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A review of *Pseudolechriops* Champion (Coleoptera: Curculionidae: Conoderinae)

HENRY A. HESPENHEIDE[1] & LOUIS M. LAPIERRE[2, 3]

[1]*Department of Ecology and Evolutionary Biology, University of California, Los Angeles, CA 90095-1606, USA.E-mail: hahiii@ucla.edu*
[2]*Department of Biology, Lower Columbia College, Longview, WA 98632-0310, USA. E-mail: llapierre@lower-columbia.edu*
[3]*Corresponding author*

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Abstract

Nine new species are described in the formerly monotypic genus *Pseudolechriops* Champion: *P. longinoi*, **new species**; *P. dimorpha*, **new species**; *P. howdenorum*, **new species**; *P. davidsonae*, **new species**; *P. klopferi*, **new species**; *P. janeae*, **new species**; *P. alleni*, **new species**; *P. wrightae*, **new species**; *P. coleyae*, **new species**. These species can be separated into two groups, the *megacephala*

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and *coleyae* groups. The species are illustrated and a key is provided. Males of some species have more or less strikingly modified rostra and possess other secondary sexual characters that suggest courtship behavior, or at least sexual recognition, is an important selective factor. Eight species have been reared from leaf petioles of members of the plant genus *Cecropia* (Cecropiaceae), and the others have been collected on *Cecropia* as adults. *Pseudolechriops* use either live or dead petioles as a reproductive and developmental substrate, and the biology of each group of species is generally described. Some *Pseudolechriops* species may mimic the *Azteca* ants (Formicidae: Dolichoderinae) that are mutualists in most *Cecropia* species.

Key words: biology, *Cecropia*, Cecropiaceae, Central America, Coleoptera, Conoderinae, Costa Rica, Curculionidae, Mexico, mimicry, **new species**, *Pseudolechriops*, taxonomy

Introduction

The genus *Pseudolechriops* was established by Champion (1906: 90) for two distinctive specimens from Guatemala. In recent years *P. megacephala* Champion has been recollected, including males showing interesting patterns of sexual dimorphism. Additionally, a number of undescribed species have been found, all in association with their host plants in the genus *Cecropia* L. (Cecropiaceae). Rearings by one of us (LaPierre) and others (Jordal & Kirkendall 1998) have established that larvae of *Pseudolechriops* feed in the leaf petioles of species of *Cecropia* and that members of that genus may be the only hosts (see discussion below). The present paper describes nine of these, primarily from Central America, as part of a more general study of insects associated with the plant genus *Cecropia* by the junior author (LaPierre 2002; Hespenheide & LaPierre 2002). Additional undescribed species have been seen from Panama and South America, where *Cecropia* is much more diverse. Specimens were measured to the nearest 0.05 mm; genitalia were not treated chemically.

The following collection codens are used throughout the text (Evenhuis & Samuelson 2004): AMNH: American Museum of Natural History, New York, N.Y.; BMNH: The Natural History Museum, London, England; CHAH: Henry A. Hespenheide, University of California, Los Angeles, CA, U.S.A.; CMNC: Canadian Museum of Nature, Ottawa, Canada; CWOB: Charles W. O'Brien, Tallahassee, FL, U.S.A.; EAPZ, Escuela Agricola Panamericana Zamorano, Tegucigalpa, Honduras; EMEC: University of California, Berkeley, CA, U.S.A.; FOC: F. Oedegaard collection, Trondheim, Norway; GBFM, Universidad de Panamá; INBC: Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica; JPPC: Jens Prena collection, Rostock, Germany; LACM, Los Angeles County Museum of Natural History, Los Angeles, CA, U.S.A.; LMLC: Louis M. LaPierre collection, Longview, WA, U.S.A.; MUCR, University of Costa Rica, San Pedro, Costa Rica; SEAN, Museo Entomológico, Léon, Nicaragua; STRI: Smithsonian Tropical Research Institute, Ancon, Panamá; USNM: National Museum of Natural History, Smithsonian Institution, Washington, DC, U.S.A.

***Pseudolechriops* Champion, 1906: 60**

Type: *P. megacephala* Champion, by monotypy.

Champion cited the "broad head, the somewhat widely separated eyes, the almost straight, flattened rostrum, [and] the short, subcylindrical prothorax" as distinctive. Champion compared his new genus with the genera *Tachylechriops* Heller and *Lechriops* Schoenherr, although it is probably not closely related to either genus. The legs of *Pseudolechriops* species are proportionately much longer and more slender than those of most *Lechriops*, but we have seen South American specimens that appear to be intermediate between the two genera. The genus *Tachylechriops* has the posterior legs disproportionately enlarged and the posterior tibiae broadly, laterally flattened and arcuately rounded on the posterior margins, a trait that occurs in several unrelated conoderine genera (*Zygops* Schoenherr, *Paramnemyne* Champion, *Macrolechriops* Heller, *etc*.) and in *Tachygonus* Schoenherr. It is found in a less extreme form in the part of the genus *Pseudolechriops* that includes *P. megacephala*, but not uniformly throughout the genus. The relationships of *Pseudolechriops* will have to wait for a more general review of New World conoderine genera and subfamilies.

As interpreted here there are two relatively well defined species groups. In the group that includes *P. megacephala* (the *megacephala* group), species are basically black in coloration, rhomboidal in body form, posterior tibiae are laterally flattened and more or less arcuately rounded on the posterior margins, and males have the rostrum more or less strikingly modified. Species in the second group (the *coleyae* n.sp. group), are usually reddish brown in coloration, more slender in form, have subcylindrical posterior tibiae, and rostra of males are not or only slightly modified. The two groups are different enough that they might be considered different genera, but all share similar larval biologies and are united by *P. klopferi* n.sp. which shares some characters of both groups.

In addition to the differences between the two species groups, species are distinguished primarily by setal patterns, coloration of the legs (the *coleyae* group), and structure of the male rostrum (especially in the *megacephala* group). Male genitalia are not very distinctive at the species level, but differences in the male rostra and in the setal coloration of the anterior and middle legs of males suggest the existence and importance of male-male interactions or male courtship behavior that usually accompanies secondary sexual characteristics. Sexes of all but one of the species treated here can be separated externally. Although not yet observed in *Pseudolechriops*, male-male interactions have been described for other conoderine weevils (Lyal 1986).

Key to species of *Pseudolechriops*

1. Posterior tibiae flattened and weakly arcuate on posterior margin; from above rhom-

boidal in shape with elytra conspicuously wider than base of pronotum 2

1'. Posterior tibiae slender, subcylindrical, not conspicuously flattened; from above usually slender, subcylindrical, with elytra not conspicuously wider than base of pronotum 7

2. Sides of pronotum with broad oblique band of dense white setae from sides of rostral canal to dorsal posterior angles (upper portion lacking in males); elytra partly or entirely dark reddish-brown with conspicuous medial sutural spot of yellowish setae; rostra of males and females similar in shape; Costa Rica, Panamá .... 6. *P. klopferi*, **new species**

2'. Sides of pronotum more or less sparsely covered with setae, in some cases forming indistinct narrow white lateral stripe; elytra entirely black with various patterns of white setae; rostra of males and females strongly sexually dimorphic in shape 3

3. Disc of pronotum appearing black, with sparse, inconspicuous white or pale yellowish setae notforming a distinct pattern; elytra with distinct pattern of white setae, but not with medial sutural chevron 4

3.' Disc of pronotum with conspicuous pattern of dark yellowish setae; elytra with small transverse chevron of white setae across suture beyond the middle 5

4. Elytra with transverse basal fascia of white setae and oblique fascia from the suture at middle to the lateral margins; femora black; Guatemala to South America .... 1. *P. megacephala* Champion

4.' Elytra with transverse basal fascia of white setae connecting along suture to elongate spot of white setae at middle; femora reddish brown; posterior tibiae black; Costa Rica ..... 2. *P. longinoi*, **new species**

5. Elytra with conspicuous basal transverse fascia of white setae; rostrum of both sexes red, that of male extravagantly modified (Fig. 3), densely covered with white setae; México, Guatemala ..... 3. *P. dimorpha*, **new species**

5'. Elytra with inconspicuous basal transverse fascia of white and pale yellow setae; rostrum of both sexes all or mostly black, that of male less extravagantly modified, glabrous and polished; Nicaragua or Costa Rica to Panamá 6

6. Anterior and middle femora almost entirely red; rostrum entirely black; Nicaragua to Panamá ..... 4. *P. howdenorum*, **new species**

6'. Anterior and middle femora black on basal 1/3–1/2; rostrum black on basal 2/3–3/4, tip red; Costa Rica, Panamá ..... 5. *P. davidsonae*, **new species**

7. Elytra completely black with more or less conspicuous and well-defined transverse white fascia at base 8

7' Elytra reddish brown or reddish brown and black, with or without transverse white fascia at base, if with basal fascia, then also with medial sutural spot 9

8. Elytra with poorly-defined basal fascia connected along suture to medial sutural spot; setae on sides of pronotum sparse, irregularly distributed over most of surface .... 8. *P. alleni*, **new species**

8'. Elytra with sharply-defined basal fascia only and no sutural spot; setae on sides of pronotum denser, forming a relatively well-defined oblique white stripe from base of eyes to anterior to elytral humeri..... 9. *P. wrightae*, **new species**

9. Elytra with transverse white fascia at base; male with eyes more widely separated, densely white setose at base of rostrum above antennal insertions..... ..... 7. *P. janeae*, **new species**

9'. Elytra without basal fascia; male with eyes narrowly separated, glabrous above antennal insertions ..... 10. *P. coleyae*, **new species**

1. *Pseudolechriops megacephala* Champion
Fig. 1, a–e

P. megacephala Champion, 1906: 90.

Diagnosis: Black except apex of rostrum, tibiae and tarsi reddish brown; posterior tibiae flattened and weakly arcuate on posterior margin; from above rhomboidal in shape with elytra conspicuously wider than base of pronotum; sides of pronotum sparsely covered with setae not forming a distinct pattern; elytra with transverse basal fascia of white setae and oblique fascia from the suture at middle to the lateral margins; rostra of males and females strongly sexually dimorphic in shape; Guatemala to South America.

Description: Male: Black, except tarsi, anterior and middle tibiae, and apical half of rostrum dark reddish brown; from above (Fig. 1a), distinct pattern of narrow white setae on elytra at bases of elytral intervals, extending for 2/7 of length of intervals 1 and 2, and in broad, oblique band from middle of elytra at suture to lateral margins; pronotum with dark inconspicuous setae on disk, very narrow pale buff setae along base and lateral margins, and broader white setae on sides; head with white setae between eyes on upper 3/4, glabrous and polished on lower 1/4 and rostrum; beneath moderately densely covered with white setae, denser on the epimera; femora and anterior and middle tibiae rather densely covered with narrow white setae, setae on hind tibiae dark and inconspicuous, appearing glabrous; 2.7–3.1 mm long (mean = 2.89 mm for 12 specimens).

Head very prominent, about 2/3 as long as pronotum, eyes expanding arcuately outwards to be as wide as pronotum at apex; from front, eyes rather widely separated, closest at apex and separated on upper half by shallow medial depression; lower half of front and rostrum polished and minutely punctate, interior margins of eyes raised to form ridges on lower half, rostrum slender, antennae inserted at middle, from side nearly straight, from front flattened and broadening somewhat toward base above antennal insertions and with lateral margins carinate, carinae ending with an oblique polished groove at base of rostrum that separates rostral carinae from carinae at lower margins of eyes (Fig. 1c). Pronotum from above nearly cylindrical, only slightly wider at base than apex, from lateral view weakly convex on basal 1/2, disc densely punctate, inconspicuously carinate along midline. Elytra together about 1/2 broader than pronotum and only slightly longer than wide,

giving a very rhomboidal appearance, lateral margins very weakly arcuate, apices rounded. Mesosternum with well-defined groove with high ridges to receive rostrum continuing to excavate and carinate anterior margin of metasternum; metasternum with rather broad medial polished depression along midline to abdomen. Abdomen with first ventral sternite narrowly depressed along midline, most deeply so at posterior margin, second sternite also weakly depressed on anterior 1/2, from side abruptly declivous at middle. All femora with more or less strong acute tooth on inner margin just beyond the middle, middle and posterior femora finely carinate; posterior tibiae conspicuously broadened and flattened (Fig. 1b), very weakly arcuately rounded on posterior margin. Aedeagus dark brown at base, becoming transparent at tip, illustrated in Fig. 1e.

Female: As male, but base of rostrum convex in cross-section (Fig. 1d) and more coarsely punctate, without carinae on rostrum or lower inner margins of eyes. Mesosternal groove present but weaker, first abdominal segment indistinctly depressed along midline; 2.85–3.45 mm long (mean = 3.30 mm for 22 specimens).

Specimens examined: **Costa Rica:** Guanacaste Pr., 3 km SE R. Naranjo, 15–20.10.1992, F.D. Parker (2, CWOB), Bagaces, Fortuna, Z.P. Miravalles, Sendero Cabra Muco, 980 m, L_N_ 299151_41000031.01.2002, A. Lopez (1, INBC, INB0003431978), Volcan Miravalles, Sector Crabromuco, 980 m, 26.06.2001, J.& A. Rifkind, P. Gum (1, CHAH); Puntarenas Pr., Brujo, 400m, 26.08.1994, B. Jordal, ex *Cecropia peltata* (1, CHAH), Est. Q. Bonita, R.B. Carara, 50m, LN-194500_469850, 02.1994, R.M. Guzman (1, INBC), Osa Peninsula, Agua Buena, 30m, 23.04.1994, B. Jordal, ex *C. peltata* (2, INBC, CHAH), Nicoya Pen., vic. Mal Pais, 0–10m, 25–29.05.2003, L.M. LaPierre, on leaf undersides of mature *Cecropia peltata* trees (1, LMLC). **Guatemala**: San Isidro, Pantaleon (Lectotype, BMNH). **Nicaragua**: 16 mi SW Managua, 2800', 14.04.1974, C.W. & L. O'Brien & Marshall (1, CWOB). **Panamá**: Mojingo Swamp, 09.07.1952 (1, USNM), Cocle Pr., El Valle, 06.07.1974, O'Briens & Marshall (1, CWOB); Colon, France Field, 12.08.1984, D.&L. Engleman (1, CWOB); Panamá Pr., Cerro Campana, 16.07.1976, W.E. Clark (1, USNM), Cerro Campana, 454 m, 20.05.1973, G. Ekis (1, CWOB), Cerro Campana, 850 m, 08º 40' N 79º 56' W, 29.05.1970, 29.07.1970, 14.07.1974, 17.07.1977, H.A. Hespenheide, on *Cecropia* (4, CHAH), Las Cumbres, 07.08, 28.10.1979, 24–30.12.1982, H. Wolda (3, CWOB), 5 mi NE Chepo, 04.07.1974, C.W. & L. O'Brien & Marshall (1, CWOB); 8–10 km N El Llano, 24.05–02.06.1992, E. Giesbert (1, CHAH), Parque Nacional Altos de Compana, 2700', 18.051991, R. Turnbow (1, CMNC); Canal Zone, Paraiso, 26.03.1911, E.A. Schwarz (1, USNM), Barro Colorado Island, 28.01.1929, C.H. Curran (1, AMNH), Barro Colorado Island, Gigante Peninsula, 05.04.1992, J.E. Tobin, Fog #3 (1, CMNC), Pipe Line Road, 30.06.1974, C.W. & L. O'Brien & Marshall (1, CWOB); Madden Forest, 24.04.1970, H.P. Stockwell (1, CWOB), Fort Gulick, 09, 10.1979, H.J. Harlan (2, CWOB); Fort Clayton, 22.05.1970, H. Stockwell (1, CWOB), Fort Sherman, 10.07.1983, D. Engleman (1, CWOB), 2 mi SSE Gamboa, 09º 06' N 79º 42' W, 15.11.1969, H.A. Hespenheide (1, CHAH), 6.5 km SE Gamboa, 09º 04' N 79º 40' W, 02.08.1978, H.A. Hespenheide, at *Cecropia* (1, CHAH), 3.5 km WNW Paraiso, 09º 02' N

79º 40' W, 13.07.1974, H.A. Hespenheide (1, CHAH), 7 km W Margarita, 09º 20' N 79º 58' W, 29.07.1978, H.A. Hespenheide (1, CHAH), Parque Natural Metropolitano, 03, 30.04, 01, 08.05.1995, F. Oedegaard, on *Cecropia peltata*, *C. longipes* (5, FOC), San Blas, Nusagandi, Nusagandi Tr., 150–350 m, 17.07.1995, C.W.&L.B. O'Brien (1, CWOB). **Venezuela**: Zulia, El Tucuco, 45 km SW Machiques, 05–06.06.1976, A. Menke & D. Vincent (1, USNM).

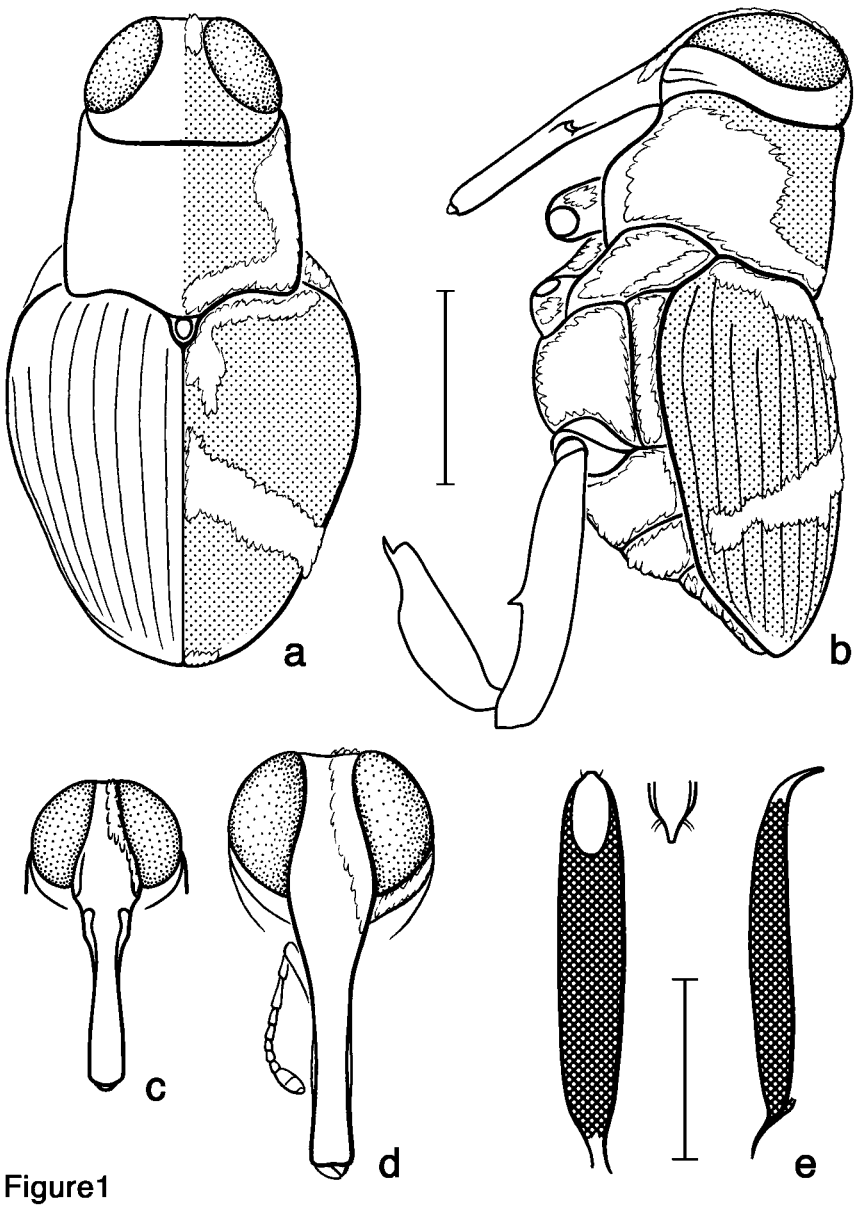

FIGURE 1. *Pseudolechriops megacephala* Champion: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male, d. front of head of female (a–d, line = 1.0 mm), e. dorsal (left) and lateral (right) views of entire male aedeagus and apex (above; line = 0.5 mm).

Discussion: Males from Puntarenas Province, Costa Rica, differ from other males in having white setae on the lateral margins of the rostrum to the antennal insertions, and are somewhat intermediate in this character with the next species. Males have been observed feeding at Müllerian bodies. Adults have most consistently been associated with *Cecropia peltata* L., but have also been taken on *C. longipes* Pitt. This species has been reared from adult *C. peltata* petioles (see Table 1). Male specimens measure 2.7–3.1 mm long (mean = 2.90 mm for 16 specimens); females measure 2.85–3.45 mm long (mean = 3.28 mm for 25 specimens).

TABLE 1. Use of *Cecropia* hosts by *Pseudolechriops* species in Costa Rica. Data are based on rearings by LaPierre except for *P. megacephala* (B. Jordal, University of Bergen, Norway).

Pseudolechriops spp.	Locality[1]	*Cecropia* host spp.	Host age	Petiole condition
P. klopferi	La Selva	*insignis*	juvenile	live
P. coleyae	La Selva	*obtusifolia*	juvenile	live
P. howdenorum	La Selva	*insignis, obtusifolia*	adult	dead
P. davidsonae	San Luis	*obtusifolia*	adult	dead
P. alleni	La Selva	*insignis*	juvenile	live
P. wrightae	Boca Tapada	*hispidissima*	adult	live
P. janeae	San Luis	*obtusifolia*	juvenile	live
P. megacephala	Agua Buena	*peltata*	adult	dead

[1] Agua Buena, Puntarenas Pr., Osa Peninsula, elevation 30 m; Boca Tapada — Boca Tapada de San Carlos, Alajuela Province, ca. 10° 38’ N 84° 14’ W, elevation 200 m; La Selva — La Selva Biological Station, Heredia Province, 3 km S Pto. Viejo, 10° 26’ N 84° 01’ W, elevation 50–150 m; San Luis — Ecolodge San Luis and Biological Station, Puntarenas Province, ca. 10° 15’ N 84° 45’ W, elevation 1100 m.

2. *Pseudolechriops longinoi* Hespenheide & LaPierre, new species

Fig. 2, a–e

Diagnosis: Black except rostrum and legs reddish brown, posterior tibiae darker, flattened and weakly arcuate on posterior margin; from above rhomboidal in shape with elytra conspicuously wider than base of pronotum; sides of pronotum moderately densely covered with setae; elytra with transverse basal fascia of white setae connecting along suture to elongate spot of white setae at middle; rostra of males and females strongly sexually dimorphic in shape; Costa Rica.

Description: Holotype male: Black, except tarsi, tibiae, femora, antennae and rostrum reddish brown; rostrum, apices of posterior femora and posterior tibiae darker; from above (Fig. 2a), indistinct pattern of narrow white setae on elytra at bases of elytral intervals, extending for 1/2 of length of intervals 1 and 2, with slightly more conspicuous spot at

middle; pronotum with inconspicuous hair like setae on disk, and broader white setae on sides, barely visible from above; head with white setae between eyes on lower 1/2 and on lateral margins of carinae to antennal insertions, and in medial spot above groove in lateral carinae, rostrum glabrous and polished below groove in lateral carinae; beneath moderately densely and uniformly covered with elongate white setae; femora and anterior and middle tibiae rather densely covered with fine white setae, setae on hind tibiae dark and inconspicuous, appearing glabrous; 2.85 mm long.

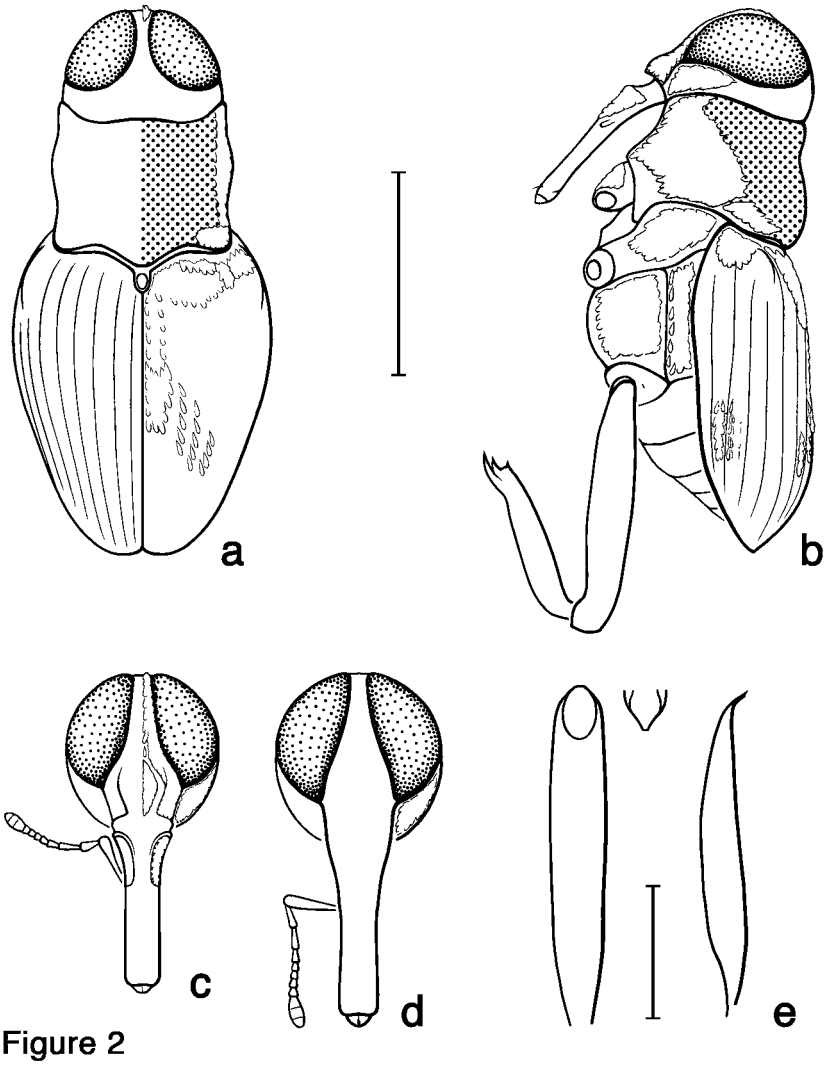

Figure 2

FIGURE 2. *Pseudolechriops longinoi*, **new species**: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male, d. front of head of female (a–d, line = 1.0 mm), e. dorsal (left) and lateral (right) views of entire male aedeagus and apex (above; line = 0.5 mm).

Head very prominent, about 3/4 as long as pronotum, dorsally with fine medial carina, eyes arcuately rounded, nearly as wide as pronotum at apex; from front, eyes narrowly

separated, closest below apex and separated on upper half by narrow medial depression; interior margins of eyes raised to form ridges on lower half ending in obtuse teeth; rostrum slender, antennae inserted at middle, from side nearly straight, from front flattened and broadening slightly toward base above antennal insertions and with lateral margins carinate, carinae ending with an oblique polished groove at base of rostrum that separates rostral carinae from carinae at lower margins of eyes (Fig. 2c). Pronotum from above nearly cylindrical, only slightly wider at base than apex, from lateral view very weakly convex on basal 1/2, disc punctate, distinctly carinate along midline. Elytra together about 1/2 broader than pronotum and only 1/6 longer than wide, giving a rhomboidal appearance, lateral margins weakly arcuate, apices conjointly rounded. Mesosternum with well-defined groove with high ridges to receive rostrum continuing to excavate and carinate anterior margin of metasternum; metasternum with rather broad medial polished depression along midline to abdomen. Abdomen with first ventral sternite narrowly depressed along midline, glabrous and more deeply so on posterior 1/2, second sternite also weakly depressed on anterior 1/2, from side abruptly declivous near apex. Middle and posterior femora with minute tooth on inner margin just beyond the middle, very finely carinate; posterior tibiae conspicuously broadened and flattened to near apices, very weakly arcuately rounded on posterior margin (Fig. 2b). Aedeagus transparent yellowish (Fig. 2e).

Allotype female: As male, but base of rostrum convex in cross-section and more coarsely punctate, without lateral carinae on rostrum or lower inner margins of eyes (Fig. 2d). Mesosternal groove present but weaker, first abdominal segment indistinctly depressed along midline; 2.95 mm long.

Holotype male: **Costa Rica:** Heredia Pr., La Selva Biol. Sta., 3 km S Pto. Viejo, 10° 26’ N 84° 01’ W, 26.07.1996, H.A. Hespenheide, *Cecropia* (INBC).

Allotype female: **Costa Rica:** same data as holotype but 31.07.1993 (INBC).

Paratypes: **Costa Rica:** Heredia Pr., La Selva Biol. Sta., 3 km S Pto. Viejo, 10° 26’ N 84° 01’ W, 28.07.1982, 27.07, 10.08.1992, 31.07.1993, 18.07.1994, 26.07.1996, H.A. Hespenheide, *Cecropia* (5, BMNH, CHAH), La Selva B. S., 50–150m, 04.07, 14–22.08.1996, L.M. LaPierre, *C. obt*[*usifolia*] (2, BMNH, LMLC), 11–12.06.2003, L.M. LaPierre, on leaf undersides of juvenile *Cecropia obtusifolia* (1, LMLC), 25, 29.08.1996, L.M. LaPierre, *Cecropia* (3, INBC). **Nicaragua:** Rio San Juan Pr, Refugio Bartola, 16 km ESE El Castillo, 10° 58/59’ N 84° 20/21’ W, 10.05.1999, H.A. Hespenheide (2, CHAH, SEAN)

Etymology: This species is named in honor of John T. Longino for his work on the ecology of the *Cecropia-Azteca* relationship (Longino 1991), as well as his coordination of the Arthropods of La Selva (ALAS) Project (Longino & Colwell 1997; see below).

Discussion: Two other undamaged male specimens are 2.5 and 2.65 mm long; females measure 2.8–3.1 mm long (mean = 2.96 mm for 14 specimens). This species has not been reared but adults have been observed on the undersides of juvenile *Cecropia* leaves.

3. *Pseudolechriops dimorpha* Hespenheide & LaPierre, new species
Fig. 3, a–e

Diagnosis: Black except rostrum and legs reddish brown (or posterior legs darker), posterior tibiae flattened and weakly arcuate on posterior margin; from above rhomboidal in shape with elytra conspicuously wider than base of pronotum; sides of pronotum moderately densely covered with setae, disc with pattern of yellowish setae; elytra with conspicuous basal transverse fascia of white setae and with small transverse chevron of white setae across suture beyond the middle; rostra of males and females strongly sexually dimorphic in shape, that of male with white setae on basal 1/2; México and Guatemala.

Description: Holotype male: Dark reddish brown, except tarsi, tibiae, femora, antennae and rostrum paler reddish brown, rostrum, beneath darker, metasternum nearly black; from above (Fig. 3a), indistinct pattern of narrow white setae on elytra at bases of elytral intervals, slightly longer on interval 2, spot of narrow white setae at middle on intervals 1 and 2; pronotum with narrow yellowish setae on disk, and broader white setae on sides, from above in vague oblique patch on basal 2/3 from posterior corners toward middle; head with narrow yellowish setae on dorsum and with white setae between eyes on lower 4/5 and on expanded portion of rostrum, rostrum glabrous and polished below expanded portion; beneath moderately densely and uniformly covered with white setae, sparser on abdomen; femora and anterior and middle tibiae rather densely covered with fine white setae, setae on hind tibiae dark and inconspicuous, appearing glabrous; 2.4 mm long.

Head prominent, about 3/5 as long as pronotum, eyes arcuately rounded, nearly as wide as pronotum at apex; from front, eyes narrowly separated, closest below apex and separated above narrowest separation by narrow medial depression; area between eyes on lower 1/2 weakly concave, ventral extensions of interior margins of eyes slightly raised to form weak ridges ending interrupted by a small notch at end of antennal scape and then continuing on to rostrum, rostrum highly modified (Fig. 3c) with tongue-shaped, weakly concave surface on basal half, the surface with weak medial and sublateral depressions and extending just beyond antennal insertions, from side (Fig. 3b) surface forms shallow acute angle with plane of front, rostrum thickest at apex of surface, apically subcylindrical, antennae inserted at middle. Pronotum from above nearly cylindrical, somewhat wider at base than apex, weakly constricted near apex, sculpture of disc indistinct, weakly carinate along midline. Elytra together about 1/2 broader than pronotum and only slightly longer than wide, giving a rhomboidal appearance, lateral margins weakly arcuate, apices conjointly rounded. Mesosternum with well-defined groove with high ridges to receive rostrum continuing to excavate and carinate anterior margin of metasternum; metasternum with medial polished depression along midline to abdomen, narrower anteriorly. Abdomen with first ventral sternite broadly depressed along midline, second sternite also weakly depressed on anterior 1/2, separation between first and second sternites indistinct at middle. Femora with minute tooth on inner margin just beyond the middle and posterior femora carinate; posterior tibiae conspicuously broadened and flattened for 3/4 length (Fig.

3b). Aedeagus transparent yellowish- (Fig. 3e).

Allotype female: Ground color black except anterior and middle legs and rostrum reddish brown; setae on front inconspicuous and rostrum glabrous and polished (Fig. 3d); setae on sides of pronotum orange-yellow; setae on legs finer and less dense and conspicuous. Otherwise as male, except first abdominal segment indistinctly depressed along midline; 2.7 mm long.

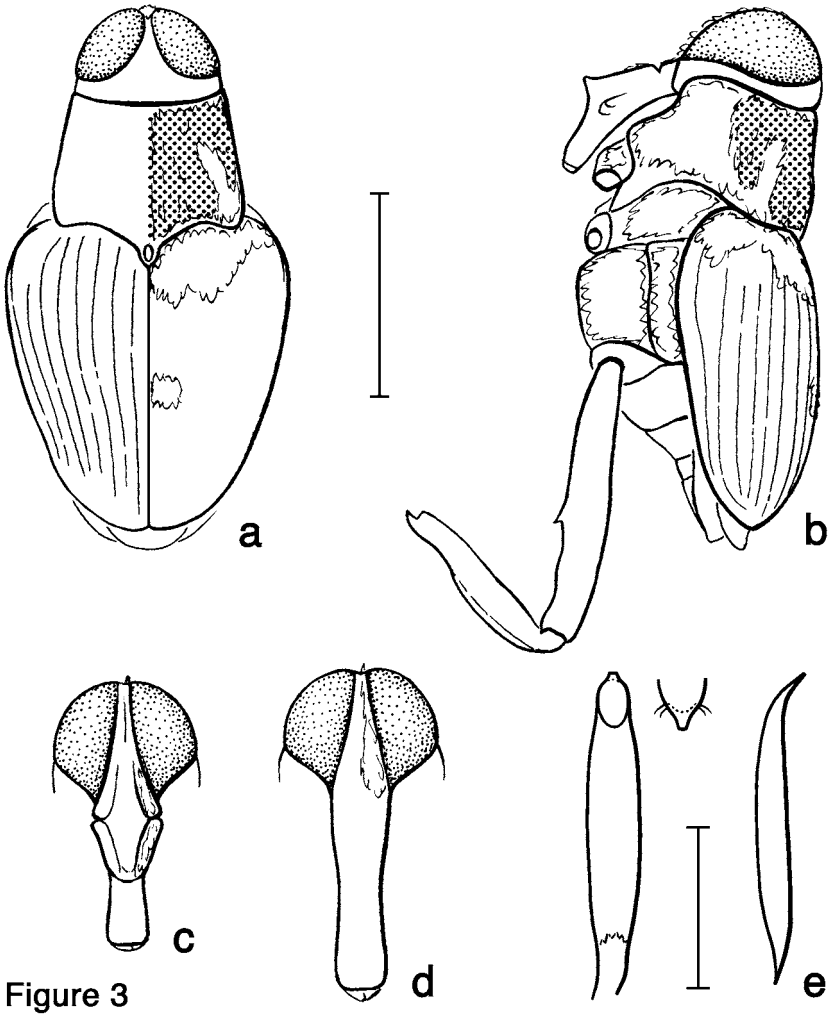

Figure 3

FIGURE 3. *Pseudolechriops dimorpha*, **new species**: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male, d. front of head of female (a–d, line = 1.0 mm), e. dorsal (left) and lateral (right) views of entire male aedeagus and apex (above; line = 0.5 mm).

Holotype male: **Guatemala**: Alta V. Paz, Trece Aguas, 25.03.[year?], Schwarz & Barber (USNM).

Allotype female: **Guatemala**: same data as holotype but 28.03.[year?] (USNM).

Paratypes: **Guatemala**: Zacapa, 3 km S La Union, 1400m, 09.06.1993, H. & A.

Howden (1, CMNC). **Honduras**: Cortés, Lago de Yojoa, Isla Venado, 28.08.1994, R. Cave, S. Peck, en petiola de *Cecropia* (1, EAPZ), 25 km N Cofradia, P.N. Cosuco, 15.09–07.10.1994, S.& J. Peck, cloud forest, flight inter. trap, 94–62 (CMNC). **México**: Chiapas, Mpio. Berriozabal, 6 mi N Berriozabal, 1000m, 06.08.89, R. Jones (1, TAMU); Vera Cruz, Est. Biol Los Tuxtlas, 18º 35' N 95º 05' W, 25, 26, 28.04.1991, H.A. Hespenheide (3, BMNH, CHAH, UNAM), Catemaco, 11.04.1967, H.R. Burke (1, TAMU).

Etymology: The name refers to the strong sexual dimorphism in the form of the rostrum between males and females.

Discussion: *Pseudolechriops dimorpha* is the only currently known Mexican species, although *P. megacephalus* occurs in Guatemala and may also occur in Mexico. The only male other than the holotype measures 2.4 mm long; females measure 2.7–3.35 mm long (mean = 3.03 mm for 7 specimens). This species has not been reared.

4. *Pseudolechriops howdenorum* Hespenheide & LaPierre, new species

Fig. 4, a–d

Diagnosis: Black except anterior and middle legs reddish brown; posterior tibiae flattened and weakly arcuate on posterior margin; from above rhomboidal in shape with elytra conspicuously wider than base of pronotum; pronotum more or less sparsely covered with mostly yellowish-orange setae, disc with conspicuous pattern; elytra with inconspicuous basal transverse fascia of white and pale yellow setae and small transverse chevron of white setae across suture beyond the middle; rostra of males and females sexually dimorphic in shape, that of male less extravagantly modified, glabrous and polished; Nicaragua to Panamá.

Description: Holotype male: Black, except tarsi, anterior and middle tibiae and femora, and antennae reddish brown; from above (Fig. 4a), narrow band of white setae on elytra at bases of elytral intervals 1–4, inconspicuous yellow brown setae with few white setae on outer intervals and anterior to humeri, conspicuous transverse spot of white setae just beyond middle on elytral intervals 1–4; pronotum with orange-brown setae, darker and less conspicuous hair like setae on disk, small patches of white setae at posterior angles; head with yellow brown setae dorsally, few white setae between eyes, lower part of front and rostrum glabrous and polished; beneath moderately densely and uniformly covered with white setae on metasternum and epimera, setae smaller and sparser on abdominal sternites; anterior and middle femora and tibiae rather densely covered with fine white setae, setae on hind femora and tibiae inconspicuous, appearing glabrous; 2.65 mm long.

Head moderately prominent, about 2/3 as long as pronotum, dorsally with fine medial carina, eyes arcuately rounded, about 4/5 as wide as pronotum at apex; from front, eyes narrowly separated, closest below apex and separated on upper half by narrow, shallow medial depression; interior margins of eyes raised to form ridges on lower 1/5 ending in rounded teeth, rostrum slender, antennae inserted at middle, from side arcuately rounded,

from front (Fig. 4c) flattened and broadening slightly toward base above antennal insertions and with lateral margins carinate, carinae ending with a broad oblique polished groove at base of rostrum that separates rostral carinae from carinae at lower margins of eyes. Pronotum from above nearly cylindrical, only slightly wider at base than apex, from lateral view slightly convex on basal 1/2, disc sculpture obscured by setae. Elytra together about 1/2 broader than pronotum and only slightly longer than wide, giving rhomboidal appearance, lateral margins weakly arcuate, apices conjointly rounded. Mesosternum with well-defined groove with high ridges to receive rostrum continuing to excavate and carinate anterior margin of metasternum; metasternum with rather broad medial polished depression along midline to abdomen. Abdomen with first ventral sternite narrowly depressed along midline, more deeply so on posterior 1/2, second sternite also weakly depressed on anterior 1/2. Femora with distinct tooth on inner margin just beyond the middle, middle and posterior femora carinate; posterior tibiae conspicuously broadened and flattened for basal 3/4, weakly arcuately rounded on posterior margin (Fig. 4b). Aedeagus pale transparent brown (Fig. 4e).

Allotype female: As male, but transverse sutural elytra band broader (intervals 1–5); base of rostrum convex in cross-section, medially carinate and finely punctate, without lateral carinae on rostrum or lower inner margins of eyes; first two abdominal segments weakly convex; 3.1 mm long.

Holotype male: **Costa Rica:** Heredia [Prov.], La Selva B.S., 50–150 m, 10º 26’ N 84º 01’W, 25.08.1996, L.M. LaPierre, *C*[*ecropia*] *obt*[*usifolia*] (INBC).

Allotype female: **Costa Rica:** same data as holotype but 08.07.1996 (INBC).

Paratypes: **Costa Rica:** Alajuela, Rio Sn Lorencito, Res. For. Sn Ramon, 5 km N Col. Palmarena, 900m, 244500-470700, 03.1990, Curso Carabidae (1, INBC, barcode INBIOCRI000160296), Sect. San Ramon, 620m, L-N-318100-381900, 13–28.03.1994, K. Taylor (1, INBC, barcode INBIOCRI001760484), 20 km S Upala, 21–28.08.1990, 01-10-04.1991, F.D. Parker (2, CWOB); Prov. Guanacaste, Estac. Pitilla, 9 km S Santa Cecilia, 700 m, 329950-380450, 04.1995, P. Rios, (1, INBC, barcode INBIOCRI002336488), Estac. Pitilla, 9 km S Santa Cecilia, P.N. Guanacaste, 700 m, 330200-380200, 09–14.07.1993, Gredy, Diego, Carlos, Estudiantes, (1, INBC, barcode INBIOCRI001955775), 3 km N Pitilla Biol. Sta, 400m, 09.09.1994, B. Jordal, ex *Cecropia obtusifolia* (1, CHAH), Cerro Ormalita, 4 km SW Pitilla Biol. Sta, 1100m, 09.09.1994, B. Jordal, ex *Cecropia insignis* (1, CHAH); Heredia Pr., La Selva Biol. Sta., 3 km S Pto. Viejo, 10º 26’ N 84º 01’ W, 02.05.1990, 25.07.1996, H.A. Hespenheide, *Cecropia* (2, CHAH), 17.08.1996, H.A. Hespenheide, *Cecropia insignis* (1, CHAH), Est. Biol. La Selva, 50–150 m, 10º 26’ N 84º 01’ W, 11–20.07.1997, emer[ged] 21, 31, 22.08, L.M. LaPierre, Cins 97.24-8 (1, LMLC), 14, 15, 03.09.1998, L.M. LaPierre, Cins 98.57-26 (1, LMLC), 09.05.2000, L.M. LaPierre, ID# 00.402, Host: *Cecropia insignis* (1, LMLC), La Selva B.S., 50–150 m, 10º 26’ N 84º 01’W, 14–16.07.96, L.M. LaPierre, *Cecropia insignis*, 26.08.1996, L.M. LaPierre, LS-60 (1, LMLC); Limon, 3 km W Bribri, 05.09.1994, B. Jordal, ex *Cecropia obtusifolia* (2,

CHAH). **Nicaragua**: Matagalpa, Fuente Pura, 12.06.1994, Maes/Tellez/Hernandez, s/ Cecropia (1, CWOB). **Panamá**: Chir[iqui], Res. For. La Fortuna, El Vivera, 20.07.1995, C.W. O'Brien (1, CWOB); Panamá Pr., Cerro Campana, 850 m, 08° 40' N 79° 56' W, 26.06.1977, H.A. Hespenheide, *Cecropia* petiole (1, CMNC), 17.08.1974, Stockwell, underside *Cecropia* leaf (1, GBFM); Cocle Pr., 5 km N El Cope, cont. divide, 850m, 17.06.1991, Windsor & Stockwell (1, STRI).

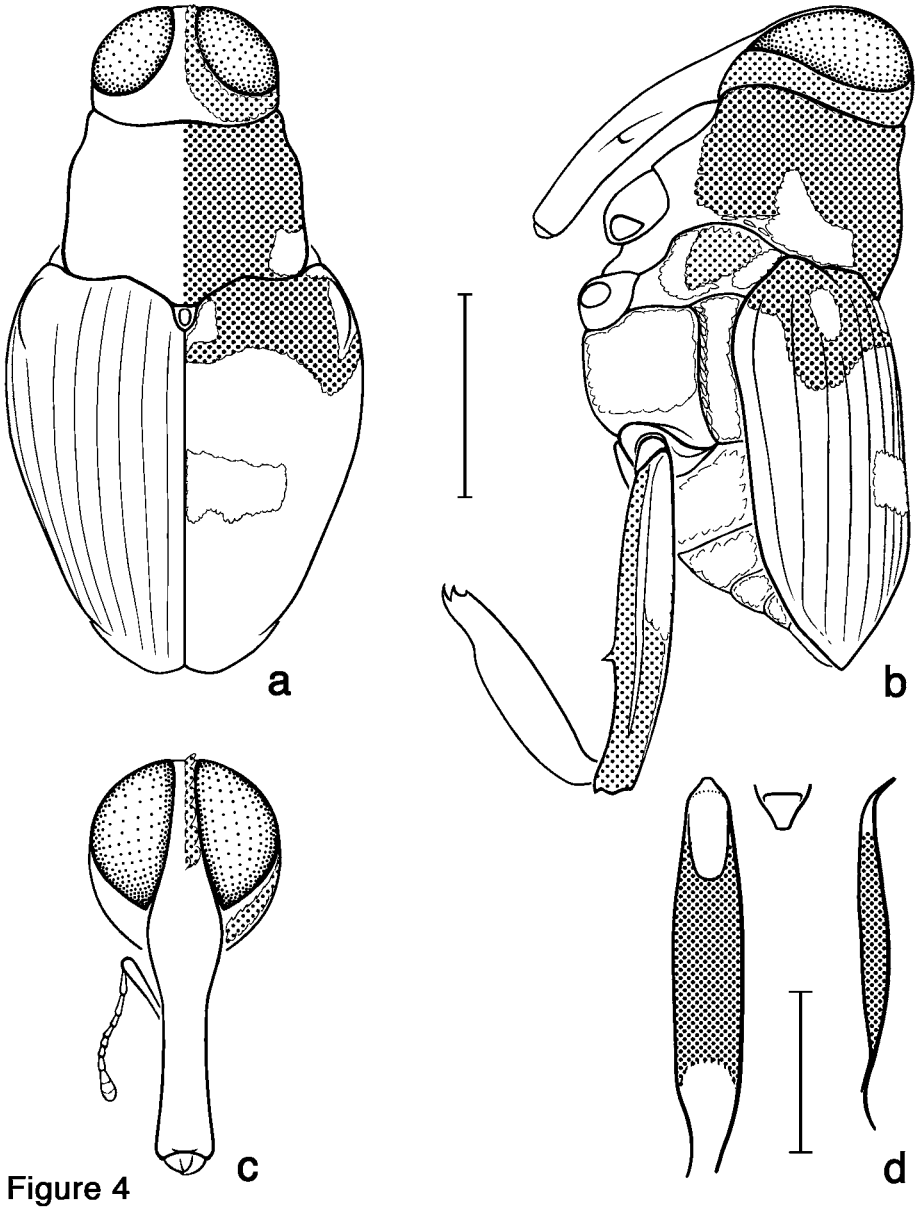

FIGURE 4. *Pseudolechriops howdenorum*, **new species**: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male(a–c , line = 1.0 mm), d. dorsal (left) and lateral (right) views of entire male aedeagus and apex (above; line = 0.5 mm).

Etymology: Named in honor of Henry and Anne Howden whose studies, respectively, of Neotropical Scarabaeidae and Curculionidae, research support, and hospitality recommend this recognition.

Discussion: Males measure 2.6–3.05 mm long (mean = 2.84 mm for 12 specimens); females measure 3.05–3.8 mm long (mean = 3.34 mm for 15 specimens). This species has been reared from dead petioles of adult *Cecropia* (see Table 1 and the Discussion section for more detailed information).

5. *Pseudolechriops davidsonae* Hespenheide & LaPierre, new species
Fig. 5, a–d

Diagnosis: Black except tip of rostrum, tarsi, anterior and middle tibiae and apical ½ of anterior and middle femora reddish brown; posterior tibiae flattened and weakly arcuate on posterior margin; from above rhomboidal in shape with elytra conspicuously wider than base of pronotum; sides of pronotum with indistinct narrow lateral stripe of white setae, disc with pattern of dark yellowish setae; elytra with inconspicuous basal transverse fascia of white and pale yellow setae and small transverse chevron of white setae across suture beyond the middle; rostra of males and females sexually dimorphic in shape, that of male less extravagantly modified, glabrous and polished; Costa Rica and Panamá.

Description: Holotype male: Black, except tarsi, anterior and middle tibiae, distal 1/2 of anterior and middle femora, and apical 1/3 of rostrum reddish brown; from above (Fig. 5a), narrow band of white and yellowish setae at bases of elytral intervals, small transverse spot of white setae just beyond middle on elytral intervals 1–2; pronotum above sparsely, uniformly covered with hair-like orange-brown setae, small patches of white setae at posterior angles and in vague fascia on basal 1/2 of sides of pronotum, glabrous below fascia; head glabrous dorsally, sparse white setae between eyes on lower 1/2 of front and along marginal carinae, lower part of front and rostrum glabrous and polished; beneath moderately densely and uniformly covered with white setae on metasternum and epimera, setae smaller and sparser on abdominal sternites; femora and anterior and middle tibiae rather densely covered with fine white setae, setae on hind tibiae inconspicuous, appearing glabrous; 2.65 mm long.

Head moderately prominent, about 3/5 as long as pronotum, dorsally finely punctate, eyes arcuately rounded, as wide as pronotum at apex; from front, eyes narrowly separated, closest below apex and separated on upper half by narrow, shallow medial depression; lower interior margins of eyes raised to form ridges ending in quadrate teeth, rostrum slender, antennae inserted beyond middle, from side nearly straight, from front (Fig. 5c) flattened and broadening slightly toward base above antennal insertions and with lateral margins strongly carinate, carinae ending with a broad oblique polished groove at base of rostrum that separates rostral carinae from carinae at lower margins of eyes. Pronotum from above nearly cylindrical, only slightly wider at base than apex, from lateral view

slightly convex on basal 1/2, disc coarsely punctate. Elytra together about 1/2 broader than pronotum, 1/10 longer than wide, giving rhomboidal appearance, lateral margins weakly arcuate, apices conjointly rounded. Mesosternum with well-defined groove with high ridges to receive rostrum continuing to excavate and carinate anterior margin of metasternum; metasternum with medial polished depression along midline to abdomen. Abdomen with first ventral sternite weakly depressed along midline, more deeply so on anterior 1/2, second sternite also weakly depressed on anterior 1/2. Femora with minute tooth on inner margin just beyond the middle, middle and posterior femora carinate; posterior tibiae conspicuously broadened and flattened for basal 3/4, weakly arcuately rounded on posterior margin (Fig. 5b). Aedeagus dark brown (Fig. 5e).

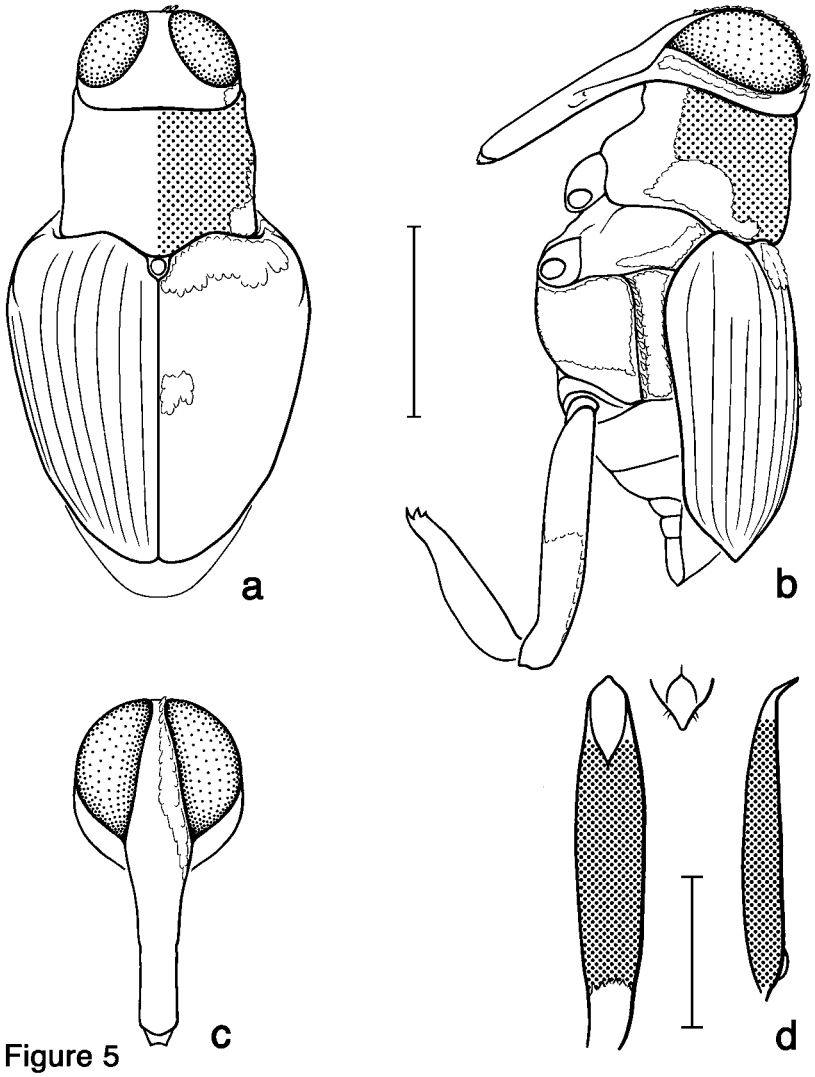

Figure 5

FIGURE 5. *Pseudolechriops davidsonae*, **new species**: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male (a–c , line = 1.0 mm), d. dorsal (left) and lateral (right) views of entire male aedeagus and apex (above; line = 0.5 mm).

Allotype female: As male, but transverse sutural elytra band larger; base of rostrum convex in cross-section, finely punctate with inconspicuous yellowish setae, without lateral carinae on rostrum or lower inner margins of eyes; abdomen uniformly rather densely covered with white setae, first abdominal segment with narrow, weak depression along midline; 3.2 mm long.

Holotype male: **Costa Rica:** Puntarenas Pr., San Luis Vly 1100–1400m, 02–09.08.1996, L.M. LaPierre, *Cecropia* (INBC).

Allotype female: same data as holotype (INBC).

Paratypes: **Costa Rica:** Puntarenas Pr., San Luis de Monteverde & vicinity, 500–1200 m, 10.1997, L.M. LaPierre, San97.67-6-8 (3, LMLC), San Luis Vly, 1100–1400m, same data as holotype (3, LMLC), 21–25.07.1996, L.M. LaPierre, *Cecropia* (4, LMLC), 26.07-01.08.1996, L.M. LaPierre, *Cecropia obtusifolia* (7, CHAH, LMLC), San Luis Vly, Ecolodge SL, 1100m, 10° 15' N 84° 45' W, 01–10.08.1997, L.M. LaPierre, on sapling *Cecropia polyphlebia* (1, LMLC), 11–20.08.1997, L.M. LaPierre, on sapling *Cecropia obtusifolia* (1, LMLC), San Luis de Monteverde, 1100 m, 10° 15' N 84° 48' W, 03–07, 09, 11–14.06.2003, L.M. LaPierre, on leaf undersides of juvenile *Cecropia obtusifolia* (4, CHAH), Los Alturas, 1200–1500m, 08° 56' N 82° 50' W, 01.1998, L.M. LaPierre, *Cecropia polyphlebia* (1, LMLC); San José, Univ. de Costa Rica, San Pedro, San José, 1200m, 16.11.1994, L. Kirkendall & H. Lezama, ex *Cecropia obtusifolia* petiole (2, MUCR). **Panamá**: Chiriqui, N Santa Clara, 08° 51' N 82° 46' W, 04.10.1975, Stockwell (1, STRI). Paratypes to be deposited in BMNH, USNM.

Etymology: This species is named in honor of Diane Davidson for her extensive study of the ecology of the *Cecropia-Azteca* relationship (Davidson 2005, Davidson and McKey 1993).

Discussion: Males measure 2.55–2.9 mm long (mean = 2.71 mm for 12 specimens); females measure 2.8–3.3 mm long (mean = 3.05 mm for 13 specimens). This species is very similar to *P. howdenorum*, but is separated by a number of small but consistent differences and is easily recognized by the dark bases of the anterior and middle tibiae. This species has been reared from dead petioles of adult *Cecropia* (see Table 1 and the Discussion section for more detailed information). *Cecropia polyphlebia* has been synonymized with *C. angustifolia* (Berg & Franco Rosselli 2005).

6. *Pseudolechriops klopferi* Hespenheide & LaPierre, new species

Figs. 6, a–d; 18

Diagnosis: Black except tip of rostrum, sides of pronotum, disc of elytra, tarsi, anterior and middle legs and basal ½ of posterior femora reddish brown; posterior tibiae flattened and weakly arcuate on posterior margin; from above narrowly rhomboidal in shape with elytra conspicuously wider than base of pronotum; sides of pronotum with broad oblique band of dense white setae from sides of rostral canal to dorsal posterior angles (upper portion lack-

ing in males); elytra with conspicuous medial sutural spot of pale yellowish setae; rostra of males and females similar in shape; Costa Rica and Panamá.

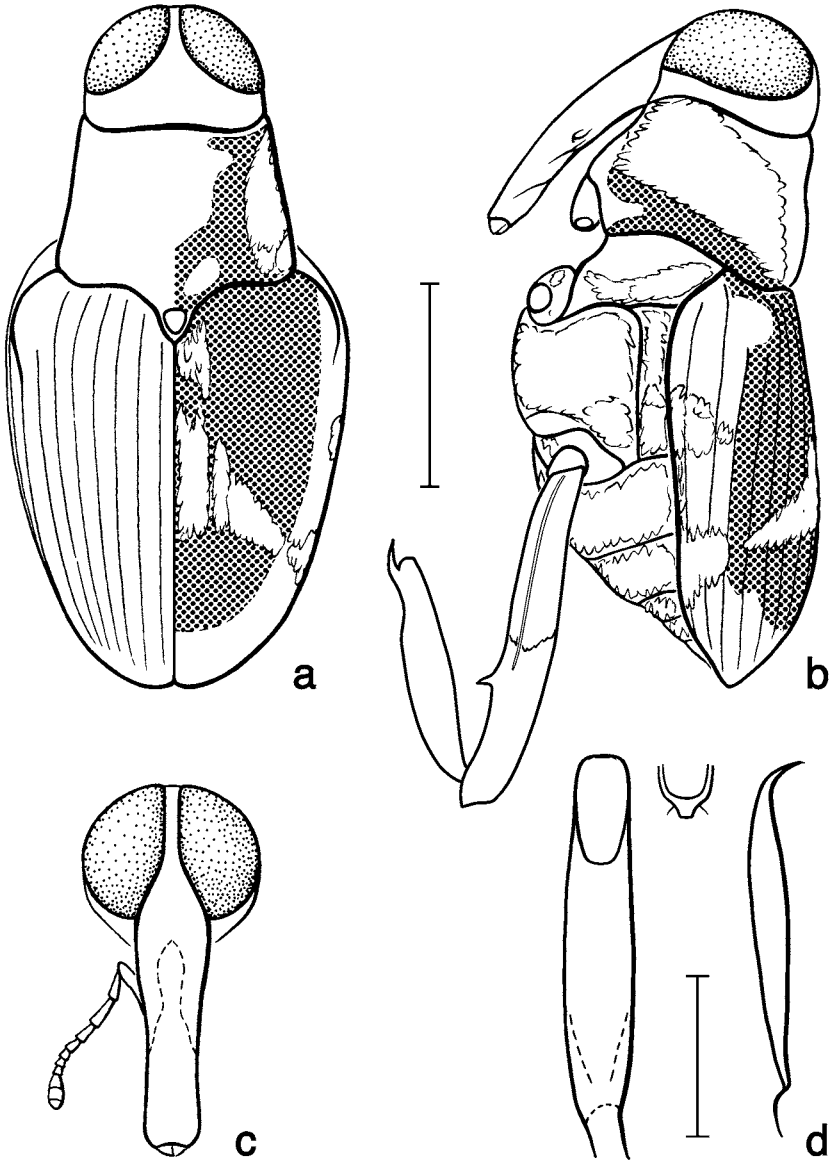

Figure 6

FIGURE 6. *Pseudolechriops klopferi*, **new species**: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male (a–c , line = 1.0 mm), d. dorsal (left) and lateral (right) views of entire male aedeagus and apex (above; line = 0.5 mm).

Description: Holotype male: Dark reddish brown, except head, elytral markings, distal half of hind femora and hind tibiae black, tarsi, anterior and middle tibiae and femora, antennae, and apical 1/3 of rostrum paler reddish brown; from above (Fig. 6a), band of creamy white setae at bases of elytral intervals 1–4, setae continuing more sparsely along

small intervals 1–2, then forming conspicuous oval spot at middle on elytral intervals 1–3, vague oblique fascia of sparse creamy setae from central spot to lateral margins, and on first interval at elytral apices; pronotum above with small patches of white sparse creamy setae in vague fascia at posterior angles and just anterior to scutellum, and setae dense on basal 1/2 of sides of pronotum; head glabrous; beneath moderately densely and uniformly covered with creamy white setae, except glabrous on anterior half of metasternum and metepimera, setae sparser on abdominal sternites 3–5; anterior and middle femora and basal 1/2 of posterior femora rather densely covered with fine white setae, setae on hind tibiae inconspicuous, appearing glabrous; 3.1 mm long.

Head moderately prominent, about 2/3 as long as pronotum, dorsally finely punctate, with medial carina, eyes arcuately rounded, as wide as pronotum at apex; from front (Fig. 6c), eyes very narrowly separated for almost their entire length, rostrum narrowest at middle, expanding somewhat apically and more so basally, sparsely, finely punctate, vaguely carinate along midline, antennae inserted at middle, from side arcuately rounded. Pronotum from above slightly conical, base 1/4 wider than apex, from lateral view nearly flat, disc finely punctate. Elytra together about 2/5 broader than pronotum, 1/4 longer than wide, giving rhomboidal appearance, lateral margins nearly straight to near apices, apices conjointly rounded. Mesosternum with well-defined groove with low ridges to receive rostrum continuing to excavate and carinate anterior margin of metasternum; metasternum narrowly incised along midline to abdomen. Abdomen with first ventral sternite weakly depressed along midline, more broadly so on anterior 1/2, second sternite also weakly, narrowly depressed on anterior 1/2. Anterior femora unarmed, middle femora blunt tooth on inner margin at apical 3/5, posterior femora (Fig. 6b) with acuminate tooth on inner margin just at apical 2/3, basal 1/2 of posterior femora carinate; posterior tibiae conspicuously broadened and flattened, arcuately rounded on posterior margin. Aedeagus pale transparent brown (Fig. 6e).

Allotype female: As male, but patch of dense setae on sides of pronotum twice as large, extending to posterior angles; transverse basal elytra band of setae less distinct except on interval 2; anterior and middle femora only with inconspicuous setae; 3.1 mm long.

Holotype male: **Costa Rica:** Prov. Heredia, F. La Selva, 3 km S Pto. Viejo, 10° 26’ N 84° 01’ W, 20.07.1982, H.A. Hespenheide, *Cecropia* (INBC).

Allotype female: **Costa Rica:** Heredia Pr., La Selva Biol. Sta., 3 km S Pto. Viejo, 10° 26’ N 84° 01’ W, 16.07.1992, H.A. Hespenheide (INBC).

Paratypes: **Costa Rica:** Alajuela Prov, N Slope Volcan de Rincon, 2 km W Dos Rios, 550 m, 22.05.1985, J.T. Doyen, P.A. Opler (1, EMEC), 20 km S Upala, 03–09.03.1991, 01–10.04, F.D. Parker (3, CWOB), Finca San Gabriel, 2 km S Dos Rios, 12.02.1994, R.W. Flowers (1, CWOB); Heredia Pr., Est. Biol. La Selva., 50–150 m, INBio-OET, 10° 26’ N 84° 01’ W, 07.1992 (4, INBC), 15.04.1993, M/05/068, bosque primario (1, INBC), 01.09.1993, M/01/192, parcelas sucesionales (1, INBC, INBIOCRI002259366),

13.08.1995, L.M. LaPierre, STR <3000m, on *Cecropia obtus*[*ifolia*]. (1, INBC, INBIOCRI002055876), 06, 04–08, 14–16.07, 17–22.08, 25.09–11.09.1996, 17–22.08.1997, L.M. LaPierre, *Cecropia insignis* (11, LMLC), 06, 17.07, 14–22.08.1996, L.M. LaPierre, *Cecropia obtusifolia* (4, LMLC), 25, 29.08.1996, died 29.08, L.M. LaPierre, *Cecropia* (4, LMLC), 11–20.07.1997, em 31.07 or 01.08, L.M. LaPierre, Cins97.24–16, -17, -26 (3, LMLC), 09.05.2002, L.M. LaPierre, on *Cecropia obtusifolia* (or *insignis*) (8, LMLC), F. La Selva (or La Selva Biol. Sta.), 3 km S Pto. Viejo, 10º 26' N 84º 01' W, 09.07.1982, 31.03.1988, 16.07, 10.08.1992, 14.07.1998 (*Cecropia insignis*), H.A. Hespenheide, *Cecropia* (4, BMNH, CHAH, INBC, MUCR), Puerto Viejo, Finca La Selva, 12.04.1982, R.J. Marquis, no.910, 28.06.1982, R.J. Marquis, no.1051, 15.08.1982, R.J. Marquis, no.1128, *Cecropia obtusifolia* (3, USNM); Prov. Guanacaste, Estac. Pitilla, 9 km S Santa Cecilia, 700 m, 330200-380200, 12.1989, 11.1990, C. Moraga & P. Rios (6, INBC, CMNC), 04, 07, 08, 09, 03–18.10.1991, 27.07-14.08.1992, 02-03, 18.04-19.05.1993, 06.1994, P. Rios (11, INBC), 02.1990, P. Rios, C. Moraga & R. Blanco (13, INBC), 05.1990, II Curso Parataxon. (2, INBC), Prov. Guanacaste, Fca. Pasmompa, 5 km SO Santa Cecilia, 400 m, L-N-333500-380600, 09.1992, C. Moraga (2, INBC), Cerro Ormalita, 4 km SW Pitilla Biol. Sta, 1100m, 09.09.1994, B. Jordal, ex *Cecropia insignis* (1, CHAH); Turrialba, 28.05.1951, O.L.Cartwright (6, USNM), Prov. Alajuela, Sect. San Ramon de Dos Rios, 620m, L-N-318100-381900, 20.02-03.03.1995, C. Cano (1, INBC); Prov. Limon, Sector Cerro Corocori, Fca de E. Rojas, 150m, L-N-286000-567500, 03.1991, 04.1993, E. Rojas (2, INBC), Prov. Limon, Sector Corocori, 30 km N de Cariari, Finca de E. Rojas, A.C. Tortuguero, 150m, L-N-286000-567500, 01.1994, E. Rojas (1, INBC). **Panamá**: Bocas del Toro, 400 m, 08º 49' N 82º 11' W, 26.05.2000, H.& A. Howden (1, CMNC); Chiriqui: Res. La Fortuna, 1100 m, 8º 44' N 82º 14' W, 21-25.03.2001, leg. Prena (1, JPPC); Cocle Pr., La Mesa ab. El Valle de Anton, 850 m, 08º 37' N 80º 07' W, 28.07.1974, H.A. Hespenheide (3, CHAH), Cerro Gaital, 10-12.06.1995 (3, CWOB); Colon Pr., Ft. Sherman, 09º 17' N 79º 59' W, 08.11, 01.12.2001, F. Odegaard, on *Cecropia insignis* (4, FOC); Panamá Pr., Canal Zone, 7 mi NW Gamboa, 09º 09' N 79º 43' W, 29.06.1971, H.A. Hespenheide, *Cecropia* (1, CHAH); Panamá Pr., Cerro Campana, 2700', 13, 23.05.1978, C.W. & L.B. O'Brien & Marshall (2, CWOB), Cerro Campana, 850 m, 08º 40' N 79º 56' W, 12.09.1970, 17.07.1977, Stockwell (2, CMNC), 29.04, 29.05, 12.06, 30.07, 01.08. 1970, 19.06.1971, 14, 27.07.1974, 17.07.1977, 24.07, 03.08.1978, H.A. Hespenheide, *Cecropia* (19, CASC, CHAH, CWOB, GBFM), Cerro Jefe, 700 m, 09º 14' N 79º 23' W, 22.06.1971, H.A. Hespenheide, *Cecropia* (3, CHAH), Cerro Azul, 4 km beyond Goofy Lake, 700 m, 09º 12' N 79º 23' W, 23.05.1970, H.A. Hespenheide, *Cecropia* (2, CHAH). Paratypes to be deposited in AMNH, CASC, GBFM, LACM, MUCR.

Etymology: This species is named in honor of Peter Klopfer of Duke University, the undergraduate mentor of Hespenheide.

Discussion: Males measure 2.5–3.15 mm long (mean = 2.90 mm for 71 specimens); females measure 2.7–3.8 mm long (mean = 3.38 mm for 41 specimens). This species has

been reared from live petioles of juvenile *Cecropia* (see Table 1 and the Discussion section for more detailed information).

7. *Pseudolechriops janeae* Hespenheide & LaPierre, new species

Fig. 7, a–e

Diagnosis: Largely reddish brown, except head (excluding rostrum), disc of pronotum and elytra, and posterior tibiae and apical ½ of posterior femora black; posterior tibiae slender, subcylindrical, not conspicuously flattened; from above slender, subcylindrical, with elytra not conspicuously wider than base of pronotum; setae on sides of pronotum dense, forming a well-defined oblique white stripe from base of eyes to anterior to elytral humeri; elytra with conspicuous transverse white fascia at base; male with eyes more widely separated, males densely white setose at base of rostrum above antennal insertions, females glabrous; Costa Rica and Panamá.

Description: Holotype male: Dark reddish brown, except distal half of hind femora and most of hind tibiae black, tarsi, anterior and middle tibiae and femora, and antennae paler reddish brown; from above (Fig. 7a), setae relatively dense mostly hair like, yellowish and inconspicuous, except band of white setae at bases of elytral intervals 1–5, setae extending slightly farther along intervals 1–3, separate short patches of white setae at middle on elytral interval 2, transverse fascia of white setae on outer three intervals of lateral margins behind humeri; pronotum with setae relatively dense mostly hair like, yellowish and inconspicuous from above, except sides (Fig. 7b) with oblique stripe of dense white setae extending from apical margin behind basal 1/2 of eyes to dorsal posterior angles; head glabrous above, front with white setae between eyes on lower half and extending on rostrum to antennal insertions; beneath moderately densely and uniformly covered with white setae on anterior margin and sides of metasternum and metepimera and abdominal sternites 1–2, setae sparser on abdominal sternites 3–5; external faces of anterior and middle femora rather densely covered with fine white setae, setae on anterior and middle tibiae and posterior femora sparser, setae on posterior tibiae inconspicuous, appearing glabrous; 3.0 mm long.

Head prominent, about 3/4 as long as pronotum, dorsally finely punctate, with fine medial carina, eyes arcuately rounded, as wide as pronotum at apex; from front (Fig. 7c), eyes rather widely separated for almost their entire length with shallow depression along midline, rostrum with antennae inserted at middle, narrow and polished distal to antennal insertions, expanding basally and sparsely, finely punctate, vaguely carinate along midline, from side nearly straight. Pronotum from above nearly conical, base only slightly wider than apex, from lateral view nearly flat, disc finely punctate, with fine medial carina. Elytra together about 1/2 broader than pronotum, widest behind humeri, 1/4 longer than wide, lateral margins very weakly arcuate, narrowing only slightly to near apices, apices broadly, separately rounded. Mesosternum with well-defined groove with low ridges to

receive rostrum continuing to excavate and carinate anterior margin of metasternum; metasternum narrowly incised along midline to abdomen. Abdomen with first ventral sternite weakly, broadly depressed along midline on posterior 1/2, second sternite also weakly, narrowly depressed on anterior 1/2. Femora unarmed, posterior femora with very fine carina; posterior tibiae only slightly flattened, almost terete (Fig. 7b). Aedeagus pale transparent brown (Fig. 7e).

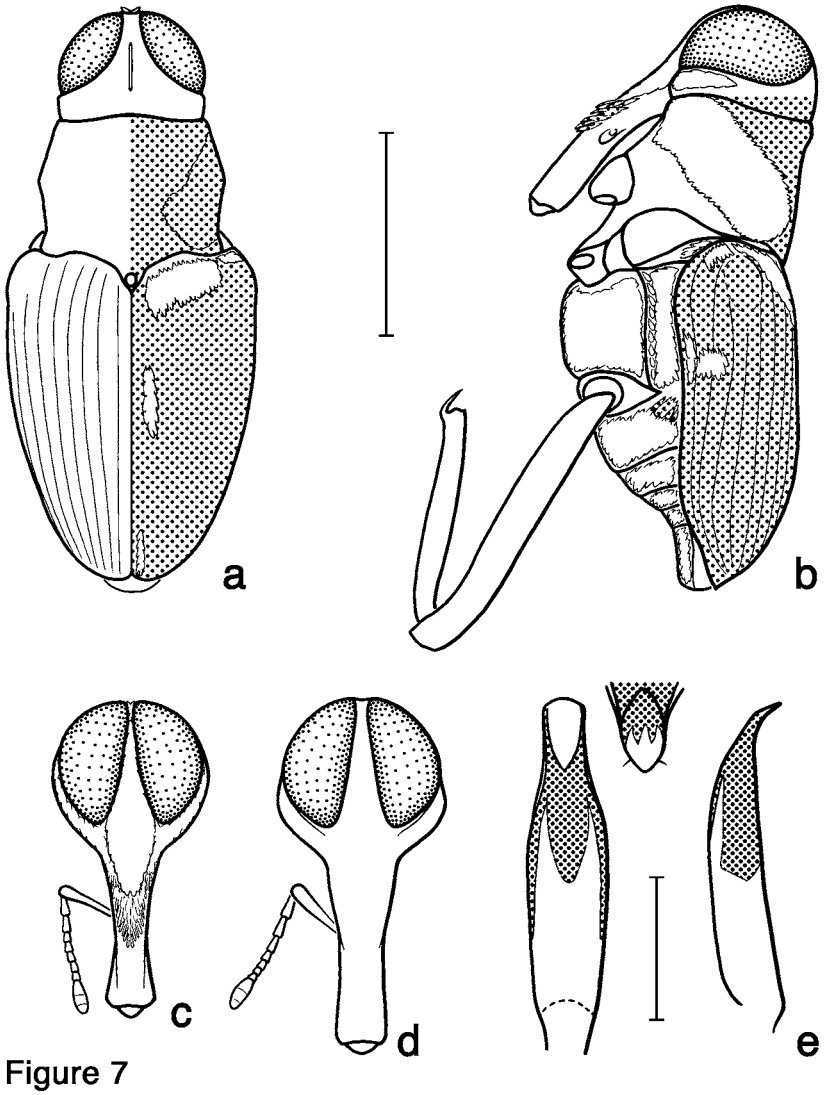

Figure 7

FIGURE 7. *Pseudolechriops janeae*, **new species**: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male, d. front of head of female (a–d, line = 1.0 mm), e. dorsal (left) and lateral (right) views of entire male aedeagus and apex (above; line = 0.5 mm).

Allotype female: As male, but band of white setae on base of elytra narrower and much less conspicuous, front and rostrum (Fig. 7d) with only small, inconspicuous yellow-

ish setae; anterior and middle femora with setae conspicuous only on distal 1/2; 3.1 mm long.

Holotype male: **Costa Rica:** Puntarenas Pr., upper San Luis Vly 1100m, 10º 15' N 84º 45' W, 24.09.1999, L.M. LaPierre, Host: *Cecropia obtusifolia* ID# 99.1111 (INBC).

Allotype female: **Costa Rica:** same data as holotype (INBC).

Paratypes: Puntarenas Pr., same data as holotype (9, INBC, LMLC).San Luis de Monteverde & vicinity, 900–1200 m, 11, 12.1997, L.M. LaPierre, SAN97.131-1, -2 (1, CHAH), San Luis de Monteverde & vic., 1000–1200 m, 10º 17' N 84º 49' W, 08.1997, L.M. LaPierre (3, CHAH), 1000–1200 m, 26.06.1998, L.M. LaPierre, *Cecropia obtusifolia* (1, CHAH), San Luis Vly 1100–1400m, 21–25.07.1996, L.M. LaPierre, *Cecropia* (1, CHAH); San Luis de Monteverde, 1100 m, 10º 15' N 84º 48' W, 03–07,09, 11–14.06.2003, L.M. LaPierre, on leaf undersides of juvenile *Cecropia obtusifolia* (11, BMNH, CHAH, CMNC, CWOB).

Other specimens examined: **Costa Rica:** San Jose P., 4 km N San Isidro del General, 870 m, 23, 24.02.1984, H.& A. Howden (CMNC). **Panamá**: Panamá Pr., Cerro Campana, 850 m, 08º 40' N 79º 56' W, 28.03.1972, W. Bivin (USNM).

Etymology: Named in honor of Dr. Jane E. Horlings of Saddleback College, CA who encouraged LaPierre to continue his interests with graduate work in biology.

Discussion: Males measure 2.5–3.05 mm long (mean = 2.86 mm for 13 specimens); females measure 2.7–3.2 mm long (mean = 2.99 mm for 16 specimens). The specimen from San Isidro has the pronotum, the central portions of the elytra, distal half of the posterior femora and posterior tibiae black, but is other wise similar to other Costa Rican material. The specimen from Panamá is very close to the Costa Rican material, including genitalia, but differs in that it lacks the post-humeral and mid-sutural spots of setae on the elytra, has a less extensive stripe of condensed setae dorsally on the sides of the pronotum, and has more slender, black hind tibiae. This species has been reared from live petioles of juvenile *Cecropia* (see Table 1 and the Discussion section for more detailed information).

8. *Pseudolechriops alleni* Hespenheide & LaPierre, new species
Fig. 8, a–d

Diagnosis: Black except tip of rostrum, tarsi, anterior and middle legs and basal ½ of posterior femora and apical ½ of posterior tibiae reddish brown; posterior tibiae slender, subcylindrical, not conspicuously flattened; from above slender, subcylindrical, with elytra not conspicuously wider than base of pronotum; setae on sides of pronotum sparse, irregularly distributed over most of surface; elytra with conspicuous transverse white fascia at base connected to weak sutural spot beyond middle; male with eyes more widely separated, males densely white setose at base of rostrum above antennal insertions; Costa Rica.

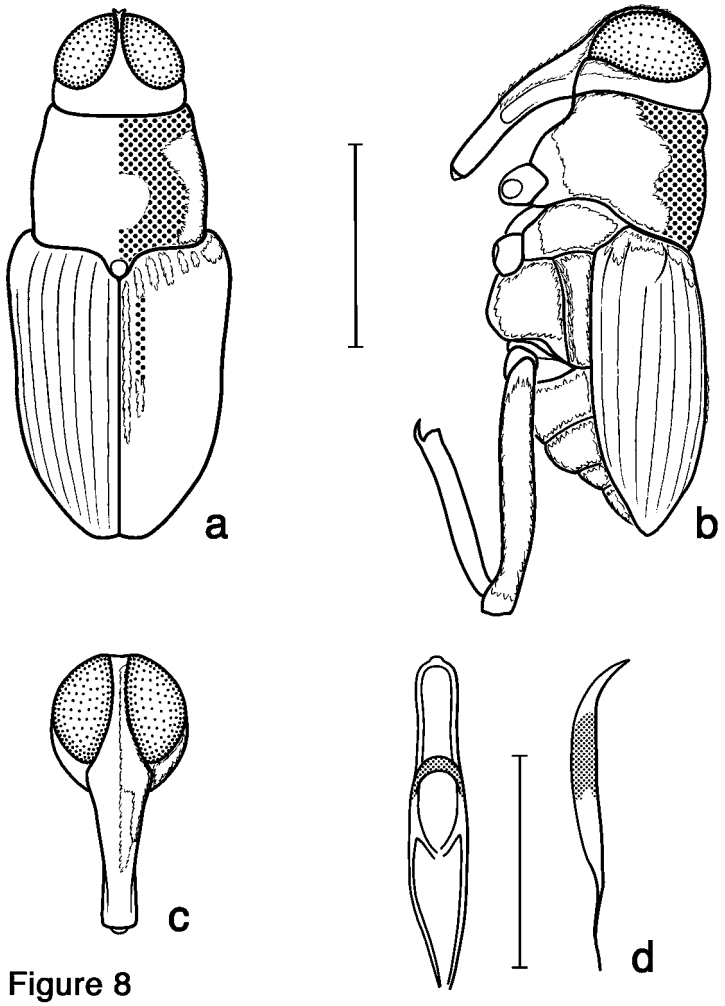

Figure 8

FIGURE 8. *Pseudolechriops alleni*, **new species**: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male (a–c , line = 1.0 mm), d. dorsal (left) and lateral (right) views of entire male aedeagus (line = 0.5 mm).

Description: Holotype male: Black, except apex of rostrum, antennae, base of hind femora and apex of hind tibiae, tarsi, anterior and middle legs reddish brown; from above (Fig. 8a), setae mostly hair like and white, elytra with transverse band of setae at bases of elytral intervals extending anterior to humeri to lateral margins, setae extending along intervals 1–2 to beyond middle, more conspicuous in a vague white spot beyond middle; pronotum with hair like setae, transparent and inconspicuous from above, except at sides with indistinct area of white setae; head glabrous above, front with dense white setae between eyes and extending on rostrum to antennal insertions; beneath and on sides moderately densely and uniformly covered with white setae, denser on epimera, sparser on middle of abdominal sternite 1 and on sternite 5; external faces of anterior and middle

femora rather densely covered with fine white setae, setae somewhat sparser on posterior femora and tibiae; 2.6 mm long.

Head prominent, about 3/4 as long as pronotum, dorsally finely punctate, with medial carina, eyes arcuately rounded, as wide as pronotum at apex; from front (Fig. 8c), eyes rather widely separated for almost their entire length with shallow linear depression along midline, rostrum expanding basally with antennae inserted at middle, narrow and polished distal to antennal insertions, carinate along midline above antennal insertions, from side nearly straight. Pronotum from above nearly conical, base 1/3 wider than apex, from lateral view nearly flat, disc somewhat coarsely punctate, with fine medial carina and small glabrous spot along midline just before middle. Elytra together about 1/4 broader than pronotum, widest behind humeri, 1/3 longer than wide, lateral margins very weakly arcuate, narrowing only slightly to near apices, apices broadly, separately rounded. Mesosternum with well-defined groove with low ridges to receive rostrum continuing to excavate and carinate anterior margin of metasternum; metasternum narrowly incised along midline to abdomen. Abdomen with first and anterior 1/2 of second ventral sternite weakly depressed along midline; sternite 5 convex. Femora unarmed, posterior femora with very fine carina only at basal 1/4; posterior tibiae terete (Fig. 8b).

Holotype male: **Costa Rica:** Heredia Pr., Est. Biol. La Selva., 50–150 m, INBio-OET, 10º 26' N 84º 01' W, 09.05.2002, L.M. LaPierre, ex *Cecropia insignis*, ID #: (INBC).

Paratype: Same data as Holotype, except 10.1997, and "see records Cins 97.28" (CHAH).

Etymology: Named in honor of Robert L. Allen, nature photographer, author and biology professor in California, who encouraged LaPierre's interest in insects during high school.

Discussion: The aedeagus of the teneral paratype is pale transparent brown, darker in the middle 1/3, and is illustrated in Figure 8d, and the paratype is 2.7 mm long. *Pseudolechriops alleni* resembles *P. janeae* in having conspicuous white setae on the front and in the pattern of white setae on the elytra, but it is black rather than brown and the setae on the lateral portions of the pronotum are not condensed into a well-defined oblique stripe. This species has been reared from live petioles of juvenile *Cecropia* (see Table 1 and the Discussion section for more detailed information).

9. *Pseudolechriops wrightae* Hespenheide & LaPierre, new species

Fig. 9, a–d

Diagnosis: Black except tip of rostrum, tarsi, anterior tibiae and base of posterior femora reddish brown; posterior tibiae slender, subcylindrical, not conspicuously flattened; from above slender, subcylindrical, with elytra not conspicuously wider than base of pronotum; setae on sides of pronotum dense, forming a well-defined oblique white stripe from base of eyes to anterior to elytral humeri; elytra with only conspicuous transverse white fascia at

base; males with white setae on rostrum above antennal insertions to middle of eyes, females glabrous; Costa Rica.

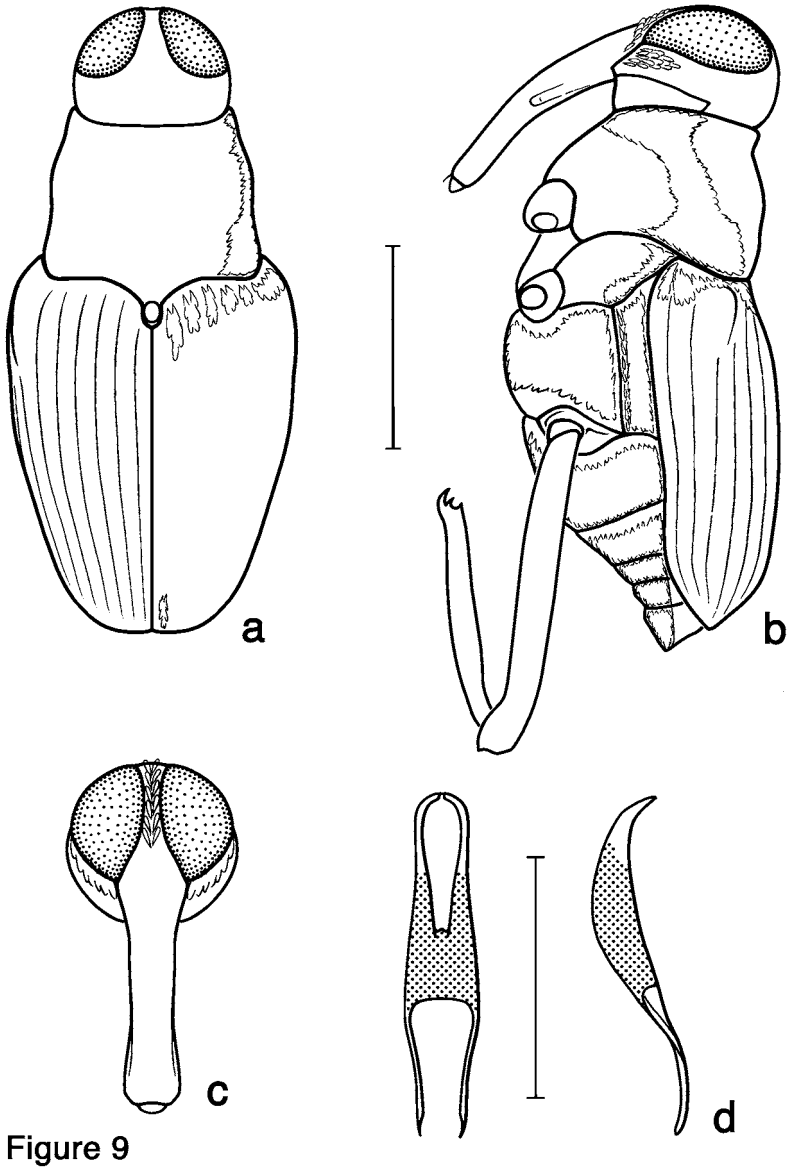

Figure 9

FIGURE 9. *Pseudolechriops wrightae*, **new species**: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male (a–c , line = 1.0 mm), d. dorsal (left) and lateral (right) views of entire male aedeagus (line = 0.5 mm).

Description: Holotype female: Intense black, except apex of rostrum, antennae, tarsi, and anterior tibiae reddish brown; from above (Fig. 9a), setae mostly slender and white, elytra with transverse band of broader white setae at bases of elytral intervals extending anterior to humeri to lateral margins, setae extending slightly farther along intervals 2–4, short line of white setae on interval 1 at elytral apices, setae otherwise dark and inconspic-

uous; pronotum with white setae, visible from above only at posterior angles, sides (Fig. 9b) with irregular band of denser white setae; head glabrous except for white setae behind lower margins of eyes; beneath moderately densely and uniformly covered with white setae except glabrous on epimera and area above anterior coxae, denser on episterna and sides of metasternum, sparser on middle of metasternum and abdominal sternite 1; external faces of middle femora, apical 1/2 of anterior femora, and basal 1/2 of posterior femora rather densely covered with fine white setae, setae otherwise inconspicuous on legs; 3.1 mm long.

Head prominent, about 2/3 as long as pronotum, dorsally finely punctate, with medial carina, eyes arcuately rounded, as wide as pronotum at apex; from front (Fig. 9c), eyes rather widely separated for almost their entire length with shallow depression along midline, rostrum with antennae inserted at middle, narrow and polished distal to antennal insertions, expanding above antennal insertions, sharply carinate along midline and finely punctate laterally, from side nearly straight. Pronotum from above nearly conical, base only slightly wider than apex, in lateral view above nearly flat except for depression behind anterior margin, disc somewhat coarsely punctate with punctures somewhat confluent, with distinct medial carina along midline. Elytra together about 1/3 broader than pronotum, widest behind humeri, 1/3 longer than wide, lateral margins very weakly arcuate, narrowing regularly to near apices, apices broadly, separately rounded. Mesosternum with well-defined groove with low ridges to receive rostrum continuing to slightly excavate and carinate anterior margin of metasternum; metasternum narrowly incised along midline to abdomen. Abdomen with first ventral sternite very weakly, narrowly depressed along midline. Femora unarmed, posterior femora (Fig. 9b) with very fine carina only at base; posterior tibiae laterally compressed but not broadened.

Allotype male: As holotype except eyes somewhat more widely spaced and raised below middle, covered with moderately dense white setae from middle of eyes and on rostrum to antennal insertions; setae on sides of pronotum dense but more extensive and less clearly forming definite stripe; 2.7 mm long; aedeagus dark brown (Fig. 9d).

Holotype female: **Costa Rica:** Alajuela Prov., Boca Tapada de San Carlos, 200 m elev, 10º 38’ N 84º 14’ W, 12.05.2002, L.M. LaPierre, coll ex mature petioles of *Cecropia polyphlebia* (INBC).

Allotype male: Same data as holotype (INBC).

Paratypes: **Costa Rica:** Same data as holotype (1, LMLC). **Panamá**: Pmá. Pr., 8 km NE Cerro Jefe, 700 m, 27.03.1976, H.P.Stockwell (1, CHAH).

Etymology: Named in honor of Pamela M. Wright, best friend and wife of LaPierre, who assisted in his study of this and other *Cecropia* herbivores.

Discussion: This species has been reared from live petioles of adult *Cecropia* (see Table 1 and the Discussion section for more detailed information). The data for the types list *C. polyphlebia* Donn. Sm. as the host, but this is an error. The host is probably *C. hispidissima* Trécul, based on the description in Berg & Franco Rosselli (2005).

10. *Pseudolechriops coleyae* Hespenheide & LaPierre, new species
Fig. 10, a–d

Diagnosis: Largely reddish brown, except head and base of rostrum, disc of pronotum and elytra, and posterior tibiae and apical ½ of posterior femora black; posterior tibiae slender, subcylindrical, not conspicuously flattened; from above slender, subcylindrical, with elytra not conspicuously wider than base of pronotum; setae on sides of pronotum dense, forming a well-defined oblique white stripe from base of eyes to anterior to elytral humeri; elytra without conspicuous basal fascia, with posthumeral marginal spot and weak sutural spot beyond middle; eyes narrowly separated, rostrum not sexually dimorphic, glabrous above antennal insertions; Nicaragua to Panamá.

Description: Holotype male: Dark reddish brown, except darker and nearly black on head and rostrum above antennal insertions, disc of pronotum, distal 2/3 and basal 1/3 of elytra along suture, distal half of hind femora and most of hind tibiae, tarsi, anterior and middle legs, and antennae paler reddish brown; from above (Fig. 10a), setae mostly hair like, transparent and inconspicuous, except short patches of white setae at middle on elytral interval 2, along suture on elytral intervals 1–2 just before apices, and in transverse fascia of white setae on outer three intervals of lateral margins behind humeri; pronotum above with band of whitish setae anterior to basal margin and sides with oblique stripe of dense white setae extending from apical margin behind base of eyes to dorsal posterior angles (Fig. 10b); head glabrous except front with sparse white setae between eyes on upper half; beneath moderately densely covered with white setae on sides of metasternum and metepimera and more sparsely on abdominal sternites; external faces of distal 1/3 of anterior and middle femora rather densely covered with fine white setae, setae on anterior and middle tibiae and posterior legs inconspicuous, appearing glabrous; 2.45 mm long.

Head prominent, about 2/3 as long as pronotum, dorsally finely punctate, with fine medial carina, eyes arcuately rounded, as wide as pronotum at apex; from front (Fig. 10c), eyes narrowly separated for their entire length, rostrum with antennae inserted just above middle, narrow and polished distal to antennal insertions, expanding somewhat basally and sparsely, finely punctate and carinate along midline, from side nearly straight. Pronotum from above nearly conical, base only slightly wider than apex, from side nearly flat, disc finely punctate, with fine medial carina. Elytra together about 1/3 broader than pronotum, widest behind humeri, 1/3 longer than wide, lateral margins very weakly arcuate, narrowing only slightly to near apices, apices broadly, nearly conjointly rounded. Mesosternum with well-defined groove with low ridges to receive rostrum continuing to excavate and carinate anterior margin of metasternum; metasternum narrowly incised along midline to abdomen. Abdomen with first ventral sternite weakly, narrowly depressed along midline on posterior 1/2, second sternite also weakly, narrowly depressed on anterior 1/2. Femora unarmed, posterior femora (Fig. 10b) with very weak carina on basal 1/2; posterior tibiae only slightly flattened, almost terete. Aedeagus pale transparent brown with dark interior tube (Fig. 10d).

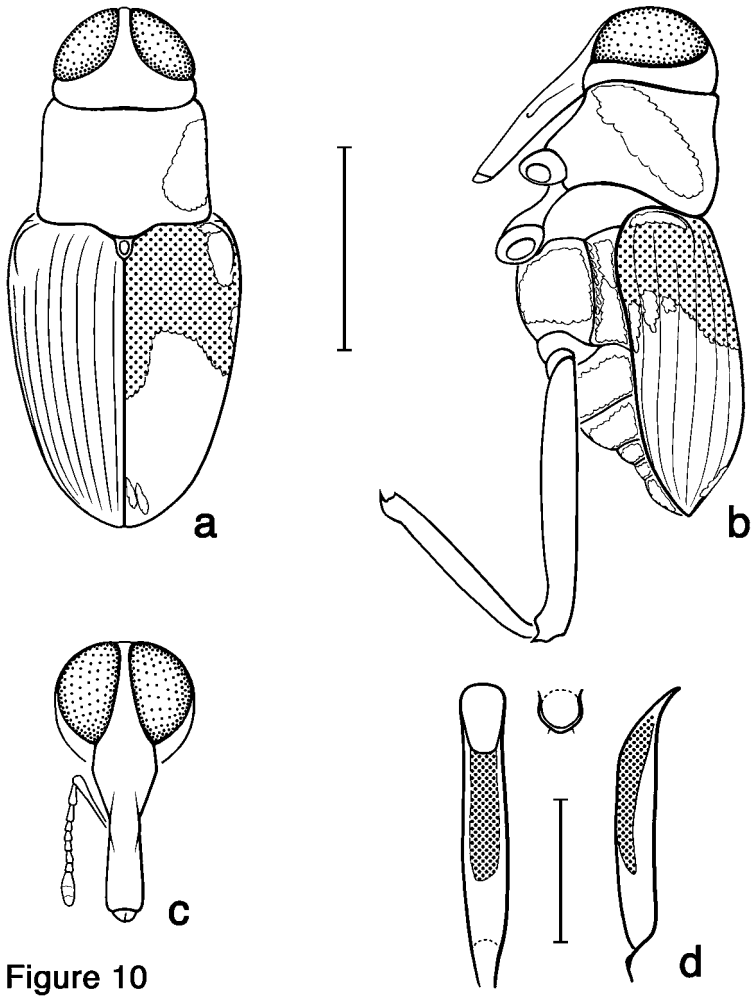

Figure 10

FIGURE 10. *Pseudolechriops coleyae*, **new species**: a. dorsal habitus, b. lateral habitus and hind leg, c. front of head of male (a–c , line = 1.0 mm), d. dorsal (left) and lateral (right) views of entire male aedeagus and apex (above; line = 0.5 mm).

Allotype female: As male; 2.8 mm long.

Holotype male: **Costa Rica:** Prov. Heredia, F. La Selva, 3 km S Pto. Viejo, 10º 26' N 84º 01' W, 05.04.1980, H.A. Hespenheide, *Cecropia* (INBC).

Allotype female: Same data as holotype, but 30.03.1984 (INBC).

Paratypes: **Costa Rica:** Prov. Guanacaste, Estac. Pitilla, 9 km S Santa Cecilia, 700 m, 330200-380200, 12.1989, C. Moraga & P. Rios (1, INBC), 04.1991, 02-19.03.1992, 21.03-07.04, 18-23.07.1993, P. Rios (6, INBC), 03.1990, P. Rios, C. Moraga & R. Blanco (1, INBC), 05.1990, II Curso Parataxon. (2, INBC), Fca. Pasmompa, 5 km SO Santa Cecilia, 400 m, L-N-333500-380600, 09.1992, C. Moraga (1, INBC), 14 km S Canas, 11–12.06.1991, F.D. Parker (1, CWOB); Heredia Pr., Est. Biol. La Selva., 50–150 m, INBio-

OET, 10º 26' N 84º 01' W, 07.1992 (11, INBC), 11–12.06.2003, L.M. LaPierre, on leaf undersides of juvenile *Cecropia obtusifolia* (2, CHAH), 20.08.1995, L.M. LaPierre, STR <3000m, underside *Cecropia obtus*. leaf (1, INBC, INBIOCRI002055829), 02.07, 21.08.1996, L.M. LaPierre, *Cecropia* (1, LMLC), 04-08, 17.07, 14–22.08.1996, 09.05.2002, L.M. LaPierre, [collected on] *Cecropia obtusifolia* (26, LMLC), 04-08, 14-16.07, 17–22.08.1996, 09.05.2002, L.M. LaPierre, [collected on] *Cecropia insignis* (7, LMLC), 09.05.2002, L.M. LaPierre, ID#[-], ex *Cecropia obtusifolia* (4, LMLC), 12.1997, 01.1998, L.M. LaPierre, ID#Cobt 97.79, 98.4 (6, LMLC), 10.11.1998, L.M. LaPierre, #98.258 (1, LMLC), 10, 11.1997, L.M. LaPierre, Cobt 97.47, 51.1–3, 79-1-4 (7, LMLC), 21.11.1999, L.M. LaPierre, ID#99.1112 Host: *Cecropia obtusifolia* (4, LMLC), 01.1998, L.M. LaPierre, ID#Cins98.2 (1, LMLC), 09.05.2002, L.M. LaPierre, ID#[-], ex *Cecropia insignis* (3, LMLC), 19, 25, 29.08.1996, L.M. LaPierre, #LS-84, 85, 86 [*Cecropia obtusifolia*], 102, 103 (5, LMLC), F. La Selva (or La Selva Biol. Sta.), 3 km S Pto. Viejo, 10º 26' N 84º 01' W, 10, 20, 24, 28, 30.07.1982, 30.03.1984, 27.03, 07.04.1988, 16, 21, 23, 27.07, 03, 06, 10.08.1992, 31.07.1993, 10.07.1994, H.A. Hespenheide, *Cecropia* (27, BMNH, CASC, CHAH, CWOB, CMNA), 11km SE La Virgen, 450–550 m, 10º 20' N 84º 04' W, 12–14.04.2003, E.G. Riley (1, TAMU); Prov. Limon, R.B. Hitoy Cerere, Send. Rompe Pechos, 400 m, Red de Golpe LS 400250 571500, 19.08.2002, W. Arana (1, INBC); Puntarenas Pr., Osa Peninsula, 5 mi S Rincon, 08º 42' N 83º 29' W., 28.07.1968, H.A. Hespenheide, *Cecropia* (1, CHAH); Prov. Puntarenas, Est. Sirena, P.N. Corcovado, 0–100m, L-N-270500-508300, 21.03-21.04.1992, Z. Fuentes (1, INBC). **Panamá**: Bocas del Toro Pr., 2–5 km W Almirante, road to Ojo de Agua, 09º 17' N 82º 26' W, 06.07.1974, T.L. Erwin, D.R. Whitehead (1, USNM); Cocle Pr., La Mesa ab. El Valle de Anton, 850 m, 08º 37' N 80º 07' W, 28.07.1974, H.A. Hespenheide (1, CHAH), [Panamá Pr.] Canal Zone, 5 mi NW Gamboa, Canal Zone, 11.04.1970, H.P. Stockwell (1, CHAH), Madden Forest, mi 2.5, 09º 05' N 79º 37' W, 01.04.1970, H.A. Hespenheide, *Cecropia* (1, CHAH), mi 5.0, 09º 07' N 79º 38' W, 17.06.1971, H.A. Hespenheide (1, CHAH). **Nicaragua:** Rio San Juan Pr, Refugio Bartola, 16 km ESE El Castillo, 10º 58/59' N 84º 20/21' W, 25.04, 04, 10.05.1999, H.A. Hespenheide, *Cecropia* (5, CHAH, SEAN). Paratypes to be deposited in AMNH, CASC, EMEC, GBFM, LACM, MUCR.

Etymology: This species is named in honor of Phyllis D. Coley for her extensive study of the ecology of *Cecropia* (Coley 1983).

Discussion: Specimens measure 1.95–3.05 mm long (mean = 2.62 mm for 99 specimens). This species is the only one of the ten considered here that shows no obvious external sexual dimorphism. This species has been reared from live petioles of juvenile *Cecropia* (see Table 1 and the Discussion section for more detailed information).

Discussion

Biology of Pseudolechriops

The junior author has conducted extensive rearings from petioles (or leaf stalks) of the plant genus *Cecropia* and species of the other two genera of the family Cecropiaceae that occur in Costa Rica, *Coussapoa* Aubl. and *Pourouma* Aubl., as part of a larger study of leaf-feeding herbivores of those genera (LaPierre 2002). Larvae of all *Pseudolechriops* species, whose habits are known, feed in either live or dead petioles of the genus *Cecropia*. *Cecropia* is a genus of approximately 80 species associated with disturbed habitats and abundantly distributed throughout the Neotropics (Jordal & Kirkendall 1998, LaPierre 2002, Berg & Franco Rosselli 2005). The majority of the species in this genus are myrmecophytes having a mutualistic association with any of several ant genera, but most notably with species of *Azteca* (Longino 1991, Davidson & McKey 1993, Davidson 2005). This mutualism is typically characterized by the plants providing food (Müllerian bodies produced on trichilia at the bases of leaf petioles; Rickson 1976; but see Sagers *et al.* 2000) and shelter inside hollow internodes which the ants access through membranous prostomata. The ants in turn provide protection to the plant by reducing herbivore damage and vine encroachment (Janzen 1969, Schupp 1986, LaPierre 2002). Adult *Pseudolechriops* are usually encountered on the undersides of live *Cecropia* leaves and less often at the bases of petioles feeding on the Müllerian bodies (adult *Pseudolechriops* will readily take Müllerian bodies in the lab (LaPierre personal observation)). The genus *Pseudolechriops* has not been reared from stems or branches of *Cecropia* or from petioles of *Coussapoa* and *Pourouma* (Berg *et al.* 1990), although other weevil genera have been reared from these tissues or hosts; *e.g.*, *Ptous* (Cryptorhynchinae) from branches (Hespenheide & LaPierre 2002) and *Lissoderes* (Conoderinae) from live stems of *Cecropia* (Hespenheide 1987, LaPierre 2002, Weng *et al.* in press); *Lechriops*, *Eulechriops* and an undescribed genus from petioles of *Cecropia*, *Coussapoa* and *Pourouma* (Jordal & Kirkendall 1998, LaPierre 2002, Hespenheide and LaPierre personal observation).

Table 1 summarizes the host utilization among species of *Pseudolechriops* associated with *Cecropia* in Costa Rica. Species of *Pseudolechriops* can be separated into two ecological groups based on whether they feed as larvae inside live or dead petioles. It is interesting that these also distinguish the *megacephalus* and *colyae* species groups described above.

Pseudolechriops species exhibit a high degree of host specialization (Table 1). They appear to use a single *Cecropia* species as their host, with the exception of *P. howdenorum* which has been reared from dead petioles of two *Cecropia* species (*i.e.*, *C. insignis* Liebm. and *C. obtusifolia* Bertol.). They are further specialized on either adult or juvenile plants. For example, 30 of 51 petioles (58.8%) of adult *C. hispidissima* sampled from Boca Tapada (see Table 1 for locality data) showed evidence of damage by *P. wrightae* compared with no evidence in 78 petioles from juvenile plants sampled in the same area as the adult trees. In addition, 77 of 113 petioles (68.1%) sampled from juvenile *C. obtusifolia* at

La Selva showed evidence of damage by *P. coleyae*, compared to no evidence of this species in 633 petioles from adult trees sampled in the same area as the juvenile plants. These levels of host specialization are not uncommon among other herbivores associated with *Cecropia* (LaPierre 2002).

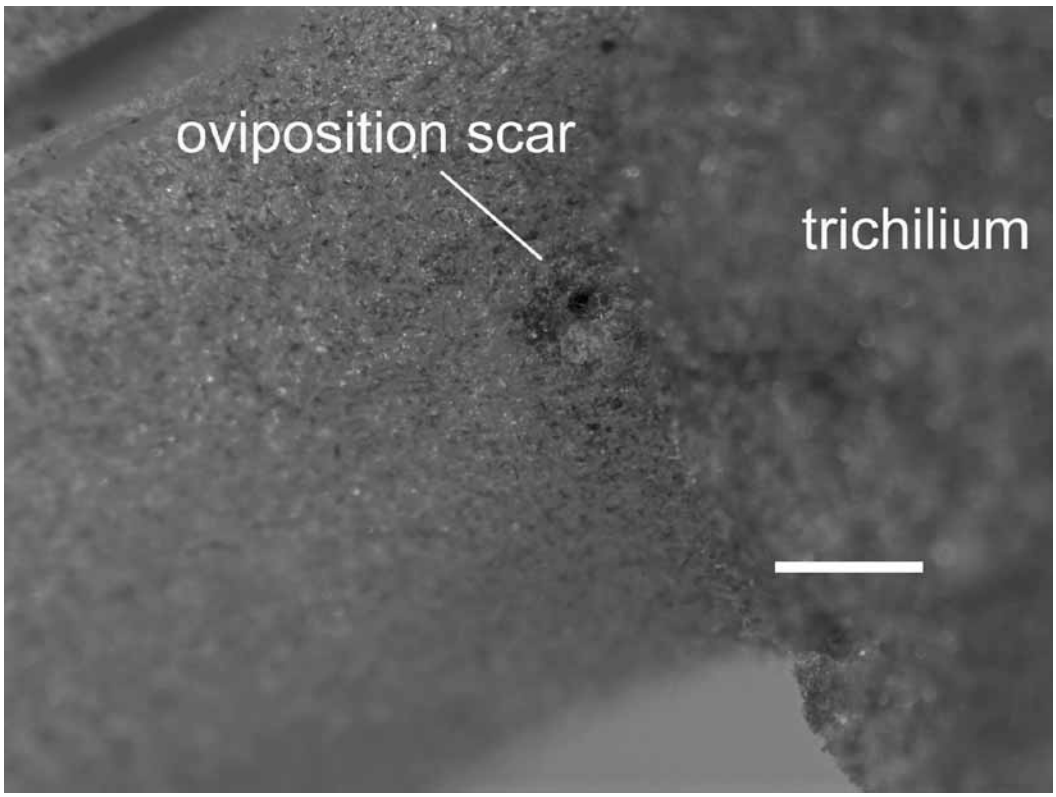

FIGURE 11. *Pseudolechriops coleyae* oviposition scar on a petiole at the margin of a trichilium (line = 1 mm).

The live petiole guild

Adults of species that utilize live petioles (*e.g., P. klopferi, P. coleyae, P. alleni, P. wrightae and P. janeae*; Table 1) typically oviposit into small depressions (approximately 0.25 mm in diameter) chewed into petioles along the outer margins of the Müllerian body-producing trichilia of young expanding leaves (Fig. 11). This behavior of chewing a depression prior to oviposition has been described for other weevil species (Howden 1995). Petioles at La Selva often exhibit evidence of more than one first instar larva, namely more than one oviposition scar and multiple feeding galleries of first instar larvae (mean = 2.1, range = 1–4; n = 24 petioles). But only one mature larva was encountered in each of 62 occupied petioles. This suggests that intra- and/or interspecific aggression occurs between later instars until only one larva survives, but no experiments have been performed to determine this. It is also unclear whether conspecific eggs on an individual petiole come from a single female or multiple females. If intraspecific aggression of early

instar larvae occurs, then multiple eggs probably originate from different females. Intraspecific aggression has been observed among larvae of *Lissoderes pusillus* Hespenheide, another *Cecropia*-specialist (Weng *et al.* in press).

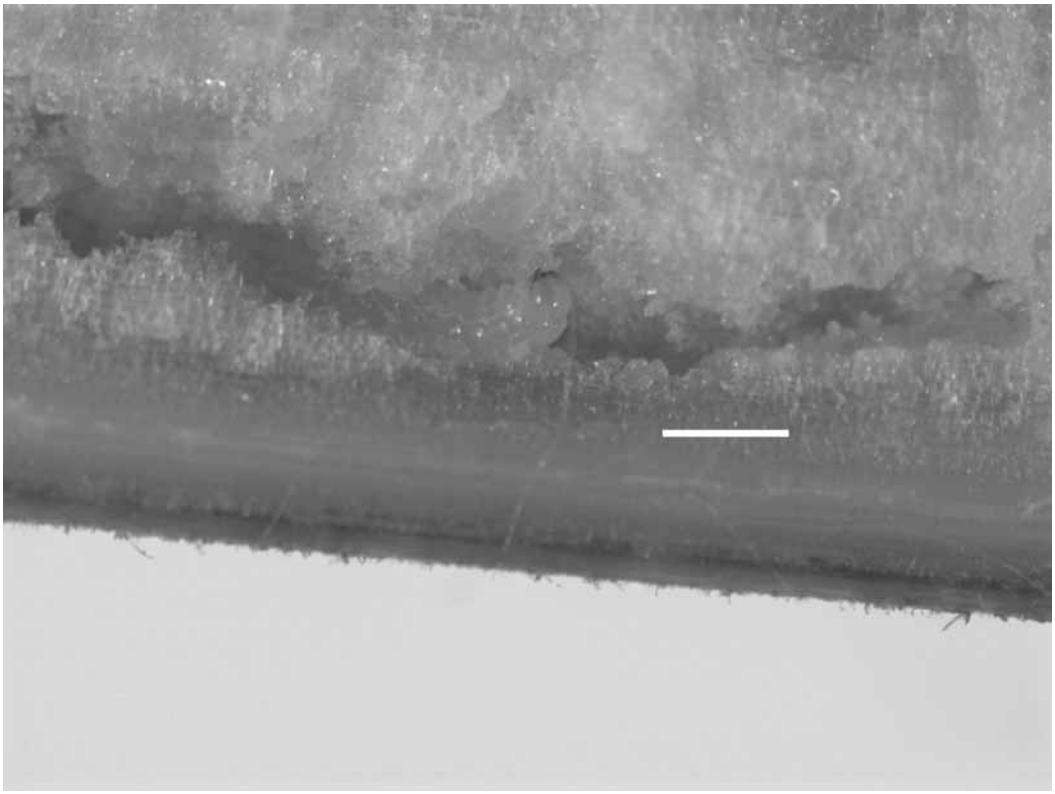

FIGURE 12. A live juvenile *Cecropia obtusifolia* petiole (l.s.) with an active *Pseudolechriops coleyae* larva feeding on the spongy parenchyma tissue (line = 1 mm).

Larvae bore through the center of the petiole along its entire length and feed primarily on the low-quality spongy parenchyma tissue or pith (Fig. 12). Larvae travel up and down the length of the petiole during the course of development and occasionally feed on cell layers surrounding the pith, presumably to take advantage of more nutritious tissue. Development of larvae to emergence (Fig. 13) as an adult was not measured precisely, but takes approximately three months. The feeding of larval *Pseudolechriops* in live petioles does not appear to weaken the petiole or shorten the leaf lifespan, although these were not compared directly. Leaf lifespans of juvenile *Cecropia* are approximately 3–4 months, and petioles of abscised leaves deteriorate quickly (Coley 1983, LaPierre personal observation).

Prior to pupating, larvae of *Pseudolechriops* create a pupal cell by plugging the gallery at either end with granular frass. Species feeding on live petioles show no preference in choosing a pupation site; for example, pupal sites of *P. coleyae* at La Selva were evenly distributed between the apical and basal half of the petiole (mean location as a proportion of petiole length as measured from the base = 0.48±0.32 S.D., N=19).

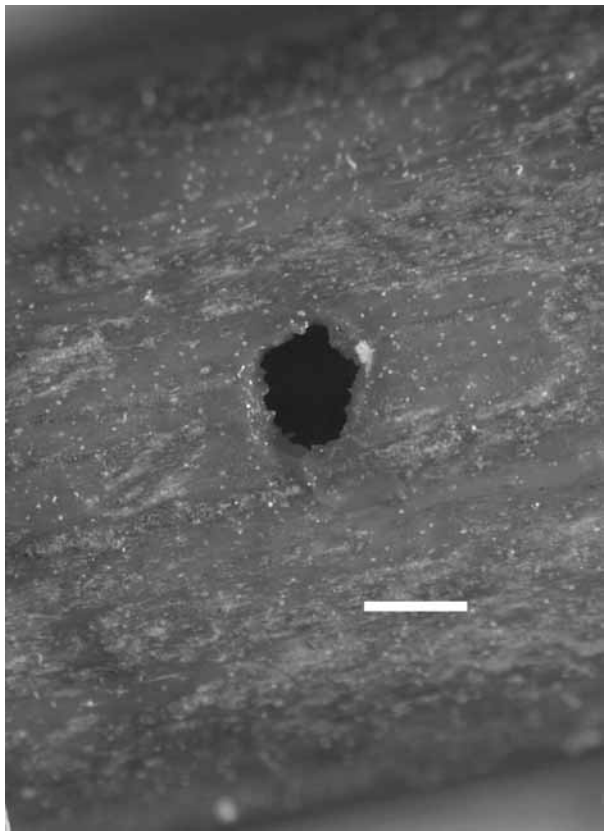

FIGURE 13. *Pseudolechriops coleyae* adult emergence hole (line = 1 mm).

The size of *Cecropia hispidissima* petioles preferred by *P. wrightae* was investigated at Boca Tapada (See Table 1). Among the petioles with larval feeding damage, the average length (73.47±11.77 cm, N=30) was significantly greater than that for intact petioles (64.95±11.70 cm, N=21; Mann-Whitney U test, p=0.01), suggesting a preference for larger petioles. The diameter of damaged petioles measured at the midpoint (1.52±0.27 cm, N=30) did not differ significantly from that of intact petioles (1.43±0.30 cm, N=21; Mann-Whitney U test, p = 0.28). Similar data were not collected for other reared *Pseudolechriops* species feeding in live petioles, but observations suggest similar preferences.

It is not clear why *P. wrightae* prefers larger petioles. All of the available expanded petioles sampled appeared to be large enough to support a developing larva. No more than a single larva of any *Pseudolechriops* species has ever been encountered feeding concurrently in a live petiole with other *Pseudolechriops* species, or with other petiole-boring insects for that matter. Petioles still attached to the tree with *Pseudolechriops* emergence holes are often colonized by predaceous ant genera (e.g., *Azteca* Forel [non-mutualist species], *Crematogaster* Lund, *Solenopsis* Westwood, and *Pseudomyrmex* Lund) which use the emergence holes to access the petiole interior. These aggressive ants may exclude other

insects from using the petiole, including additional *Pseudolechriops*, although petioles generally do not remain on a tree long enough to support two consecutive larval development cycles. Alternatively, it may be that the behavior of adult *Pseudolechriops* ovipositing in larger petioles serves to reduce levels of larval predation and parasitism or reduce the chance of premature leaf abscission in response to larval feeding.

Specialization among live petiole-feeding *Pseudolechriops* species between juvenile and adult *Cecropia* hosts may be influenced by *Azteca* colony occupation as a deterrent against weevils ovipositing. The rate of Müllerian body production is highest on the trichilia of expanding leaves and consequently *Azteca* workers spend a disproportionate amount of time defending them (Downhower 1975). It is at the distal edge of these young trichilia where *Pseudolechriops* oviposits. However, an inspection at La Selva of 127 petioles from adult myrmecophytic *Cecropia* lacking *Azteca* colonies produced no evidence of *Pseudolechriops* oviposition scars. But the apparent absence of an *Azteca* influence on *Pseudolechriops* in the present does not preclude a selective pressure by the ants upon the weevils in the past. LaPierre observed that myrmecophytic adult trees are infrequently encountered without mutualist ants, and the non-myrmecophytic *Cecropia* in this study, *C. hispidissima,* is the only species which hosts *P. wrightae,* the only confirmed live petiole borer of adult *Cecropia*.

Larvae of *Pseudolechriops* feeding in live petioles are parasitized by *Heterospilus* sp. (Braconidae: Doryctinae) and an undetermined species of the family Eurytomidae (LaPierre 2002).

The dead petiole guild

Adults of *Pseudolechriops howdenorum* and *P. davidsonae* oviposit on petioles of recently abscised leaves of adult *Cecropia insignis* and *C. obtusifolia*. Feeding damage by *P. howdenorum* does not appear until well after the leaf has abscised. Larvae of *P. howdenorum*, unlike species of *Pseudolechriops* that specialize on live petioles, restrict the majority of their feeding to the thicker, woodier base of dead petioles rather than feeding along their full length. Petioles of adult leaves are woodier than those of juvenile plants and therefore do not deteriorate as quickly.

In contrast to live petiole feeders which show no preference for pupation site, *P. howdenorum* and *P. davidsonae* form their pupal cells in the base of dead petioles, presumably because this region deteriorates more slowly and provides more protection from environmental damage or predaceous arthropods compared to the rest of the petiole.

Pseudolechriops howdenorum and *P. davidsonae* do not benefit from exclusive use of the petiole as do its congeners feeding in live petioles. The community of beetle herbivores feeding in dead petioles of adult *Cecropia* in Costa Rica includes Cerambycidae, Scolytinae and other genera of Conoderinae in addition to *Pseudolechriops* (Jordal & Kirkendall 1998, LaPierre 2002). Elateridae have also been reared from these petioles but may be predators of the petiole-boring fauna. Non-beetle inhabitants of dead *Cecropia* petioles include Diptera, Hymenoptera (Formicidae and Vespoidea), Isoptera, and Orthoptera.

Pseudolechriops *as possible mimics of* Azteca *ants*

Weevils in the subfamily Conoderinae have been hypothesized to participate in a number of mimicry complexes (Hespenheide 1973, 1995, 1996, 2005). It is possible that *Pseudolechriops* species are Batesian mimics of the *Azteca* mutualists of their *Cecropia* hosts. The size, overall color, and setal pattern of *Pseudolechriops* produce a resemblance to *Azteca* workers. Moreover, *Pseudolechriops* are frequently observed on the undersides of leaves in company with *Azteca*, and are difficult to distinguish from the ants.

But why mimic *Azteca*? *Azteca* ants are noted for their aggressive behavior and habit of spraying formic acid into wounds created with their mandibles (Longino 1991, LaPierre, personal observation). Colonies generally maintain a constant presence on the surfaces of plants they inhabit, and often swarm immediately after the plant is disturbed. Although the colonies' broods inside the hollow stems are preyed on by a few specialized bird species (Carroll 1983, Stiles & Skutch 1989), individual ants on leaf surfaces are not targeted. Mimicry of ants by arthropods is not uncommon (Hespenheide 1984, 1986 and included references).

Are Pseudolechriops *rare?*

The Arthropods of La Selva (ALAS) Project has employed canopy fogging, Malaise trapping, light trapping and other methods to sample insects for the past 14 years (Longino & Colwell 1997). Although Conoderinae are well-represented in the samples, only two individual *Pseudolechriops* have been collected from 761 Malaise trap samples at the station and an additional 500 at 5 sites along a 2000m transect up the slopes of Volcán Barva. On the other hand, adults of several *Pseudolechriops* species treated here can be readily collected from the undersides of *Cecropia* leaves. The pattern of being rare in trap samples but common in specific microhabitats or on a specific host has been observed for other insects associated with *Cecropia*; *e.g.*, *Ptous* (Hespenheide & LaPierre 2002), leaf-mining beetles (Hespenheide and LaPierre personal observation), bark beetles (*Scolytodes cecropicolens* Wood, LaPierre personal observation) and certain ants (Longino *et al.* 2002). Such species have been termed "methodological edge" species (Longino *et al.* 2002) or "inefficiently sampled" species (Novotny & Basset 2000), and represent one of the difficulties in biodiversity assessment. Without knowledge of the biological relationship of these species with their hosts, their rarity in samples might cause them to be dismissed as "tourists" in more general biodiversity samples (Ødegaard 2004).

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