cheliceral stylets harpoon-like at tip 13—18, about 1/2 width of gnathosoma.

Idiosoma — length 11—131, width 100—117.

Dorsum — prodorsal plate narrows anteriorly, conical aedeagus at mid-anterior border. Setae v_1, v_2 and sc_1 all microsetae, clustered immediately posterior to aedeagus. Setae sc_2 56. Plates C and D fused; setae c_1 4, c_2 3, d 4.

Venter — slightly sclerotized apodemes 1,2 meet medially at sternal apodeme. Coxae III fused, all coxal setae 3.

Figure 1. *Podapolipus luzoni* n. sp., female, ventral whole body view.

Figure 2. *Podapolipus luzoni* n. sp., female, ventral view.
Figure 3.  *Podapolipus luzoni* n. sp., male, dorsal view.

Figure 4.  *Podapolipus luzoni* n. sp., male, ventral view.
Legs — leg setation as in Table 1. Leg I with a terminal stout claw and an anteroventral stout spine with two slender adjacent setae. Solenidion $\omega$ 6. solenidion $\phi$ 5. Femur I 1” seta 25. Ambulacra II, III 17, with small symmetrically paired claws. Femur I i” seta 5. Tibia I spine 7, tibia II, III spines 4. Tibia III longest seta 32, tarsus III longest seta 56.

Larval female (Figs. 7, 8). Gnathosoma length 35, width 45; dorsal setae 33, ventral setae 9. Palps 2-segmented, each segment with a seta 6 in length. Cheliceral stylets corkscrew-like, harpoon-like tips. length 30.

Idiosoma — length 162, width 148.

Dorsum — prodorsal plate length 46, width 121; $v_1$ 4, $v_2$ 5, $sc_2$ 84. Plate D length 37, width 83; plate EF length 38, width 41. Setae $c_1$ 8, $c_2$ 6, d 7, f 4. Setae $h_2$ 137.

Venter — apodemes weakly sclerotized; apodemes 1 and 2 meet medially at anterior sternal apodeme. Coxae III separate from each other and from coxae I, II; coxae I, II setae 3, coxae III setae 4. Sclerotized funnel-like structure, length 12, width 5, between anteromedial borders of coxae III; best observed in exoskeleton of larval female.

Legs — leg setation as in Table 1. Leg I with 2 parallel terminal claws. Solenidion $\omega$ 7. solenidion $\phi$ 6. Femur I setae v 8, 1” 25. Femur II seta 6.
Table 1. Total setae on legs of *Podapolipus* spp. from Tenebrionidae

<table>
<thead>
<tr>
<th></th>
<th>Leg I</th>
<th></th>
<th>Leg II</th>
<th></th>
<th>Leg III</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>G</td>
<td>Ti</td>
<td>Ta</td>
<td>F</td>
<td>G</td>
</tr>
<tr>
<td><em>P. reconditus</em></td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><em>P. apodus</em></td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><em>P. tribolii</em></td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><em>P. haramotoi</em></td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><em>P. pacificus</em></td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>P. luzoni</em> n. sp.</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

![Figure 7](image-url) *Podapolipus luzoni* n. sp., larval female, dorsal view.
Ambulacra II, III 18, with small symmetrically apired claws. Tibia III longest seta 32, tarsus III longest seta 85.

Type data. Holotype male: Villarica, Pantabangan, Nueva Ecija, Luzon Is., collected on 23 February 1979 by R.T. Rosario. Deposited in the Entomology Collection of the University of the Philippines at Los Baños Museum of Natural History, College, Laguna, Philippines (RWH 860403-1). The host beetle can not be located.

Paratypes (2 males, 4 larval females, 9 females) — same data as holotype. One male (RWH 860403-2), two larval females (RWH 860403-3, -4) and three females (RWH 860403-6, -11 and -13) are in the Entomology Museum of Adrian College, Adrian, Michigan 49221 U.S.A. The balance of paratypes are in the collection of the Entomology Museum, UPLB Museum of Natural History with the holotype.

Etymology. The species is named for the locality of collection, Luzon Island, Philippines.

Diagnosis. Like most podapolipid mites from tenebrionid beetles. male P. luzoni have femur II v setae. Males of P. pacificus Husband 1986 lack femur II v setae. The length of femur II v seta in P. haramotoi Husband 1986 is 16. more than 1/2 the width of femur II. This seta in P. luzoni is 5, less than 1/3 the width of femur II. Most setae in P. luzoni are shorter than in P. haramotoi. Tarsus III longest seta is shorter than in either P. haramotoi or P. pacificus. Larval females of P. luzoni resemble P. pacificus in that coxal setae v₁, v₂, c₁, c₂ and d are short. In larval females of P. pacificus,
femoral I setae v are twice the diameter of the setal socket and femoral II setae v are lacking. In *P. luzoni*, femoral I v setae are more than 1/4 the width of femur I and femoral II setae v are present. Adult females of *P. luzoni* have small anterior bulges which are characteristic of podapolipid mites from tenebrionid beetles. The conspicuous prodorsal plate found in *P. haramotoi* and *P. pacificus* is not apparent in most *P. luzoni*. Although adult females of *P. luzoni* have slightly smaller setae, gnathosomas and pharynxes than *P. pacificus* females have, these species are best distinguished by characters of larval female exoskeletons attached to adult females or characters of immature males and larvae often seen inside adult females.

Eutarsopolipus leytei (Husband and Corpuz-Raros, n.sp. Figs. 9 — 12

Female (Figs. 9,10). Gnathosoma length 78, width 72; dorsal setae 20, ventral setae 3. Cheliceral stylets smooth, slender 68. Pharynx length 29, width 20. Stigmata on slightly elevated bulges dorsolateral to base of gnathosoma. Palps 2—segmented, longer than wide, distal segment with a short distolateral seta and ventral sclerotized patterned area.

Idiosoma — length 335-820, width 250-500.
Dorsum — prodorsal plate length 96, width 122; setae v1, 5, v2 11, sc 62. Plate C length 63, width 245; setae c1 12, c2 9. Plate D length 77. width 221; setae d 12. Plate EF length 68, width 149; setae f 8.
Venter — well sclerotized apodemes 1 and 2 meet medially at the sternal apodeme. Coxae III setae 3a thick 8, setae 3b thin 4.

Legs — leg setation as in Table 2. Ambulacrum I with a terminal stout claw. Ambulacra II, III with prominent, symmetrically paired claws. Single tarsal I spine, two terminal spines each on tarsi II, III. Tarsus I and tarsus II solenidia ω about as long as setal socket. Solenidion φ 7, slightly longer than 1/3 width of base of tibia I. Tibiae I, II, III setae d 35,15 and 11, respectively.

Larval female (Figs. 11,12). Gnathosoma length 56, width 56; dorsal setae 20, ventral setae 3. Palps 2—segmented, distal segment with a small seta and a sclerotized patterned ventral area. Cheliceral stylets smooth, slender 54.

Idiosoma — length (non-swollen specimens) 205—220, width 142—150.
Venter — well sclerotized apodemes 1 and 2 meet medially at the sternal apodeme. Coxae III separate from each other and coxae I, II; setae 1a 2, 2a 2, 3a stout 4, 3b slender 2.
Figure 9. *Eutarsopolipus leytei* n. sp., female, dorsal view.

Figure 10. *Eutarsopolipus leytei* n. sp., female, dorsal view.
Figure 11. *Eutarsopolipus leytei* n. sp., female, ventral view.

Figure 12. *Eutarsopolipus leytei* n. sp., larval female, ventral view.
Legs — leg setation as in Table 2. Leg I with small parallel, terminal claws, fused at bases. Solenidia ω on tarsi I, II no longer than the diameter of setal sockets. Solenidion φ 7. Ambulacula II, III with minute, symmetrically paired claws. Tibiae I, II, III setae d 46, 17 and 21, respectively.

Table 2. Setae on legs of Eutarsopolipus leytei n. sp.

<table>
<thead>
<tr>
<th></th>
<th>Leg I</th>
<th>Leg II</th>
<th>Leg III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F G Ti Ta</td>
<td>F G Ti Ta</td>
<td>F G Ti Ta</td>
</tr>
<tr>
<td>Setae and spines</td>
<td>3 2 6 8</td>
<td>0 1 4 6</td>
<td>0 1 4 6</td>
</tr>
<tr>
<td>Solenidia</td>
<td>— — 1 1</td>
<td>— — 1</td>
<td>— — —</td>
</tr>
</tbody>
</table>

**Type data.** Holotype larval female: Bato Creek, 380 m., Mt. Pangasugan, Baybay, Leyte Is., Philippines (RWH 860414-9). The host beetle cannot be located.

Paratypes (8 females, 6 larval females) — same data as holotype. Three females (RWH 860414-2, —3, —8) and two larval females (RWH 860414—10, —11) are in the Entomology Museum of Adrian College, Adrian, Michigan, U.S.A. The balance of paratypes are in the collections of the UPLB Museum of Natural History, College, Laguna, and the Biological Museum, Visayas State College of Agriculture, Baybay, Leyte, Philippines.

**Etymology.** The species is named for Leyte, the island on which it was collected.

**Diagnosis.** No male Eutarsopolipus leytei was found. Larval females have coxae 3a setae twice as thick and twice as long as coxae 3b setae, a condition unlike any previously described larval female with setae h1 longer than the gnathosoma. Solenidia ω are very short and a genu II seta is present in E. leytei. Adult females have ambulacula II, III with prominent claws while larval females have ambulacula II, III with minute claws. Adult females have coxae 3a setae twice as thick and long as coxal 3b setae. E. pseudopus Regenfuss 1974 from Guadalcanal Is. have short setae sc2 in adult females and all coxal setae are thick and stout in larval females. E. crassipes Regenfuss 1974 from S. India have short setae sc2 in adult females and setae h1 are distinctly shorter than the gnathosoma in larval females. Setae sc2 are longer in E. leytei and all coxal setae are not thick and stout.
DISCUSSION

*Podapolipus luzoni* and *Eutarsopolipus leytei* are the first records of these genera in the Philippines. Close relatives of *P. luzoni* occur as parasites of the tenebroid beetles *Gonocephalum* spp. in Australia and Hawaii and *Blapstinus* sp. and *Alphitobius* sp. in Hawaii. Although *P. luzoni* is closely related to Pacific area relatives, *P. pacificus* and *P. haramotoi*, *Eutarsopolipus leytei* has fewer characters in common with two other species described from the Pacific area and South India, *E. pseudopus* and *E. crassiceps*. Of these two species, *E. leytei* shares more characters with *E. crassiceps* than with *E. pseudopus*. Many more carabid beetles from this region need to be examined before generalizations about relationships between carabid mite species can be considered in detail.

Relatively few instances of mating in podapolipid mites have been recorded. Volkonsky (1940) was the first to illustrate mating in *Podapolipoides grassii* (Berlese 1897). Regenfuss (1973) described the proconjugate position observed in other genera of Podapolipidae. Mating pairs and specialized structures in the larval female were noted by Husband and Flechtmann (1972). Mating pairs of *Locustacarus buchneri* (Stammer 1951) were observed by Husband (1970). In *P. luzoni*, the male inserts chelicerae in a sclerotized, receiving structure between anteromedial borders of coxae III of the larval female (Fig. 8) in the fashion illustrated (Figs. 5,6). This structure appears as a cone in exoskeletons of larval females. Legs III of the larval female are on top of and lateral to legs I and II of the male. Long prodorsal setae sc2 of the male are adjacent to h2 setae and trichal setae of the female. Plate H and bases of h setae are dorsal to the male in this swollen larval female. The aedeagus is positioned at the genital opening between the posteromedial borders of coxae III. Close inspection of additional larval females of *Podapolipus* spp. may reveal structures found in *P. luzoni* and be helpful in understanding mating in Podapolipidae.

REFERENCES


