NEW RECORDS AND SPECIES OF LEIODINAE AND CATOPINAE (COLEOPTERA: LEIODIDAE) FROM JAMAICA AND PUERTO RICO, WITH A DISCUSSION OF WING DIMORPHISM*

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Since my earlier reports on the Leiodidae of Jamaica and Puerto Rico (Peck, 1970, 1972), I have had the opportunity to spend an additional 13 weeks in field work on these islands. In Jamaica this was from mid-December to mid-January, 1972–1973, and from late July to early September, 1974. In Puerto Rico it was from early to late May, 1973, and a week in June, 1974. This has resulted in new data on the leiodids of these islands, which are presented here. Additional data and information on forest habitat sites may be found in Peck and Kukalova-Peck (1975), and on cave sites in Peck (1974, 1975).

Methods and materials are similar to those utilized for my earlier papers. Collections were primarily made in forests with pitfall traps baited with carrion and human dung (Newton and Peck, 1975); by Berlese-Tullgren funnel extraction of arthropods from sifted forest litter, and from bat guano accumulations in caves. In this work, 259 kg (770 liters) of sifted forest litter were processed for Jamaica and 93 kg (171 liters) for Puerto Rico, in addition to many other extractions from samples of bat guano. Most of the arthropod residues from these collections are deposited with the Field Museum (Chicago). Some beetles are deposited in the Museum of Comparative Zoology (Harvard University), and the Canadian National Collection of Insects (Agriculture Canada, Ottawa).

In this paper I report only on new collections of 393 specimens of *Dissochaetus jamaicensis,* 460 specimens of *Aglyptinus puertoricensis,* 10 specimens of *Aglyptinus jamaicensis,* 1032 specimens of *Aglyptinus dimorphicus,* and on four new species of *Aphelo-*

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plastus. Type specimens will be placed in the Canadian National Collection, Ottawa. The rest will be held in the author's collection, with some distributed to the Field Museum and Museum of Comparative Zoology.

Subfamily Catopinae

Dissochaetus jamaicensis Peck, 1972

New Records. Jamaica. Portland Parish. 1 mi W Ecclesdown (John Crow Mts.), 1500 feet, August, 1974, 14 males in traps. St. Thomas Parish. Portland Gap, 5500 feet, January, 1973, 2 in traps; August, 1974, 2 in dung traps; below Portland Gap at 4500 feet, August, 1974, 37 in traps. Whitfield Hall, 4250 feet, August, 1974, 13 females and 51 males in traps in forested ravine; 5 from guano in abandoned mine. Corn Puss Gap (4 mi N Bath), 2100 feet, August, 1974, 37 in dung trap. St. Andrew Parish. Hardwar Gap, 4200 feet, January, 1973, 215 in traps. Hermitage Dam, 1750 feet, August, 1974, 17 in traps.

Proptomaphaginus puertoricensis Peck, 1970

New Records. Puerto Rico. Aguas Buenas Cave (near town of Aguas Buenas), 15 mi S San Juan, 250 m elev., May, 1973, several hundred on guano. No specimens of this beetle were taken in traps in the well-preserved forest outside of this cave.

We can conclude that this genus is absent from Jamaica in the light of the failure of extensive collecting to take it there. It is otherwise known to occur only in Cuba and Mexico (Peck, 1977).

Subfamily Leiodinae

Correction. I earlier indicated (1972) that the tarsal formula for the genus *Aglyptinus* was 3–3–3 in females and 4–3–3 in males. Dr. Alfred F. Newton and Mr. Quentin Wheeler have brought it to my attention that it is really 3–3–3 in both sexes. I have re-examined my material and have found them to be correct.

Aglyptinus puertoricensis Peck, 1972

New Records. Puerto Rico. Aguas Buenas Cave (near town of Aguas Buenas, 15 mi S San Juan), 250 m elev., May, 1973, 3 females and 1 male in forest malt traps; 422 from forest litter Berlese;

20 males and 12 females from wet guano in cave. Cueva del Humo (part of Rio Camuy Cave System at Bayaney), May, 1974, Forest Miller leg., 2 on guano.

No tendency for eye reduction or wing dimorphism has been noted in forest or cave populations of this species.

Aglyptinus jamaicensis Peck, 1972

New Records. Jamaica. St. Andrew Parish. Hardwar Gap, 4000 feet, January, 1973, 1 male and 3 females in Berlese of woody fungi; 1 male, 6 females in Berlese of fleshy fungi.

This species remains scarce, and the only detailed habitat data is its association with fungi. Previous examples came from forest litter samples and it is remarkable that no more appeared in the more extensive litter samples reported on in this paper. The species is now known from the center and eastern half of the island, and from 2000 to 4000 feet elevation.

Aglyptinus dimorphicus Peck, 1972

The dimorphic condition of the wings is reported below as LW (long winged) and SW (short winged). The long winged form seems to be fully functional in flight. It has two folds, with the extended wing exceeding two elytral lengths. There is a distinct gap between this condition and the short winged form, which at most has only one wing fold, and in length barely extends beyond the elytra. From this condition various degrees of reduction culminate in a thin and tiny paddle-shaped remnant. Individuals with the most reduced wings have partially fused elytra, and occur at higher elevations.

New Records. Jamaica. Clarendon Parish. Pedro River, outside Pedro Great Cave, 1750 feet, August, 1974, litter Berlese 284, LW females 5, SW females 15, LW males 5, SW males 14. Pedro Great Cave (inside), December, 1972, SW females 1, SW males 5.

Portland Parish. 1 mi W Ecclesdown, 1500 feet, August, 1974, litter Berlese 280 and 294, LW females 13, SW females 21, LW males 6, SW males 15. 0.5 mi NE Ecclesdown, 1250 feet, August, 1974, litter Berlese 296, LW females 9, SW females 1, LW males 0, SW males 2.

St. Andrew Parish. Hardwar Gap, 4–4500 feet, January, 1973, litter Berlese 256, LW females 1, SW females 14, LW males 0, SW

males 12. Hermitage Dam, 1750 feet, August, 1974, bait trap, SW males 1; litter Berlese 295, LW females 29, SW females 3, LW males 25, SW males 3. Morces Gap, 5000 feet, January, 1973, litter Berlese 253, SW males 2.

St. Ann Parish. 1 mi S Claremont, 1500 feet, December, 1972, litter Berlese 249, LW females 4, SW females 8, LW males 6, SW males 10. Ken Connell Hole (cave), August, 1974, SW females 1, SW males 2. Mt. Diablo (S of Moneague), 2250 feet, December, 1972, litter Berlese 258, LW females 6, SW females 18, LW males 6, SW males 27. Moseley Hall Cave, December, 1972, SW females 69, SW males 95. Thatchfield Great Cave, October, 1973, R. Norton leg., SW females 10, SW males 15.

St. Catherine Parish. Swansea Cave, November, 1973, R. Norton leg., SW females 2, SW males 1.

St. Elizabeth Parish. Peru Cave (near Santa Cruz), December, 1972, LW females 1, LW males 1.

St. James Parish. Mocho Cave, October, 1973, R. Norton leg., LW females 5, SW females 1, LW males 5, SW males 0. Brandon Hill Cave (Montego Bay), September, 1974, SW females 1. Maldon School Cave, September, 1974, SW females 3, SW males 5.

St. Mary Parish. Goshen, 1500 feet, December, 1972, litter Berlese 257, SW females 0, SW females 16, LW males 2, SW males 16. Lucky Hill Farm Cave, December, 1972, SW females 2, SW males 6. Mt. Plenty Cave, March, 1973, R. Norton leg., SW females 7, SW males 17; August, 1974, SW females 14, SW males 15. Rock Springs Cave (near Pear Tree Grove), August, 1974, SW females 4, SW males 8.

St. Thomas Parish. Bath Fountain, 500 feet, August, 1974, litter Berlese 283, LW females 36, SW females 9, LW males 36, SW males 11. Blue Mountain Peak, 7400 feet, January, 1973, litter Berlese 252, SW male 1; August, 1974, dung bait traps, SW females 10. Corn Puss Gap, 2100 feet, August, 1974, litter Berlese 293, LW females 13, SW females 0, LW males 16, SW males 2. Portland Gap, 5500 feet, January, 1973, litter Berlese 254, SW females 28, SW males 23; on rocks at soil line under debris (in site shown in fig. 3 in Peck and Kukalova-Peck, 1975), SW females 8, SW males 16; dung traps, SW females 6, SW males 6; litter Berlese 291, August, 1974, SW females 26, SW males 37. Whitfield Hall, 4100 feet, January, 1973, litter Berlese 255, LW females 1, SW females 1, SW males 2.

Trelawny Parish. 5 mi N Alberttown, January, 1973, litter Berlese 250, LW females 3, LW males 8. Discovery Bay Marine Lab., 10 feet, September, 1974, dung trap LW males 1. Drip Cave, August, 1974, SW females 6, SW males 6. Windsor Great Cave, March, 1973. R. Norton leg., SW females 8, SW males 10; August, 1974, SW females 54, SW males 72. Windsor, 500 feet, August, 1974, litter Berlese 290, SW females 3, SW females 1, SW males 2, SW males 3.

These data show the species to be spread across the island in humid forests, from sea level to 7400 feet elevation.

Discussion. For purposes of analysis of wing dimorphism, the above data has been combined with that of this species in my 1972 paper. The data show that there is no particular relationship between wing condition and sex. The sex ratio is statistically distributed around an equal ratio of males to females, and the short wing form is not significantly more prevalent in either sex.

However, there is a relationship between wing condition and habitat. In all 15 caves known to be inhabited by the beetle (ranging from 200 feet to 1750 feet in elevation), the populations are almost exclusively short winged. The exceptions are two and 10 long winged specimens from Peru and Mocho Caves respectively. Otherwise, all the other 516 cave-collected specimens are short winged.

A second relationship exists between wing condition and forest habitat elevation. Generally, the short winged form is more prevalent at higher elevations. Combined data were analyzed to try to determine the existence of a quantitative relationship between wing reduction and elevation, but the scatter of the data points, even after an arc sin transformation, was too great to allow the calculation of a meaningful regression line. This is because many of the lower elevation samples are too small to significantly record wing condition in the population. Even large Berlese samples often yielded only one or two specimens. Another error source is that pitfall traps in the lowlands selectively sampled long winged individuals because they are more able to arrive at the traps by flight.

The increased occurrence of wing reduction at higher elevations has been noted and discussed by Darlington (1943, 1970) for temperate and tropical carabid beetles. The phenomenon has also been an important component in the unraveling of the Pleistocene and Recent distributional history of carabids in Scandinavia (Lind-

roth, 1969, 1970). In addition to wing reduction, high elevation litter beetles are often eyeless or microphthalmous, and less darkly pigmented. This generalization was strikingly demonstrated to me by the beetles in a litter sample from the highest point in Jamaica, forested Blue Mountain Peak at 7400 feet. The sample contained beetles with these characters in the families Histeridae, Tenebrionidae, Curculionidae, Cerylonidae, Pselaphidae, and Carabidae, as well as Leiodidae. Most of these beetles were absent or much less common at lower elevations. In *Aglyptinus dimorphicus* there was only a very slight indication of reduction in eye size at higher elevations or in cave populations.

An explanation for wing reduction in *A. dimorphicus* is not difficult to envision. Selective pressures must favor retention of long winged genotypes in the lowlands because the habitats are climatically more variable (with wet and dry seasons) and have feeding and reproduction resources that last for a short time (dung and fungi is consumed or decays quickly). The ability to disperse to new and more favorable sites is necessary for populations in such lowland circumstances. In contrast, selection for wings is relaxed in cave and montane forest populations because the dispersal function of flight is less important. The beetles live in a stable climate (with little or no seasonal variation in temperature and moisture, especially in deep litter), and feeding and reproduction resources are long lasting (guano piles and deep mats of slowly decomposing montane vegetation).

I would reason that the lowland caves were occupied in the past by long winged individuals. They could more easily arrive at the guano piles deep in the caves, through flight guided by olfaction. These winged colonizers also carried the short winged condition in their genome, perhaps in a simple recessive condition. Peru and Mocho caves now contain long winged members in their populations and may thus represent recent colonizations. The other 13 caves, with only short winged populations, must represent older colonizations from which selection has removed the long winged condition. This seems to represent an active selective force against wings, rather than just a relaxed selection which no longer encourages their genetic maintenance. I cannot identify the selective force that seems to work so well against the winged condition of these beetles in caves (but see Barr, 1968, and also Regal, 1977, for a discussion of the loss of "useless" features). I also cannot deter-

mine the amount of time that has been required for the selection of short wings, but I imagine that the process has been rapid and in the span of a few thousand years.

Creagrophorus jamaicensis Peck, 1972

My Jamaican field work yielded no collections of this poorly known genus and species. However, Dr. Newton has found another four specimens in the collections of the Museum of Comparative Zoology, from Port Antonio, Jamaica, collected by A.E. Wight, "12/14." The male protarsal segment number was previously not known for this species. Examination shows that the one male in the new material has three protarsal segments. Thus, the tarsal formula for both sexes of the species is 3–3–3. Since Matthews (1888) reported his species to have a formula of 4–4–3, they should be reexamined to confirm this and allow a more secure characterization for the genus. The unusual shape of the first abdominal sternite that Matthews mentioned is a longitudinal carina crossing the face of the segment, so that it superficially looks as if it were composed of two segments, of which the first is triangular and separated by the coxae. The characters of the longitudinal carina across the first abdominal segment and the 3–3–3 tarsal formulae of both sexes are shared with *Aglyptinus* and the Scotocryptini, eyeless inquilines in Meliponine bee nests. These characters unite all these beetles more than had been previously thought. The compact antennal club of *Creagrophorus* separates it from *Aglyptinus* and the Scotocryptini, with their longer and less compact clubs.

Apheloplastus Brown

Diagnosis (drawn from Brown, 1937, 1963). Shape rounded, strongly convex. Antennae with 10 segments, club composed only of last four enlarged segments, with no smaller segment between the seventh and eighth. Antennal grooves beneath head. Prosternum finely carinate before the coxae. Mesosternum carinate, vertical between coxae. Middle and posterior legs with tibiae very broad, and tarsi compressed. Male and female with tarsal formulae of 5–5–4. Six visible abdominal sternites.

The aedeagus is unusually small in relation to adult body size, ranging from 0.2 to 0.3 mm in different species.

The only other species presently recognized in the genus is *A. egenus* LeConte, distributed from Ontario to North Carolina (Brown, 1937). The presence of the following four new species in Jamaica and Puerto Rico strengthens Brown's suspicion that *Cyrtusa conicitarsus* Champion (1925) of St. Vincent in the Lesser Antilles is actually an *Apheloplastus*. We may also expect that other species described as *Cyrtusa* belong in *Apheloplastus*. In this context, Brown mentions species from New Zealand and Europe. The many species of *Cyrtusa* described in the past two decades by Hlisnikowski should also be reexamined with this in mind.

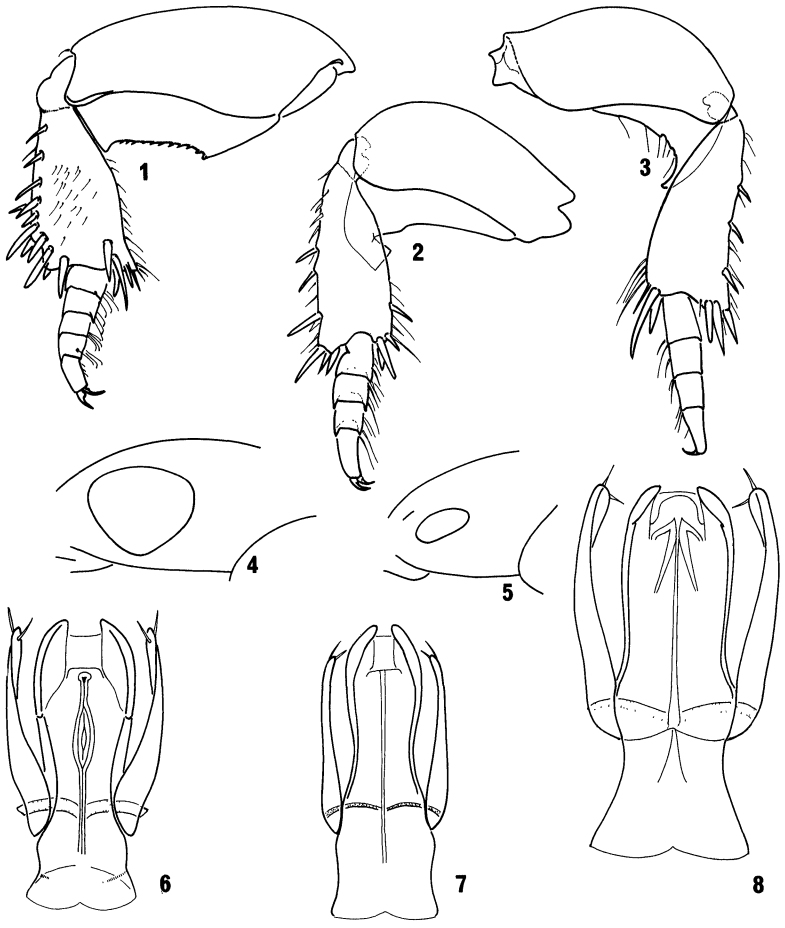
All members of the genus probably feed on fungi in decomposing forest litter. All specimens reported on in this paper were taken in litter Berlese samples only.

Apheloplastus jamaicensis new species
Figs. 1, 2, 4, 6.

Holotype male and allotype female in CNC. Locality and data. Jamaica. Trelawny Parish. Windsor, 500 feet, 25.VII.74, S. & J. Peck, litter Berlese 290. Paratypes: 2 females with same data. 5 mi N Alberttown, 1000 feet, 30.XII.72, S. & J. Peck, Berlese 250, 1 male. Portland Parish. 0.5 mi NE Ecclesdown, 1250 feet, 12.VIII. 74, S. & J. Peck, Berlese 296, 2 females. St. Andrew Parish. Hardwar Gap, 4–4500 feet, 6–7.I.73, S. & J. Peck, Berlese 256, 1 female. Morces Gap, 5000 feet, 8.I.73, S. & J. Peck, Berlese 253, 1 female. St. Ann Parish. 1 mi S Claremont, 1500 feet, 26.XII.72, S. & J. Peck, Berlese 249, 1 male.

Diagnosis. The species is distinguished by its restriction to Jamaica, its large eye size, functional flight wings, relatively uniform brown color, shape of male femora and tibiae, and aedeagus.

Description. Length 0.9–1.4 mm, width 0.7 to 0.9 mm. Color uniformly light to medium dark yellowish brown. Eye large (fig. 4), as wide as long. Head and pronotum lightly punctured, elytra with nine rows of punctate striae, the ninth marginal. Metasternum strongly punctured. Flight wings fully developed. Male mesofemur with partially serrated hind margin, mesotibia with many strong spines (fig. 1). Male metafemur with pronounced apical tooth (fig. 2). Aedeagus (fig. 6) with broad lobes at tip, parameres almost as long as median piece.



Figures 1–8. 1. Middle leg of *Apheloplastus jamaicensis*. 2. Hind leg of *A. jamaicensis*. 3. Hind leg of *A. puertoricensis*. 4. Side of head of *A. jamaicensis* showing relatively normal eye size. 5. Side of head of *A. microps* showing reduced eye size. 6. Dorsal view of aedeagus of *A. jamaicensis*. 7. Dorsal view of aedeagus of *A. microps*. 8. Dorsal view of aedeagus of *A. puertoricensis*. Figs. 1–5 all to same scale. Figs. 6–8 all to same scale.

Variation. Heterogonic development affects the male metafemoral tooth. It varies in shape from sharply pointed in smaller individuals to more broadly blunt in more developed individuals.

Collection data of the ten known specimens suggests that the species occurs throughout the island, at least from Windsor in the west to Ecclesdown in the east, and from the lowlands (500 feet at Windsor) to montane sites (5000 feet at Morces Gap).

Apheloplastus microps new species
Figs. 5, 7.

Holotype male in CNC. Locality and data. Jamaica. St. Andrew Parish. Morces Gap, 5000 feet, 8.I.73, S. & J. Peck, litter Berlese 258.

Diagnosis. The species is distinguished by its restriction to high elevation forests of Jamaica, its small eye, lack of elytral striae, strongly reduced wings, and aedeagus.

Description. Length 0.9 mm, width 0.7 mm. Color uniformly darker brown. Eye reduced in size, about twice as long as wide (fig. 5). Head and pronotum lightly punctured. Elytra with small, sparsely distributed hairs; with no trace of punctate striae. Metasternum without strong punctures. Flight wings reduced to tiny paddle-shaped rudiments. Male meso- and meta-femora with ventral flange extending over tibiae when reflexed, but apices broadly rounded, teeth not present. Aedeagus (fig. 7) with thin lobes at tip in dorsal view, parameres clearly shorter than median piece.

The species is known only from the holotype male. It was taken in a litter sample along with one female *A. jamaicensis* so the species are sympatric at this site. Slide preparations were not made of the legs of the unique, so they could not be illustrated.

Apheloplastus puertoricensis new species
Figs. 3, 8.

Holotype male in CNC. Type locality and data. Puerto Rico. Forest at Aguas Buenas Cave, 250 m elev. (near town of Aguas Buenas, about 15 mi S of San Juan), 7–17.V.73, S. Peck, Berlese 265.

Diagnosis. The species is distinguished by its restriction to Puerto Rico, and the shapes of the male hind femora and tibiae, and aedeagus.

Description. Length 1.3 mm, width 1.0 mm. Color uniformly light yellowish brown. Eye large. Head and pronotum lightly punctured. Elytra with nine rows of punctate striae. Metasternum strongly punctured. Flight wings fully developed. Male mesofemur with sharp, curved, distal-posterior tooth (fig. 3). Metatibia strongly spinose (but less so on inner margin than in *A. jamaicensis*). Aedeagus (fig. 8) more robust, with thin lobes at tip, two sclerotized "teeth" near orifice, at side of internal sac-stylet; parameres as long as median piece.

Apheloplastus bicolor new species

Holotype female in CNC. Type locality and data. Jamaica. St. Ann Parish. Goshen, 1500 feet, 25.XIII.73, S. & J. Peck, litter Berlese 257.

Diagnosis. The species is distinguished by its restriction to Jamaica, its distinctly bicolored body with dark blackish brown head and prothorax and lighter reddish brown elytra, and larger size.

Description. Length 1.7 mm, width 1.1 mm. Distinctly bi-colored; head and prothorax dark blackish brown, elytra lighter reddish brown. Antennae dark brown at base, club lighter brown. Eyes large. Head and pronotum regularly punctured. Elytra with nine rows of strongly punctured striae, intervals with two or three faint rows of very weak punctures. Metasternum strongly punctured. Posterior-ventral surface of female femora expanded to partially cover tibiae when reflexed; hind margin rounded, without teeth. Tibiae expanded to apex, strongly spinose. Male unknown.

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