DESCRIPTIONS AND RECORDS OF SOME PHILOTARSIDAE FROM TRINIDAD, WEST INDIES (PSOCOPTERA)¹

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ABSTRACT

Four species of Philotarsidae are recorded from Trinidad, West Indies, 3 of which are new to science. Two new species of Aaroniella are described and 1 new genus is erected. Broadheadia (type B. caribe new species). Philotarsus bruchi Williner of Argentina, is transferred to Aaroniella. A key to the known species of Trinidad Philotarsidae is included.

Despite much collecting and several publications in recent years, the psocid faunas of South America and the West Indies remain relatively poorly known. From Trinidad there exist literature records of only 8 species of psocids (Mockford 1967, 1971; New 1973; Eertmoed 1973), although many more species are at hand.

Investigation of the psocids of Trinidad apparently began in February 1969, when the senior author and Mr. Aaron M. Nadler spent 8 days collecting on the island. The senior author returned to Trinidad in August 1961 and spent 3 days collecting psocids there. The Trinidad psocid fauna did not receive attention again until April 1974, when the junior author began faunal and ecological investigations there which have lasted for a year.

The family Philotarsidae seems to be poorly represented in South America and the West Indies. A single species has been described from South America (Williner 1943). One species is known from Hispaniola and Cuba (Mockford 1974), and 1 is known from Jamaica (Turner 1975).

It is apparent from the field work to date that the Philotarsidae constitute a relatively small, inconspicuous part of the entire psocid fauna of Trinidad. Four species have been found, represented by only 9 individuals. Of the 4, 3 are new to science, and 1 represents a new genus. In this paper the new taxa are described and a key to the species is presented.

Measurements (Table I) are in microns and have an error of ±0.231μ. Abbreviations used in the measurements are as follows: Fw=forewing; Hw=hindwing; f₁, f₂, f₃ = first, second, and third flagellomeres; F=posterior femur + trochanter; T= posterior tibia; t₁, t₂, t₃ = posterior first, second and third tarsomers; cten.= number of ctenidia on posterior t₁; IO/D=least distance between compound eyes in dorsal view divided by greatest antero-posterior diameter of compound eye in dorsal view; PO=greatest transverse diameter of compound eye divided by greatest antero-posterior diameter of the eye in dorsal view.

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Aaronella dentata Mockford and Evans, new species

DIAGNOSIS.—With radial pattern of spots in forewing. Except for A. bruchi (Williner) new combination, differing from other previously described species with radial spots by entire border of pterostigma being heavily pigmented. Differing from A. bruchi in absence of spot in M, at apex of areola postica and longer wing length. Male characterized by absence of radial spot in R, and toothed posterior margin to clunium.

MALE.—Measurements (Table I).

Head: With epicranial line present; frontal lines absent. Bearing numerous setae with longer ones, each about 3/4 length of f., on vertex and anterior margin of clypeus. Antennae bearing setae each about length of f. Distal flagellomere terminating in seta longer than the segment. Anterior ocellus slightly smaller than the others. Lacinal tip (Fig. 4) with relatively large, concave, median cusp; lateral cusp with a few low, rounded denticles. Eyes a little larger than those of female.

Thorax: Each prealar seta with a basal seta and a pulvillus with a lightly dilated tip. Pterostigma with a spur vein from its posterior angle.

Abdomen: Clunium (Fig. 11) with 15-20 small denticles, in specimen examined, either side of median convexity. Epiprost (Fig. 11) with spinous posterior margin and denticate lateral lobes. Sense cushion of paraproct with 21, 18 trichobothria in specimen examined. Hypantrium (Fig. 7) with gently curved posterior margin dorsally, bearing scattered setae. Phallic frame (Fig. 8) anteriorly rounded, relatively wide and thick; narrower on sides. Endophallic sclerotizations complex with 5 denticles along midline. Tip of aedeagal arch tuberculate and ending acuminately.


Thorax light brown with sclerotized areas medium brown. Anterior half of mesoscutellum and medio-posterior corners of metanotal lobes very dark brown. Coxae medium brown, pale brown distally. Femora medium brown except for pale brown distal tips. Tibiae medium brown with pale brown proximal tips. Tarsi medium brown. Forewing (Fig. 3) with medium brown margin and veins except for colorless Cu1 and Cu2 around junction with Cu2. Radial spots pale brown with more distinct, similarly colored spots at vein-margin junctions. Margin and veins of hindwing medium brown except for pale brown Cu2.

Abdomen covered with scattered dark brown pigment. Dorsally, pigment segmentally concentrated except for very narrow median, unpigmented line. Phallic frame medium brown, aedeagus very dark brown; remainder of terminalia dark brown.

FEMALE.—Measurements (Table I).

Head: With epicranial line almost reaching ocellar interval; frontal lines absent. Bearing 25-30 setae each about length of f.; almost twice this
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*These measurements represent a mesothoracic leg since no other legs are present on this specimen.

TABLE I. Measurements (greatest lengths in μ), head ratios, and ctenidial counts for new species of Philotarsidae from Trinidad. Abbreviations are explained in the text.
length on posterior margin of vertex and anteriorly on clypeus with 1 on each side directed forward and about 6-8 along anterior margin directed downward. Antennae with short setae about 4X width of a flagellomere in length, distal flagellomere terminating in a seta longer than the segment. Anterior ocellus of similar size to others. Lacinial tip (Fig. 5) with relatively large, concave median cusp; lateral cusp with a few low, rounded denticles.

Thorax: Mesonotal lobes bearing setae of similar size range to those of head. Each pretarsal claw with basal seta and pulvillus with slightly dilated tip. Pterostigma with minute spur vein.

Abdomen: Clunium simple. Epiproct subsemicircular with scattered setae. Sense cushions of paraprocts with 17, 16 trichobothria in specimen examined as well as 2 setae without rosettes in each. Subgenital plate (Fig. 9) with arms separated but poorly sclerotized; bearing scattered setae on its distal third with 2 medial ones about twice as long as others; sculptured terminal sclerite without setae. Gonapophyses (Fig. 10): relatively short ventral valve with several minute spinelets on tip; dorsal valve subrectangular with spinous protuberance ventral to apex; lateral valve triangular and shallow with apex a little to ventral half and bearing numerous setae of different lengths. Spermapore plate (Fig. 6) complex with pore bordered by heavily sclerotized area and a basal area bearing sinuate bands.


Thorax generally light brown with diffuse dark brown patches on notal lobes. Medio-posterior corners of latter, anterior half of scutellum, and posterior margin of meta-postnotum very dark brown. Sclerotized parts of pleura very dark brown; coxae similar shade with pale brown distal tips. Femora very dark brown with pale brown tips; tibiae medium brown, tarsi dark brown. Forewing (Fig. 1) with margin and veins medium brown except for Cu1s and Cu1a around junction with Cu1a. Membrane patches medium brown. Pterostigma with medium brown pigment bordering a central hyaline area. Hindwing (Fig. 2) with medium brown margin, veins, and patches at vein-margin junctions.

Abdomen with diffuse dark brown cuticular and subcuticular pigments, more concentrated ventrally. Clunium dark brown with a light brown patch either side of dorsal mid-line. Paraprocts and epiproct dark brown. Genitalia and subgenital plate very dark brown.

NYMPH.—Essentially same as adult in body shape, ciliation, and color.

Fig. 1-10. Aaroniella dentata n. sp. (scales in mm): 1) female, forewing. 2) female, hindwing. Scale of Fig. 1. 3) male, forewing. Scale of Fig. 1. 4) male, lacinial tip. 5) female, lacinial tip. 6) female, spermapore sclerite (distal end up on this and all other terminal abdominal parts except epiproct and paraproct). Scale of Fig. 9. 7) male, hypandrium, scale of Fig. 9. 8) male, phallosome, scale of Fig. 9. 9) female, subgenital plate. 10) female, ovipositor valves.
pattern, except that head and body paler, legs very light brown, setae of abdomen grouped in segmental bands.

Holotype male, allotype female, 2 male and 1 female paratypes taken beating trees, Trinidad (West Indies) Simla, Arima Valley, 24-II-1959, E. L. Mockford collector. The holotype and allotype will be deposited in the American Museum of Natural History, New York City. Other records (all from Trinidad, West Indies, collected by H. A. Evans): 1 female on coffee (Coffea arabica Linn.), Wells Plantation, Maracas Valley, 19-VI-1974; 1 nymph on cacao (Theobroma cacao Linn.), same location, 25-I-1975; 1 nymph on tonca bean (Dipteryx odorata Willd.), same locality, 27-I-1975; 1 female on cacao, Sooby Plantation, Orinola Valley, 25-I-1975, 1 nymph on mango (Mangifera indica Linn.), 2000 ft, Textel Telecommunications Station, Arima-Blanchisseuse Road, 8-XI-1974.

Aaroniella festiva Mockford and Evans, new species

DIAGNOSIS.—With radial pattern of spots in forewing (Fig. 16). Except for A. bruchi differing from other previously described species with radial spots by entire border of pterostigma being heavily pigmented. Differing from A. bruchi in having proximal pigmentation in cell M, confluous with that in cells R,, Cu,, and Cu,, forming a large central spot.

FEMALE.—Measurements (Table I).

Head: With epicranial line complete; frontal lines distinct. Anterior ocellus about half size of posterior pair. Bearing several setae with longer ones, each about length of f, on posterior margin of vertex and anterior margins of clypeus and genae. Anterior setae directed downward except for 1 forward-directed individual on each antero-lateral corner of clypeus. Antennae with setae about 3 times as long as width of a segment; terminal seta longer than remainder of segment. Lacinial tip (Fig. 13) with small, rounded denticle on median cusp and a few low, rounded denticles on lateral cusp. Eyes slightly triangular in outline.

Thorax: Each pretarsal claw with basal seta and pulvillus with strongly dilated tip. Pterostigma with no spur vein from its posterior angle. Hindwing as in Fig. 17.

Abdomen: Clunium simple. Epiproct relatively acutely rounded with 4 long setae (length about half distance across epiproct base) and several smaller ones. Sense cushions of paraprocts with 15, 17 trichobothria on single specimen observed and 2 setae without rosettes in each. Subgenital plate (Fig. 14) with pigment arms separated but poorly developed; bearing scattered setae except on its distal third; 2 medial setae longer than others. Gonapophyses (Fig. 18): relatively short ventral valve suddenly tapering in terminal 1/5 to acuminate tip; dorsal valve with low lobe bearing minute setae, a large denticle and a few small denticles, near distal end;

Fig. 11-18. Aaroniella n. spp. Fig. 11-12: A. dentata n. sp.: 11) male, epiproct and paraproct. 12) female, epiproct and paraproct, scale of Fig. 11. Fig. 13-18: A. festiva n. sp.: 13) female, lacinial tip. 14) female, subgenital plate. 15) female, spermapore sclerite, scale of Fig. 11. 16) female, forewing. 17) female, hindwing, scale of Fig. 16. 18) female, ovipositor valves, scale of Fig. 13.
lateral valve with dorsal corners irregularly squared-off, bearing numerous setae. Spermapore plate (Fig. 15) highly complex with pore inside sclerotized plate and loops with crescent-shaped sclerotizations anteriorly.


Thorax dark brown with very dark brown, narrow lateral line just above coxae. Latter medium brown, pale brown distally. Femora very pale brown proximally grading to medium shade distally. Tibiae pale brown with a narrow medium brown band subapically at each of the proximal and distal tips. Tarsi medium brown. Forewing (Fig. 16) with veins pigmented medium brown except for Cu10 and Cu11 a little before and after junction with Cu9. Radial spots and large patch over junction of M+Cu1, Cu2, and M also medium brown. Pterostigma similarly pigmented except for pale center. Hindwing (Fig. 17) with medium brown veins and large but faint patch at junction of M+Cu1, Cu2, and M.

Abdomen unpigmented except for a few small, irregularly scattered patches of dark brown pigment. Spiracles dark brown. Terminalia dark brown.

Holotype female, Trinidad (West Indies), Textel Telecommunications Station Arima—Blanchisseuse Road, 28-IX-1974, H. A. Evans collector. The type is in the collection of the senior author, Normal, Illinois.

**Aaroniella achrysa** (Banks)

*Graphocaecilius achrysus* Banks, 1941:391.

*Aaroniella achrysa* (Banks), Mockford, 1974:133.

This species was diagnosed and described in detail by Mockford (1974). It is distinguishable from the other Trinidad species by the accompanying key. Outside of Trinidad, it is known from Hispaniola, Cuba, and Florida.


**Genus Broadheadia** Mockford and Evans, new genus

Differing from *Aaroniella* in (1) microptery, (2) lack of ocelli, (3) both truncated and pointed setae on body, (4) only 2 tarsal segments, (5) sub-genital plate with long, stout seta on terminal segment, (6) lacina with very large lateral cusp widening toward tip, (7) relatively short antennal segments.

Type species: *Broadheadia caribe* new species.

This genus is named for Dr. Edward Broadhead, Reader in Pure and Applied Zoology at the University of Leeds, England. Dr. Broadhead is well known for his studies in psicology.
Broadheadia caribe Mockford and Evans, new species

FEMALE.—General form as in Fig. 19. Measurements (Table I).

Head: Relatively large with width and length axes more than twice dimensions of corresponding axes of thorax and 2/3 × those of abdomen. Epicranial line distinct; frontal lines absent. Setae of head each about length of f, except 1 pair slightly longer and gently curving about 1/3 the way along posterior margin of vertex from each eye. Numerous setae directed forward from anterior margins of clypeus and genae. Antennae (broken) bearing setae about 2-1/2 × width of a flagellomere in length; f. to f. only twice longer than wide. Lacinial tip (Fig. 20) with median cusp bearing 1 small, median denticle; very large lateral cusp widening toward tip. Eyes small with black center forming irregular junction with light brown periphery.

Thorax: Pterothoracic notal lobes poorly developed. Minute forewings only reaching a little over half distance to abdomen. Hindwings extremely minute. Pointed and truncated setae on terga and forewings. Only left mesothoracic leg remaining on damaged specimen. Each pretarsal claw (Fig. 21) with pulvillus slightly dilated at end and a basal seta ventrally.

Fig. 19-24. *Broadheadia caribe* n. gen., n. sp., female: 19) whole specimen in dorsal view. 20) lacinial tip. 21) pretarsal claw. 22) epiproct and paraproct. 23) ovipositor valves. 24) subgenital plate.
Abdomen: Bearing pointed and truncated setae dorsally and laterally, very few ventrally. Clunium simple. Epiproct (Fig. 22) semicircular with about 19 scattered setae, 8 marginal or submarginal including 2 very long ones posteriorly. Paraproct simple with about 17 scattered setae; no sense cushion. Gonapophyses (Fig. 23): ventral valve relatively short with pointed, curved tip bearing minute spines; dorsal valve narrow with spinous pointed lobe subapically; lateral valve relatively large; almost equilateral, bearing about 30 scattered setae. Subgenital plate (Fig. 24) with sclerotized arms separated; well sclerotized posterior sections, without setae, distinct from poorly-sclerotized, setose anterior sections; terminal sclerite with relatively long, strong apical seta. Spermaphore plate complex but damaged in mounting.


Thorax light brown with sclerotized parts dark brown. Mesothoracic femur and coxa light brown; tibia dark brown, paler at tips, and tarsus medium brown. Winglets dark brown.

Abdomen light brown with diffuse, medium brown pigmentation dorsally and laterally. Terminalia dark brown.

Holotype female, Trinidad (West Indies) Sonny Plantation, Ortinola Valley, on cacao, 12-X-1974, H. A. Evans collector. The type is in the collection of the senior author, Normal, Illinois.

DISCUSSION.—Broadheadia is a highly neotenic member of the Philotarsus Aronuesta Haplophallus line, as opposed to the Austropsocus-Zelandopsocus line of Thornton and Smithers (1974). Its closest relative appears to be Aaroniesta, but several features point to a more basic distinctness than the purely neotenic features. These features are (1) the more rounded lateral valve (2) acute subapical lobe of dorsal valve, (3) seta of distal piece of subgenital plate. Several setae are present on the distal piece of the subgenital plate in A. rawlinssi Smithers (New Zealand) and A. palida New (Australia), but these 2 species appear to be unique in several features and may require a distinct genus or transfer to another established genus.

KEY TO THE KNOWN SPECIES OF TRINIDAD PHILOTARSIDAE

1. Adults micropterous and with 2 tarsomeres......................
   ................................................................. Broadheadia caribe n. sp.
1'. Adults macropterous and with 3 tarsomeres.............. Aaroniesta......2.

2. Forewing with a large spot in basal half on and surrounding M-Cu, division ................................................. A. festiva n. sp.
2'. Forewing with no spot touching M-Cu, division..............3.

3. Pterostigma continuously and heavily pigmented around its entire margin ...................................................... A. dentata n. sp.
3'. Pigmentation of posterior margin of pterostigma not continuous, forming discrete spots ........................... A. achrysa (Banks).
ACKNOWLEDGMENTS

The senior author wishes to acknowledge a travel grant from the American Museum of Natural History, New York City, which covered his expenses on his first trip to Trinidad in 1959. The work of the junior author was carried out during tenure of a N.A.T.O. overseas studentship administered by N.E.R.C.

LITERATURE CITED


PASTURE MOLE CRICKET CONTROL WITH AN APPLICATOR-FORMULATED BAITS\(^1\)\(^{(Note)}\). The southern mole cricket, *Scapteriscus acutus* Rehn and Hebard, and the changa, *S. vicinus* Scudder, are major pests of pasturegrass in the southeastern United States (P. G. Koehler and D. E. Short. 1976. J. Econ. Ent. In press). P. G. Koehler and D. E. Short (1976. J. Econ. Ent. In press) and D. E. Short and P. G. Koehler (Fla. Ent. In press) have shown that malathion 2% baits can provide excellent mole cricket mortality when applied at 1.0 to 2.0 lb AI/acre. However, a major factor in pasture mole cricket control is economics. More than 75% of the cost of a bait material is the cost of carriers and attractants. The actual toxicant usually accounts for less than 25% of the manufacturer's cost of the ingredients in baits.

A major economic savings by the farmer could be realized if baits could be formulated on the farm from materials which are readily available. Finely cracked corn (grits) or commercial laying mash in a crumble form were chosen for testing as carriers, and molasses was selected as a suitable attractant (Fla. Dep. of Agric. 1938. Fla. Bull. of the Dep. of Agric, New Series No. 3). Malathion 2% baits (B) were formulated from the following ingredients:

100 lbs—finely cracked corn or laying mash (crumble)
5 qts—water
54 fl oz—molasses
51 fl oz—malathion (5 lb Al/gal E.C.)

\(^1\) Fla. Agricultural Experiment Station Journal Series No. 9033.