TAXONOMIC REVIEW OF AMITUS (HYMENOPTERA: PROCTOTRUPOIDEA, PLATYGASTRIDA) OF THE WESTERN HEMISPHERE

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Abstract

Collections of Amitus (Hymenoptera: Proctotrupoidea, Platygastridae) from the Western Hemisphere are referred to the following species: from Canada and the United States, *A. aleurodinis* Haldeman, *A. granulosus* n. sp., and *A. gibbosus* n. sp.; from Mexico and South America, *A. spiniferus* (Brethes), *A. pigeanus* n. sp., *A. hesperidum* Silvestri, and *A. fuscipennis* n. sp.

A lateral plate-like process on the male fourth antennal segment is regarded as a phenocline, characteristic of species or species groups.

*Amitus* species (Platygastridae) are minute (< 1 mm) wasp parasites of whiteflies (Aleyrodidae), with three species previously described from the Western Hemisphere. Recent loans from the Canadian National Collection (CNC) and the United States National Museum (USNM) enabled us to re-examine the genus in detail, which resulted in the addition of four new species to the western fauna. The loans consisted of short series from Canada, United States of America, Mexico, Colombia, Peru, Chile, the Dominican Republic, and Guatemala.

Scanning electron microscope studies of the specimens revealed a paddle-like or plate-like process on the outer side of the fourth antennal segment of males, a character later found throughout the subfamily Platygastrinae, but not observed in Inostematinae other than *Amitus*. However, the distinct, simple submarginalis and foamy propodeal membrane of *Amitus* establishes them as inostematines.

The antennal process, or plate, appears to be a reliable characteristic for species or species group identification, and can be interpreted as a phenocline throughout the family. Lack of sensoria on the process suggests that it may have a mechanical function. It covers a corresponding groove or depression in the fourth antennal segment; this groove also is devoid of sensoria. Similar plate organs are known in Chalcidoidea, but are not restricted to a single segment as in the Platygastridae (Proctotrupoidea).

Canada and United States

All *Amitus* specimens from Canada and the United States were referrable to *A. aleurodinis* Haldeman, *A. granulosus* n. sp., or *A. gibbosus* n. sp. *A. arcturus* Whittaker, the only other northern species, was not represented in the collections, and is problematic since very little material was available. The type specimen used in this study is distinct from the others by having the flagellar segments all longer than wide, suggesting that *A. arcturus* should be retained.

*Amitus aleurodinis* Haldeman

Fouts' (1924) redescription of *A. aleurodinis* is sufficient for identification, but the antennal dimensions cited should not be interpreted too rigidly. Specimens of this species from Canada and the United States show considerable variation in proportions of the antennal segments. Females have relatively long and narrow segments III and IV, with the remaining flagellar segments progressively shorter and broader, until segment VII, which is usually quadrate or transverse. Convexity and texture of the thorax are also variable, therefore these characteristics alone are not reliable for separating species without other supportive characters.

*A. aleurodinis* is separated from the closely related neotropical species *A. spiniferus* (Brethes) and *A. hesperidum* Silvestri by lacking a projection between the
antennal bases. The interantennal area smoothly joins the lower facial area with the clypeus.

**Material Examined** (deposited in CNC). Crow Lake, Marmora area, Ontario, 10 Aug. 59; L. K. Smith, Collr.; 7 specimens. Marmora area, Ontario, 11, 17, 25 Aug. 59; L. K. Smith, Collr., notes “44”; 18 specimens. Innisville, Ontario, 12 July 63; W. R. M. Mason, Collr.; ex malaise trap; 1 specimen. Rockliffe, Ontario, 18 Aug. 41; O. Peck, Collr.; 1 specimen. Lac Brulle, Quebec, 7 Aug. 45; O. Peck, Collr.; 1 specimen. Buckingham Township, Papineau Co., Quebec, 1 Aug. 62; L. K. Smith, Collr.; 1 specimen. Winchester, Virginia, 16 June 64; O. Peck, Collr.; 1 specimen.

*Amitus granulosus* n. sp. 
Figs. 1-4

**Diagnosis.** *A. granulosus* is readily identified from other species of *Amitus* by the short, oblique process on the male fourth antennal segment, a vertical keel originating between the antennal bases extending over halfway up the frons, and the very scaly mesonotum and scutellum.

**Description.** *Female.* Length, 1 mm. Head in top view very full, oval, twice as wide as long; occiput and vertex scaly, with no trace of a carina; lateral ocelli nearer to eyes than to median ocellus (2:1); ocellar triangle densely reticulate; face reticulate above, appearing aciculate below; clypeus broad, the face with a keel originating between antennal bases, extending over halfway up the frons; entire head deflexed. Antennal segments I1 and I11 considerably longer than wide, IV to VII progressively shorter and broader, and VIII to X forming an enlarged club.

Mesonotum and scutellum flat, reticulate except on the apical half of the median lobe of the mesonotum and a median strip on scutellum which are smooth. Notauli complete, broad apically, each with a deep basal pit; scutellum transverse, gently sloping caudad, the dorsal surface separate from the posterior surface by an irregular ridge. Pronotum reticulate on humeral angles; pleura bare, polished, wrinkled under forewing and with a deep fovea extending across middle or mesopleura.

Abdomen as long and broad as thorax, depressed, nearly circular in top view, sometimes broader distally; tergite I very short, transverse, dilated laterally; tergite II with deep basal foveae and deep striae covering most of the surface. Remainder of gaster less than half as long as tergite II, polished, sparsely setose.

Head and thorax black; gaster piceous to black; legs dark brown, antennae yellowish brown.

*Male.* Length, 0.93 to 0.98 mm. Similar to females except with less pronounced sculpture; antennae very long, slim, as long as the entire insect; lateral plate of antennal segment IV short, narrow, oblique. Pedicel short, subglobose; remaining segments long, pubescent, becoming gradually shorter distally.

Wings extending well beyond tip of abdomen. Colored as in the female.

**Types.** Holotype, female, Galveston, Texas, ex *Tetraleurodes perileucae* on oak leaf; B. L. Trigg, Collr.; lot no. 39-869, 8 Jan. 39. USNM # 73203.

Paratypes, 9 females, 5 males, same data as holotype, deposited in USNM, CNC.

*Amitus gibbosus* n. sp.

**Diagnosis.** *A. gibbosus* was set apart because of its unusually short eye length, long malar line, and its overall convexity and depth of sculpture, which surpass the limits of variation in *A. aleurodinus*.

**Description.** *Female.* Length, 0.9 mm. Head in top view twice as wide as long, quadrangular, narrower than mesonotum across tegulae (20:23); occiput and vertex evenly rounded, uniformly and densely reticulate, vaguely aciculate at occipital foramen. Lateral ocelli distant from eyes, nearer to median ocellus; eyes no longer than malar space; face uniformly, diagonally aciculate; clypeus forming an oval cavity with mandibular area, without a clypeal projection.

Scape surpassing vertex, moderately clavate, clothed with short setae; ratios of lengths to widths of antennal segments, 6.2, 5.2, 6.1, 7.5, 1.5, 1.25; antennal club (segments 8 to 10) 2.5 times as long as wide; all segments beyond scape with appressed pubescence.
Thorax convex, with complete notauli; scutellum as high as mesonotum, both uniformly scaly; propodeum with a foamy membrane.

Wings extending well beyond apex of abdomen, transparent, with long fringes.

Abdomen robust, varying from shorter than to as long as the thorax; tergite I carinate medially, foveate submedially, the foveae pubescent; tergite I smooth at the extreme sides. Tergite II transverse (25:18), broadest distally, tergites III to VI progressively shorter, about half as long as I and II combined; tergite VI triangular.

Body dark reddish brown, the legs and antennae yellowish.

Figs. 1–4. Amitus granulosus. 1, ♀, 100×; 2, ♀, antenna, 250×; 3 mouthparts, 850×; 4, ♂ fourth antennal segment, 600×.
Male. Length, 0.9 mm. Essentially like the female, except antennal segments beyond III subequal in length and width, 3.5 times as long as wide; pedicel and segment III equally long, each shorter than segment IX; antennal segments III to X uniformly clothed with subsequent pubescence.

Abdomen shorter than thorax (25:30).

Types. Holotype, 1 female, Edinburg, Maine, ex litter sample from ground surrounding balsam fir trees, 5 June 72; E. A. Osgood, Jr., Collr. USNM #73203.

Paratype, 1 female, same data, deposited in USNM.

Other specimens: 1 female, coated for scanning electron microscopy, in colln., Miss. St. Univ., Miss.

Mexico and South America

Species from Mexico and South America are referred to *A. spiniferus* (Brethes), *A. pigeanus* n. sp., *A. fuscipennis* n. sp., and *A. hesperidum* Silvestri, an introduced species. Three species groups are represented. *A. pigeanus* is sufficiently divergent from any other *Amitus* species to suggest a new subgenus. *A. spiniferus* and *A. hesperidum* share several characters and form a unit more closely allied to the northern *A. aleurodinus*, but possess a flared interantennal projection which is absent in *A. aleurodinus*. *A. fuscipennis* is differentiated by the infuscated wings and lack of an interantennal projection.

*Amitus spiniferus* (Brethes)

Figs. 5–7

Diagnosis. Ocelli near the eyes than median ocellus; flagellar segments very short in both sexes, the female club proportionately very large; face with a flared process between the antennal bases; male antennal segment IV with a short, broadly oval plate; female genitalia spine-like, more obvious than in other species except *A. hesperidum*; thorax and abdomen without unusual features, the wings very narrow, transparent.

Material Examined (in CNC, USNM). Callao, Peru, ex aleyrodid, 1956, and Mazatlan, Sinaloa, 10 July 69, P. DeBach; 6 specimens.

*Amitus pigeanus* n. sp.

Fig. 13

Diagnosis. *A. pigeanus* diverges markedly from all other *Amitus* species. The lateral plate on the male fourth antennal segment covers the whole outer side of the segment, and is bordered by short setae. The scutellum is oval, rounded in side view as in *Platygaster*. The propodeum has a reduced membrane and two widely separated carinae either side of the midline. The species could be placed in a new subgenus, but it is probably more suitable to broaden the concept of *Amitus* instead, since the genus has traditionally been based on a limited amount of material and was unavoidably restrictive.

Description. Female. Length, 1 mm. Head in top view as wide as thorax, nearly half as long as wide; occiput and vertex lightly reticulate (appearing microgranular with a light microscope); postocellar line twice as long as ocellocular line; face faintly reticulate; antennal scape surpassing vertex, pedicel twice as long as wide; antennal segment III as long as pedicel, narrower, the remaining flagellars progressively shorter until segment VII, which is quadrate; club not sharply differentiated, about half as long as the flagellum, gradually widened toward distal third.

Thorax as long as broad, with moderately angulate humeri; mesonotum wholly reticulate, with complete notauli; scutellum half as wide as mesonotum at humeri, oval, smoother than mesonotum, margined as in *Platygaster*. Propodeum visible at the sides beneath the scutellum, carinate as in *Platygastrinae* but with the carinae widely separated.
Figs. 5–7. *Amitus spiniferus*. 5, ♂, 150×; 6, mesonotum, scutellum, 500×; 7, ♂ fourth antennal segment, 1750×.
Gaster as long as thorax, slightly longer than broad (probably variable in this respect); tergite I with 2 submedian, pubescent pits, the median area raised, carinate; lateral areas flatter with sparse, long setae at the sides; tergite II deeply foveate either side of the median plate, with a short fan of striae radiating from each fovea; tergites III to VI subequal, their combined length about a third that of tergite II. Gaster broadest behind the middle.

Forewing 1.2 times as long as the thorax and abdomen combined, with the fringe very short, at most 0.05 as long as the maximum width of the wing.

Body piceous, legs reddish brown to dark brown; antennae yellowish.

**Males.** Generally like the female but without an antennal club; flagellars short, less than twice as long as wide except segment IV, which is 2.5 times as long as wide, and segment X, which is twice as long as wide. Segment IV with a large, plate-like process covering entire outer side of the segment.

Legs and antennae honey yellow, a variable condition; body color variable from light reddish brown to black.

**Types.** Holotype, female, Lugar, Chile, ex Aleurodicus pigeonus; L. Duran, #6; 11 Nov. 36. USNM #73204.

Paratypes, 7 females, 2 males, same data as holotype. Deposited in USNM, SNM, Miss. St. Univ. Colln.

Other Specimens: 1 gold-palladium coated male, same data as types, in Miss. St. Univ. Colln.; 7 specimens. Aleurodicus pigeonus B. and M., Angol, Chile; D. S. Bullock, Collr.; 30 Nov. 33, deposited in USNM.

*Amitus hesperidum* Silvestri

**Fig. 12**

**Diagnosis.** *A. hesperidum* differs from *A. aleurodinis*, which it closely resembles, by having a flared process between the antennal bases. It differs from *A. spiniferus* by having the lateral ocelli nearer to the median ocellus than to the eyes, a longer plate-like process on the male fourth antennal segment, and longer flagellars in both sexes. The thorax, gaster, and fourth antennal segment differ insignificantly from those of *A. fuscipennis* (Figs. 8 to 10) but the wings are transparent, not fuscous as in that species.

**Description.** **Female.** Length 0.8 mm. Head in top view more than twice as wide as long (39:16); lateral ocelli nearer to median ocellus than to eyes (4:5); occiput deeply scaly, vertex more lightly so; vertex in front view forming a broad, low arc, with raised protuberances at the ocelli; eye height greater than length of malar line (16:9); face reticulate above, aciculate below and on the sides; interantennal space with a flared process; clypeus protrusive, sharply angled at the sides, as broad as interantennal space. Pedicel twice as long as wide, a little longer than antennal segment III; segments III and IV subequal, about twice as long as wide; segments V, VI, and VII progressively shorter and broader; club as narrow basally as segment VII, broadening a little distally, two-thirds as long as flagellum.

Thorax only moderately flattened, the scutellum somewhat drawn out at the apex, not evenly rounded; scutellum smooth or faintly reticulate laterally, the median area smooth to the apex. Pleura typical, without diagnostic features.

Gaster somewhat longer than thorax, tergite I with a median, carinate elevation, with submedian pits and irregular carinulae at the sides; tergite II striate on the basal half; tergites III to VI each with long setae either side of a bare median area. Genitalia as in *A. spiniferus*.

Body piceous, legs and antennae yellow.

**Males.** Essentially like the female; differs from *A. spiniferus* by having the lateral plate of antennal segment IV about two thirds as long as the segment; male flagellar segments longer, more loosely connected, without an antennal club.

**Material Examined.** Veracruz, Mexico, ex *Aleurocanthus woglumi*; H. D. Smith, Collr. [no date given]; 6 specimens. Cuernavaca, Mexico; par. whitefly and pupa on *Aleurocanthus* sp. of citrus; H. D. Smith, March 1950; collection No. 13984; 7 specimens.
Amitus fuscipennis n. sp.
Figs. 8–11

DIAGNOSIS. *A. fuscipennis* is distinguished from the other species by the longer, loosely connected flagellar segments of the female, the rounded vertex, smooth interantennal space, and by the brownish wings. The lateral process on antennal segment IV in males is similar to that of *A. hesperidum*.

DESCRIPTION. Female. Length, 0.9 mm. Head in top view 1.7 times as wide as long; narrowed toward the vertex, both the vertex and occiput lightly reticulate; lateral ocelli much nearer to median ocellus than to eyes (4:9); frons broad, lightly reticulate, diagonally aciculate.
below the middle; space between antennal bases smooth, without a flared process; vertex in front view forming a low arc, without ocellar protuberances. Pedicel 2.5 times as long as wide, very little longer and narrower than segment IV; segments V to VII gradually shorter, each about equally wide, segment VII about three-fourths as wide as long, not quadrate; club 0.33 as long as funicle, not especially widened. Antennal pubescence nearly spinose, especially near the ends of the segments.

FIGS. 12–13. 12, *Amirus hesperidum*, thorax, 300×; 13, *A. pigeanus*, thorax, 250×.
Thorax moderately convex, scaly textured, smoother at the apical half of the middle lobe and medially on the scutellum. Mesopleura smooth, deeply foveate.

Tergite I carinulate in the center, with sublateral pits filled with pubescence, the extreme lateral areas smooth; hind margin of tergite I with rather long setae projecting over the forward margin of tergite II. Tergites II to VI without unusual features, the entire gaster somewhat longer than the thorax.

Body piceous; legs and antennae dark reddish brown, without yellow markings; wingsfuscous.

**Male.** Coated for scanning electron microscopy, not described.

**Types.** **Holotype,** female, San Jose, Costa Rica, 2620 m, 10 miles south of Empalme, Cerro Las Vueltas; 8 Oct. 72; J. Helava. USNM #73731.

**Paratypes,** 3 females, same date, deposited in CNC.

**Other Records.** Laredo, Mexico, ex aleyrodid pupal case, *Trialeurodes vaporariorum,* 21 Sept. 51, No. 51665-51-9941; 9 specimens all with lighter colored antennae than the types, otherwise the same. Valle Colombia, Central Hidroelectric del Rio Anchicaya, 400 m, 29 Jan. 72, C. Garcia; 1 specimen. Chimaltenango, Guatemala, 5 miles south of Acatenago; 2400 m; 2 Aug. 72, J. Helava; 3 specimens. Costanga, Dominican Republic; Cord Central; 17 Aug. 72, J. Klapperick; 1 specimen.

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**REFERENCE**

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