

- WALDE, S. J., AND W. W. MURDOCH. 1988. Spatial density-dependence in parasitoids. *Annu. Rev. Ent.* 33: 441-466.
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## THE PYCOMERINI (COLEOPTERA: COLYDIIDAE) OF THE WEST INDIES

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### ABSTRACT

Eight species of *Pycnomerus* Erichson are recorded from the West Indies. A lectotype is designated for *Penthelispa longior* Grouvelle, which is placed in synonymy with *Penthelispa infima* Grouvelle as *Pycnomerus infimus* NEW SYNONYMY, NEW COMBINATION. A lectotype is designated and the type locality restricted to Puerto Rico for *Penthelispa corpulenta* Reitter, with *Penthelispa aequicollis* Reitter placed as a junior synonym, under the name *Pycnomerus corpulentus* NEW SYNONYMY, NEW COMBINATION. A lectotype is designated for *Pycnomerus biimpressus* Reitter. The following species are described as NEW SPECIES: *P. annae* (Jamaica), *P. darlingtoni* (Jamaica), *P. hottae* (Haiti), *P. uniformis* (Guadeloupe), and *P. valentinei* (Hispaniola). A key and illustrations are provided for the identification of adults of West Indian *Pycnomerus* species.

### RESUMEN

Se registran ocho especies de *Pycnomerus* Erichson en las Indias Occidentales. Se designa el lectotipo de *Penthelispa longior* Grouvelle, cual especie está reconocida como sinónimo de *Penthelispa infima* Grouvelle NUEVO SINÓNIMO, y está listada como *Pycnomerus infima* (Grouvelle) NUEVO COMBINACIÓN. Se designa el lectotipo de *Penthelispa corpulenta* Reitter, y la localidad del tipo está limitada a Puerto Rico. *Penthelispa aequicollis* Reitter se reconoce como sinónimo de esta especie y aparece como *Pycnomerus corpulentus* (Reitter) NUEVO SINÓNIMO, NUEVA COMBINACIÓN. Se designa el lectotipo de *Pycnomerus biimpressus* Reitter. Se describen cinco NUEVAS ESPECIES: *P. annae* (Jamaica), *P. darlingtoni* (Jamaica), *P. hottae* (Haiti), *P. uniformis* (Guadalupe), y *P. valentinei* (La Española). Hay ilustraciones y una tabla diagnóstica para facilitar la identificación de los adultos de las especies de *Pycnomerus* de las Indias Occidentales.

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The Colydiidae are a small family of Tenebrionoidea, poorly understood at all taxonomic levels, due in large part to the artificiality of the family in classical usage, and the large number of taxa transferred in and out of the family in recent years (Ivie & Ślipiński, in press a). The recent redefinition of the family (Lawrence 1980) and its tribes (Ślipiński & Burakowski 1988) and the cataloging of included genera (Ivie & Ślipiński, in press a) provide a framework within which to produce taxonomic data on poorly studied faunas.

The colydiids of the Neotropics are virtually unknown, and the West Indian species are no exception. No comprehensive treatment of any group of colydiids has been published for the West Indies, and only isolated descriptions, many inadequate, are available for identification purposes. We hope this will be the first in a series of papers eventually covering all West Indian members of this family.

The *Pycnomerini* are a small tribe, with 3 currently recognized genera. Only the cosmopolitan *Pycnomerus* occurs in the West Indies. For a definition of the tribe see Ślipiński & Burakowski (1988), and for a key to the genera, Ivie & Ślipiński (in press b).

*Penthelispa* Pascoe, here considered a synonym of *Pycnomerus*, has been recognized as distinct from *Pycnomerus* on the basis of a 2 versus 1 segmented antennal club. The fallacy of this division was recognized by Sharp (1894) and Grouvelle (1908) who synonymized them. The fact that the 1 segmented club is actually a very close association of segments 10 and 11, and that intergrades between the loose and tight clubs occur, makes it impossible to recognize 2 monophyletic lineages on this single character. Hetschko (1930) and subsequent workers ignored Sharp's action, until *Penthelispa* was returned to synonymy by Ślipiński (1984). Dajoz' (1977: 175) assertion that the 2 are separated by a ciliate fovea on the submentum of *Pycnomerus* is proved incorrect by the presence of this sexual character in American loose-clubbed species, and none of his key characters purporting to separate the 2 have any usefulness at the generic level.

Blackwelder (1945) listed 6 species of *Pycnomerus* and *Penthelispa* from the West Indies. One of these, *P. exaratus* (Chevrolat) has been moved to *Philothermus* (Cerylonidae) (Ślipiński, in press); 1 (*armata* Erichson 1845: 291) is a nomen nudum; 2 others have been found to be synonyms (see below); and 1 additional species, listed by Blackwelder (1945) from "Central America" has been found to be West Indian. To these 3 remaining described species, we add 5 more. These 8 species constitute a major portion of the 22 currently recognized Neotropical species, although there are undoubtedly many mainland species yet to be described.

Of the West Indian species, 2 are widespread both on several islands and the Neotropical mainland, with 5 of the remaining 6 apparently being highland forms, each endemic to a single island. The last occurs on 2 of the high islands of the Lesser Antilles. Champion's (1898) record of *Penthelispa* sp. from St. Vincent remains of unknown identity, as we saw no specimens from that island.

*Pycnomerus* are associated with dead, decaying wood in moist forests. They can often be found in considerable numbers in such habitats, but they are often overlooked due to their small size, brown color, and sluggish movements. Although specimens have been seen from only the larger islands of the Greater and Lesser Antilles, *Pycnomerus* probably occurs on any island supporting moist tropical forest. The general absence of specimens from Cuba is of interest (only 2 specimens have been seen from Cuba). This large, moist, forested island must be home to more species than are reported here.

The actual food of all *Pycnomerus* is probably fungi (Ślipiński 1984), and neither adult nor larval morphology (Dajoz' 1977, Nikitsky & Belov 1980) give any indication of support for Dajoz's (1977: 178) assertion that *Pycnomerus* "c'est sans doute un prédateur de Microarthropods". The mandibles and other mouthparts are clearly of a form useful in crushing fungi or decayed wood, and are not fitted for a predatory lifestyle. Examination of gut contents of preserved material showed no arthropod parts, but

considerable wood and/or fungal material. Label data recorded below and personal observation (MAI) support the fungivorous habit of this genus.

Material utilized for this study is deposited in several collections and is cited in the text with the following acronyms: AMNH—American Museum of Natural History, New York, USA. CASC—California Academy of Science, San Francisco, USA. CNCI—Biosystematics Research Centre, Agriculture Canada, Ottawa, Canada. FSCA—Florida State Collection of Arthropods, Gainesville, USA. IJAM—Institute of Jamaica, Kingston, Jamaica. INHS—Illinois Natural History Survey, Urbana, USA. IZPN—Institute of Zoology, Polish Academy of Science, Warsaw, Poland. HFCM—H. Franz, private collection, Mödling, Austria. MAIC—Michael A. Ivie, private collection, Bozeman, Montana, USA. MCZC—Museum of Comparative Zoology, Cambridge, Massachusetts, USA. MHND—Museo Nacional de Historia Natural, Santo Domingo, Dominican Republic. MNHN—Museum National d'Histoire Naturelle, Paris, France. NMNH—United States National Museum of Natural History, Washington. RSMC—Richard S. Miller, private collection, Columbus, Ohio, USA.

#### KEY TO THE SPECIES OF WEST INDIAN *PYCNOMERUS*

1. Antennomeres 10 and 11 fused into a 1-segmented club (Fig. 1-4); pronotal disk with a pair of distinct longitudinally impressed lines (Fig. 1-4); pronotum at base with a pair of confluent irregular foveae opposite elytral striae 3 and 4 (Fig. 1-4) ..... 2
- 1'. Antennomeres 10 and 11 free, forming a loose 2-segmented club (Fig. 8-10, 12); pronotal disk with at most faint depressions (Fig. 8-11); pronotum with basal punctures either obsolete or uniform ..... 5
2. Elytron parallel-sided, at least 2.2X as long as wide and 2.3X as long as pronotum; interval 8 reaching anterior margin (Fig. 2); eyes normal, extending onto ventral portion of head. Widespread ..... *Pycnomerus biimpressus* Reitter
- 2'. Elytron rounded laterally, less than 2X as long as wide and 2X as long as pronotum; with interval 8 not reaching anterior margin (Fig. 1, 3, 4); eyes reduced, entirely lateral. Mountains of Greater Antilles ..... 3
3. Interstriae 6 and 8 fused at level of metacoxa or 1st visible sternite (Fig. 16); lateral margin of pronotum, in lateral view, markedly sinuate (Fig. 5). Mountains of Jamaica ..... *Pycnomerus annae* n. sp.
- 3'. Interstriae 6 and 8 fused at level of third visible sternite (Fig. 14); lateral margin of pronotum, in lateral view, nearly straight (Fig. 6-7) ..... 4
4. Pronotum with transverse medial sub-basal sulcus (Fig. 3); intervals costiform and uniform in area of fusion of 4, 5, and 6, not pustulate (Fig. 14); penultimate visible sternite impunctate medially (Fig. 15). Blue Mountains of Jamaica ..... *Pycnomerus darlingtoni* n. sp.
- 4'. Pronotum not bordered postero-medially (Fig. 4); intervals confused and indistinct in area of fusion of 4, 5, and 6, pustulate; penultimate visible sternite punctate medially (Fig. 17). La Hotte Peninsula of Haiti ..... *Pycnomerus hottae* n. sp.
5. Pronotum coarsely punctate, basal margin with line of coarse punctures, at least toward sides (Fig. 8-9) ..... 6
- 5'. Pronotum finely punctate; basal margin without line of punctures, not delimited (Fig. 10-11) ..... 7
6. Second elytral interval reaching anterior margin (Fig. 8), all intervals of equal prominence; stria punctures on elytral disk elongate, narrowed medially (Fig. 8, inset); last visible sternite flat, pronotum rounded laterally (Fig. 8). Hispaniola, Cuba? ..... *Pycnomerus valentinei* n. sp.

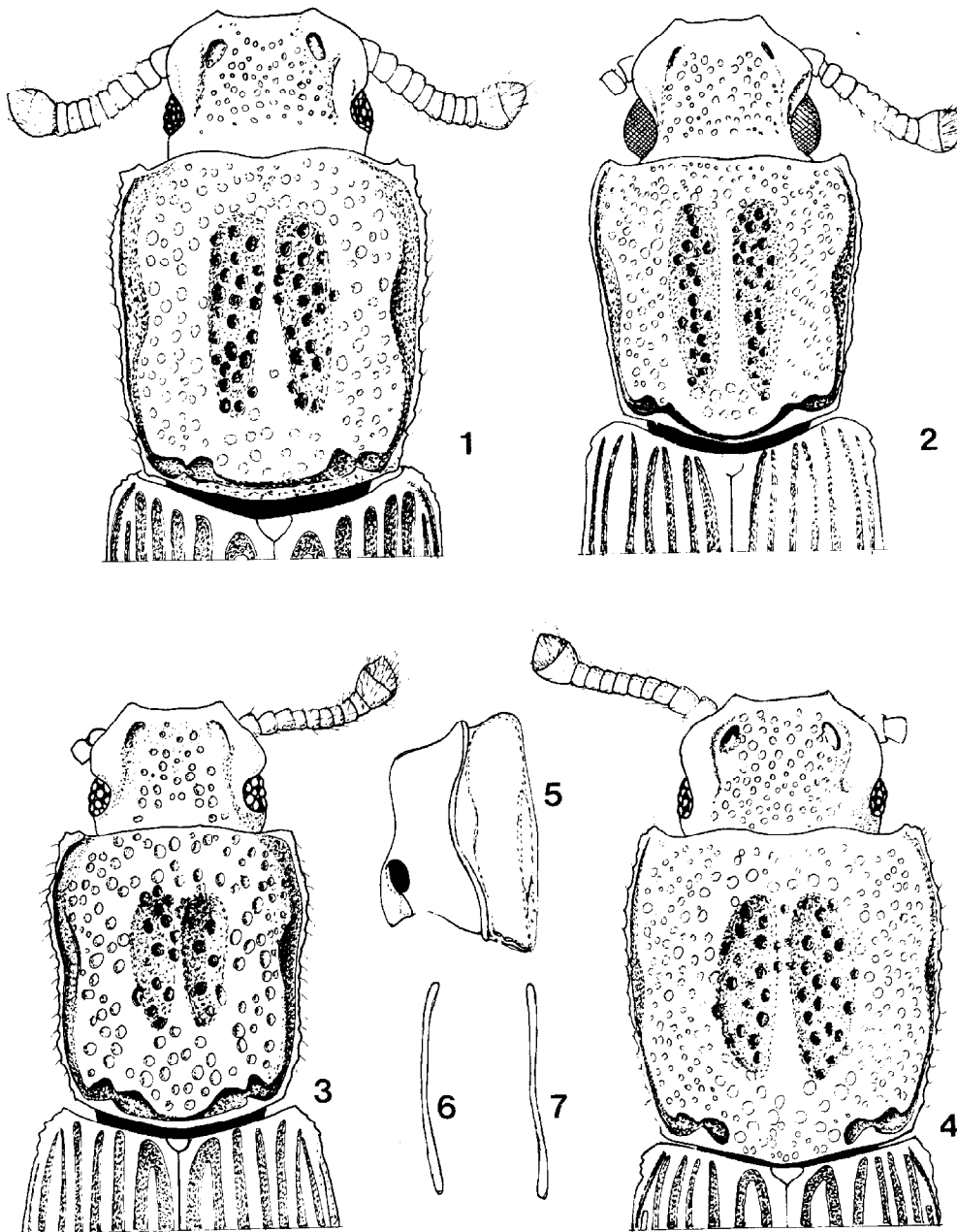


Fig. 1-7. *Pycnomerus* spp. 1-4) dorsal view. 1) *P. annae*; 2) *P. biimpressus*; 3) *P. darlingtoni*; 4) *P. hottae*. 5) *P. annae*, lateral view of pronotum. 6-7) shape of pronotal lateral margin in lateral view. 6) *P. hottae*; 7) *P. darlingtoni*.

- 6'. Second elytral interval not reaching anterior margin (Fig. 9), intervals 3, 5, and 7 more prominent than 4 and 6, with 6 especially less prominent on disk; striae punctures on elytral disk round (Fig. 9, inset); last visible sternite with arcuate concavity; pronotum weakly bisinuate laterally (Fig. 9). Puerto Rico ..... *Pycnomerus corpulentus* (Reitter)
7. Pronotal punctures round (Fig. 10); elytra less than 2.3X as long as wide, less than 2.5 X as long as pronotum; last visible sternite concave; length greater than 3 mm. Guadeloupe ..... *Pycnomerus uniformis* n. sp.

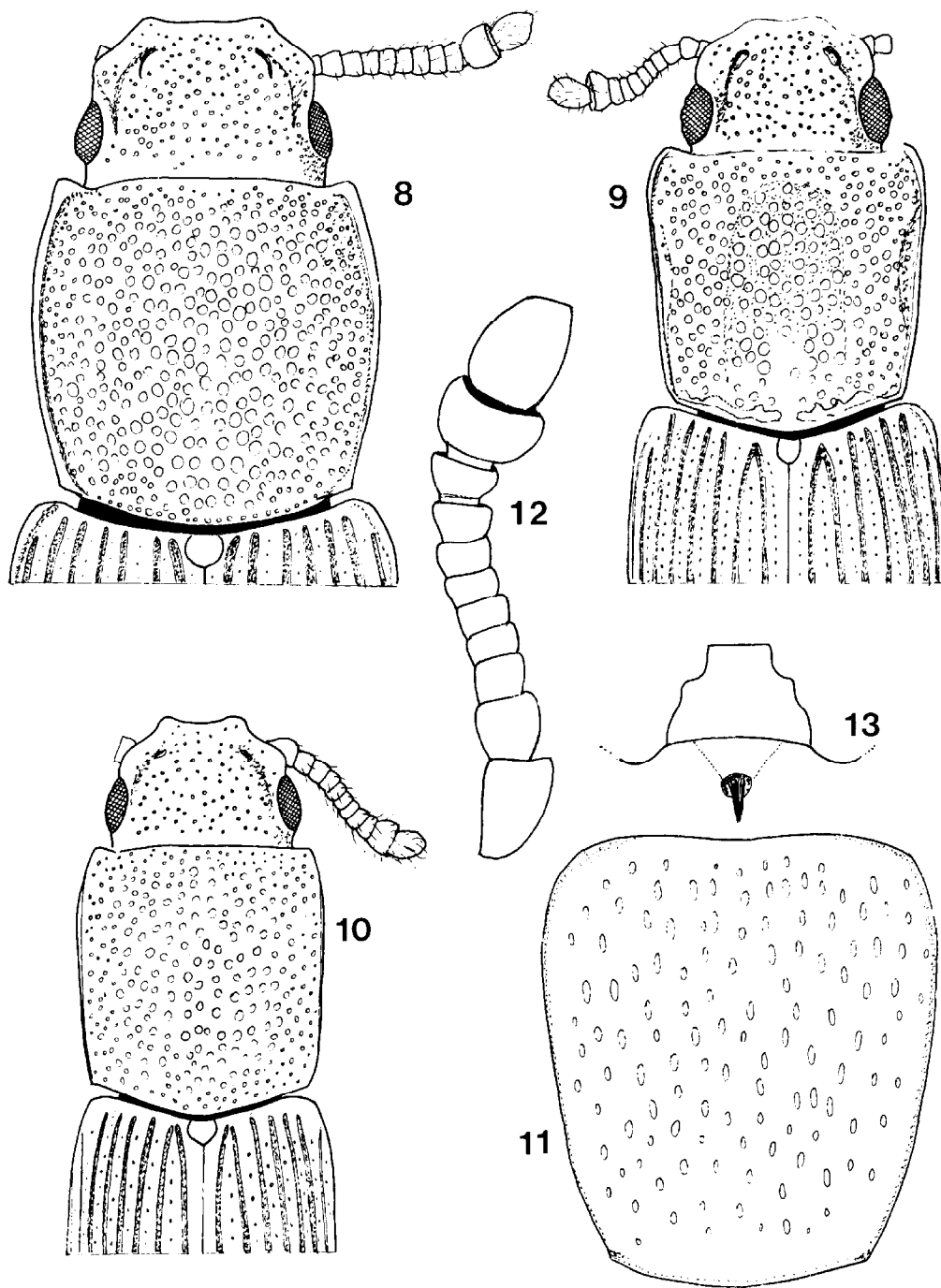


Fig. 8-13. *Pycnomerus* spp. 8-10) dorsal view. 8) *P. valentinei*; 9) *P. corpulentus*; 10) *P. uniformis*. 11-13) *P. infimus*. 11) pronotum; 12) antenna; 13) mentum and submental pit of male.

- 7'. Pronotal punctures shallowly elongate (Fig. 11); elytra more than 2.5X as long as wide, more than 2.7X as long as pronotum; last visible sternite flat; length less than 3 mm. Lesser Antilles ..... *Pycnomerus infimus* (Grouvelle)

*Pycnomerus biimpressus* 
 Reitter  
 (Fig. 2, 22)

*Pycnomerus biimpressus* 
 Reitter 1877: 355 [Puerto Rico, Lectotype in MNHN].

Hetschko 1930: 61. Blackwelder 1945: 472. Wolcott 1951: 316.

*Pycnomerus exaratus* 
 Champion 1898: 401 [not Chevrolat]. Wolcott 1951: 316.

Distribution: Cuba, Jamaica, Hispaniola, Puerto Rico, Tortola, Guadeloupe, Dominica, Martinique, St. Vincent, Grenada, Central and South America.

From the type series, a single, partial, card-mounted specimen, missing the head and prothorax, is in the MNHN. A second specimen, formerly mounted on the same pin is missing, but the card remains. This pin bears 4 labels as follows: "Brit. Mus./Portorico/ typ Reitter/ biimpressum Reitter". This partial specimen is here designated lectotype, and has been so labeled.

This widespread species is 1 of 4 in the West Indies belonging to the tight-clubbed group of *Pycnomerus*. The domed, biimpressed pronotum links all 4 of these West Indian species. The other 3 species (*P. hottae*, *P. annae*, and *P. darlingtoni*) are narrow-endemics to high mountains of the Greater Antilles, and it seems possible that *biimpressus* is the ancestor of the others, all of which share the incomplete elytral interval 8 and reduced eyes. Of these shared characters, the first is associated with loss of wings, and both loss of wings and reduction of eyes is common for montane West Indian endemics in a variety of groups. These characters are shared with an undescribed Andean species from Ecuador and Peru [CASC], which seems to belong to a different species group. No real phylogenetic conclusions can be drawn without a revision of the entire genus, an undertaking far beyond the scope of this work.

Diagnosis: The tight antennal club, with antenomeres 10 and 11 appearing as a single ball, the biimpressed pronotal disk (Fig. 2), the large eyes extending onto the ventral portion of the head, the elytra 2.2-2.3X as long as wide and 2.3-2.5X as long as the pronotum, and elytral interval 8 reaching anterior margin, will distinguish individuals of this species from those of all other known West Indian *Pycnomerus* spp. Some Greater Antillean specimens have the eyes somewhat smaller and the pronotum more strongly impressed than the Lesser Antillean populations, but this variation seems at most clinal in nature, as expected in a widespread species with island populations, and is not indicative of different taxa. Length 3.0-4.8 mm, male genitalia as in Fig. 22.

Material examined, in addition to type: BRAZIL: 1—[IZPN]. PERU: 1—Huanuco, 2500 m, Chinchao, 25 km below Carpish, 06 IX 1946, F. Woytkowski [AMNH]. GUATEMALA: 7—Coban, 4000 ft., 31 VII 1947, C. & P. Vaurie [AMNH, IZPN, MAIC]. CUBA: 1—Prov. Oriente, Gran Piedra Range, 30-31 V 1936, 2000-3000 ft., Darlington [MCZC]. JAMAICA: 4—Pt. Antonio, 7 I, A. E. Wright [IZPN, MCZC]. 5—Whitfield Hall, Blue Mts., nr. 4500 ft., 13-20 VIII 1934, Darlington [MCZC]. 1—Gordon Tn., 4 II 1937, sta. 382, Blackwelder and Chapin [NMNH]. 1—Whitfield Hall, Blue Mts, nr 4500 ft., 13-20 VIII 1934, Darlington [IZPN]. 1—Chincona, 26 II 1911 [AMNH]. 1—Hardwar Gap, 13 XI 1966, A. B. Gurney [NMNH]. 21—*ibid.*, 4000 ft., 5-29 VII 1966, Howden and Becker [CNCI]. 22—*ibid.*, 10-17 VII 1966, A. T. Howden [CNCI, IZPN, MAIC]. 14—*ibid.*, 16 XII 1972, J. Peck [CNCI, IZPN, MAIC]. 3—*ibid.*, 16 XII 1973, S. & J. Peck, under bark [CNCI]. 5—Portland Par., Hardwar Gap, 5 XII 1975, C. W. & L. O'Brien & Marshall [CASC]. 14—St. Andrew Par., Hardwar Gap, 6-8 XII 1975, G. F. Hevel [IZPN, MAIC, NMNH]. 1—St. Andrew Par., St. Peters, 18 VII 1966, A. T. Howden [CNCI]. 6—Blue Mountains, H. Franz [HFCM, IZPN]. HISPANIOLA: Haiti: 9—Furcy, W. M. Mann [IZPN, MCZC]. 1—Desbarriere, Massif La Hotte, nr. 4000 ft., 12-14 X 1934, Darlington [IZPN]. 6—La Visite & vic., La Selle Range, 5-7000 ft., 16-23 IX 1934, Darlington [MCZC]. 9—Dept. Sud-Oueste, Parc National La Visite, nr. Headquarters, 1880 m., 10 V 1984, M. C. Thomas, in rotting log

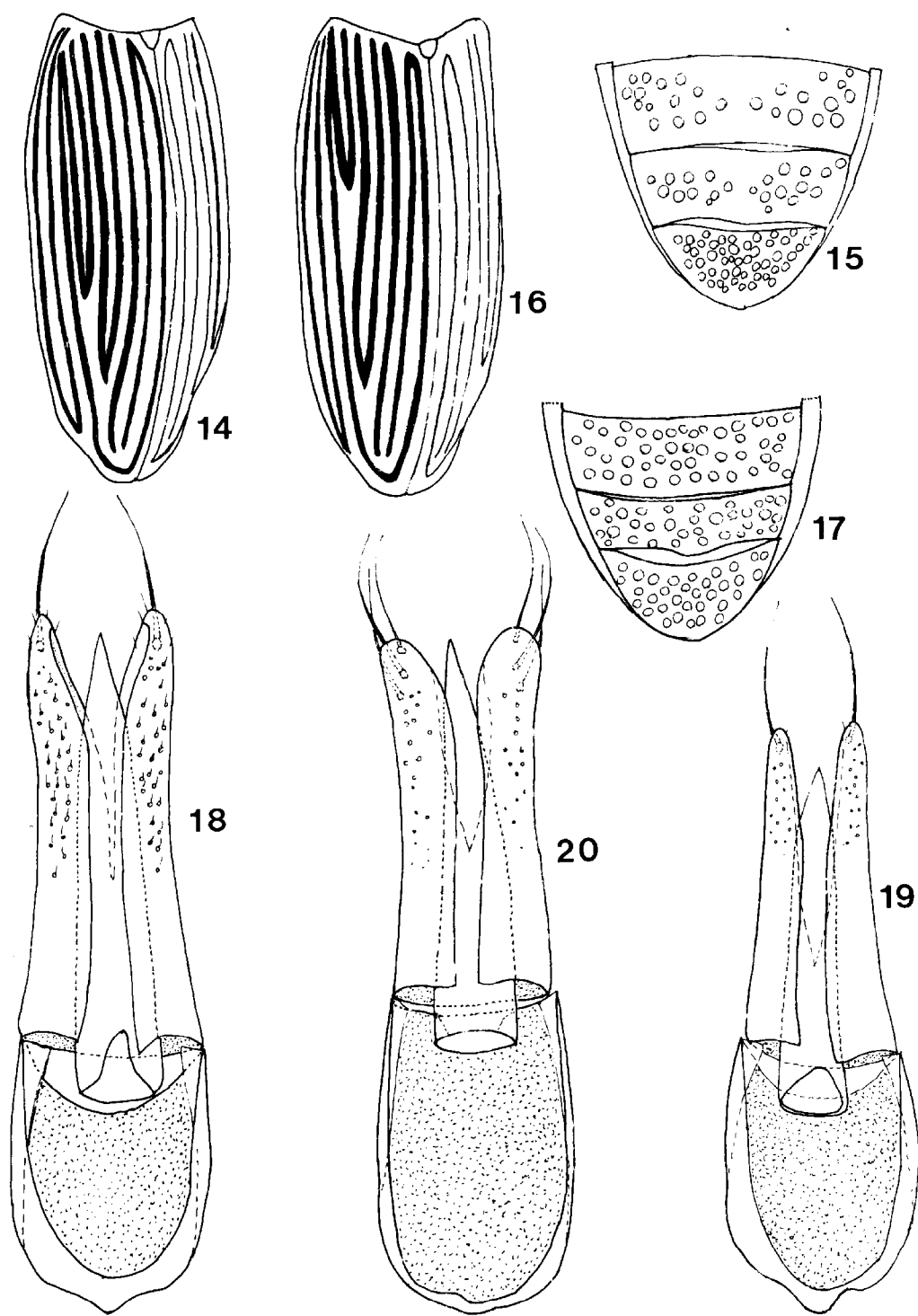


Fig. 14-20. *Pycnomerus* spp. 14-15) *P. darlingtoni*. 14) elytra in 3/4 lateral view; 15) visible sternites III-V. 16) *P. annae*, elytra in 3/4 lateral view. 17) *P. hottae*, visible sternites III-V. 18-20) male genitalia. 18) *P. valentinei*; 19) *P. corpulenta*; 20) *P. hottae*.

of *Pinus occidentalis* [FSCA, IZPN, MAIC]. 5—Dept. Sud-Oueste, Parc National La Visite, ca. 1km S. Roche Plat, 22 V 1984, M. C. Thomas [FSCA, IZPN, MAIC]. 1—Dept. Sud-Oueste, Massif de La Selle, Morne d'Enfer, 1850 m., 16 V 1984, M. C. Thomas [FSCA]. 5—Morne Gimby, 22 km SE Fond Verrettes, 8 VII 1956, 6500', B. & B. Valentine, Forêt des Pines, hardwood cloud forest, beating [MAIC, IZPN]. 1—Dept. l'Ouest, Fond Verrettes to Refuge, 28 V 1950, H. B. Mills [INHS]. HISPANIOLA: Dominican Republic: 1—Loma Vieja, ca. 6000 ft., S. Constanza, VIII 1938, Darlington [MCZC]. 2—Constanza, 3-4000 ft. VIII 1938, Darlington [IZPN, MCZC]. 3—San José de las Matas, 1-2000 ft., VI 1938, Darlington [IZPN, MAIC, MCZC]. PUERTO RICO: 1—El Yunque, c. 3000 ft., V 1938, Darlington [MCZC]. 9—El Yunque Sta., Luquillo Forest, 6-16 VII 1969, H. & A. Howden [CNCI, MAIC, IZPN]. 1—Cerro Dona Juana, Ponce, 28 XII 1966, ex *Polyporus zonalis*, S. Peck [IZPN]. 2—Maricao For. Res., Hwy 120, K11H8, 26 VII 1979, O'Briens & Marshall [IZPN, MAIC]. 5—Maricao For. Res., Hwy 120, K19H8, 25 VII 1979, L. O'Brien & Marshall [IZPN, MAIC]. 1—Caribbean Nat. For., El Yunque Hwy (191), K11H4, 29 VII 1979, G. B. Marshall, under bark [IZPN]. 3—El Yunque, Rt. 191, km 9.7, 16 VIII 1961 [NMNH]. 1—Guilarte For. Res., Hwy 131 & 158, 23 VII 1979, L. B. O'Brien [MAIC]. 1—Caribbean National Forest, 1km. S. Palmer, 200 m, 23 IX 1987, M. A. Ivie, under bark [MAIC]. TORTOLA (BRITISH VIRGIN IS.): 1—Mt. Sage Nat. Park, 460m, 7-8 XII 1985, S. & P. Miller [NMNH]. GUADELOUPE: 4—Gourbeyre [AMNH, MAIC]. DOMINICA: 19—Long Ditton, 14-19 VI 1911 [AMNH, IZPN, MAIC]. 1—St. Joseph Par., Wet Area Exp. Sta., 800 ft, 31 XII 1978, M. A. & L. L. Ivie [MAIC]. 2—4 mi S. Salisbury, 19 VIII 1986, C. W. & L. B. O'Brien [IZPN, MAIC]. 1—6 mi E. Dublanc, 16 VIII 1986, C. W. & L. B. O'Brien [MAIC]. 1—6 mi E. Salisbury, Morne Apion, 2500', 19 VIII 1986, C. W. & L. B. O'Brien. 1—N. Pont Cassé, 1500 ft., 25 VI 1969, P. J. Darlington, Jr. [MCZC]. MARTINIQUE: 4—12 km. N. Fort de France (N3), 23 VIII 1986, C. W. & L. B. O'Brien [IZPN, MAIC]. 1—5 km SE Morne Rouge, 24 VIII 1986, Forest Rd., C. W. & L. B. O'Brien [MAIC].

*Pycnomerus annae* NEW SPECIES

(Fig. 1, 5, 16, 21)

This is an extremely well marked species, apparently restricted to the mountains of Jamaica. The AMNH series from Montego Bay may represent a lowland population, but the meaning of the code number F2192 on the under side of the labels is unknown. The specimens were probably collected by L. B. Woodruff, but the location of his notebooks is unknown. These specimens are probably from the mountains south-east of Montego Bay.

*Pycnomerus annae* is sympatric with *P. biimpressus* at Hardwar Gap, elev. 1212 m., on the border of the Parishes of St. Andrew and Portland, and at Chincona, 1515 m., but seems to occupy the middle elevational habitats in Jamaica, with *P. biimpressus* below and *P. darlingtoni* above.

Diagnosis: the compact antennal club (Fig. 1), reduced eyes (Fig. 1), elytral intervals 2 (Fig. 1) and 8 (Fig. 16) not reaching anterior margin, and the fusion of intervals 6-8 at the level of metacoxa to 1st visible sternite (Fig. 16) will distinguish individuals of this species from those of all other West Indian *Pycnomerus*.

Description. Male: elongate oval, rufo-castaneous, wingless.

Head (Fig. 1) with surface finely punctate anterior to antennal insertions, coarsely umbilicate punctate behind; anterior margin weakly emarginate, angles square; frons with distinct depressions mediad of supra-antennal ridges; supra-antennal ridges distinctly punctate, narrow anterior to frontal depressions, wider laterad of depressions. Antenna (Fig. 1) with compact club of antennomeres 10 and 11; 10 slightly larger than



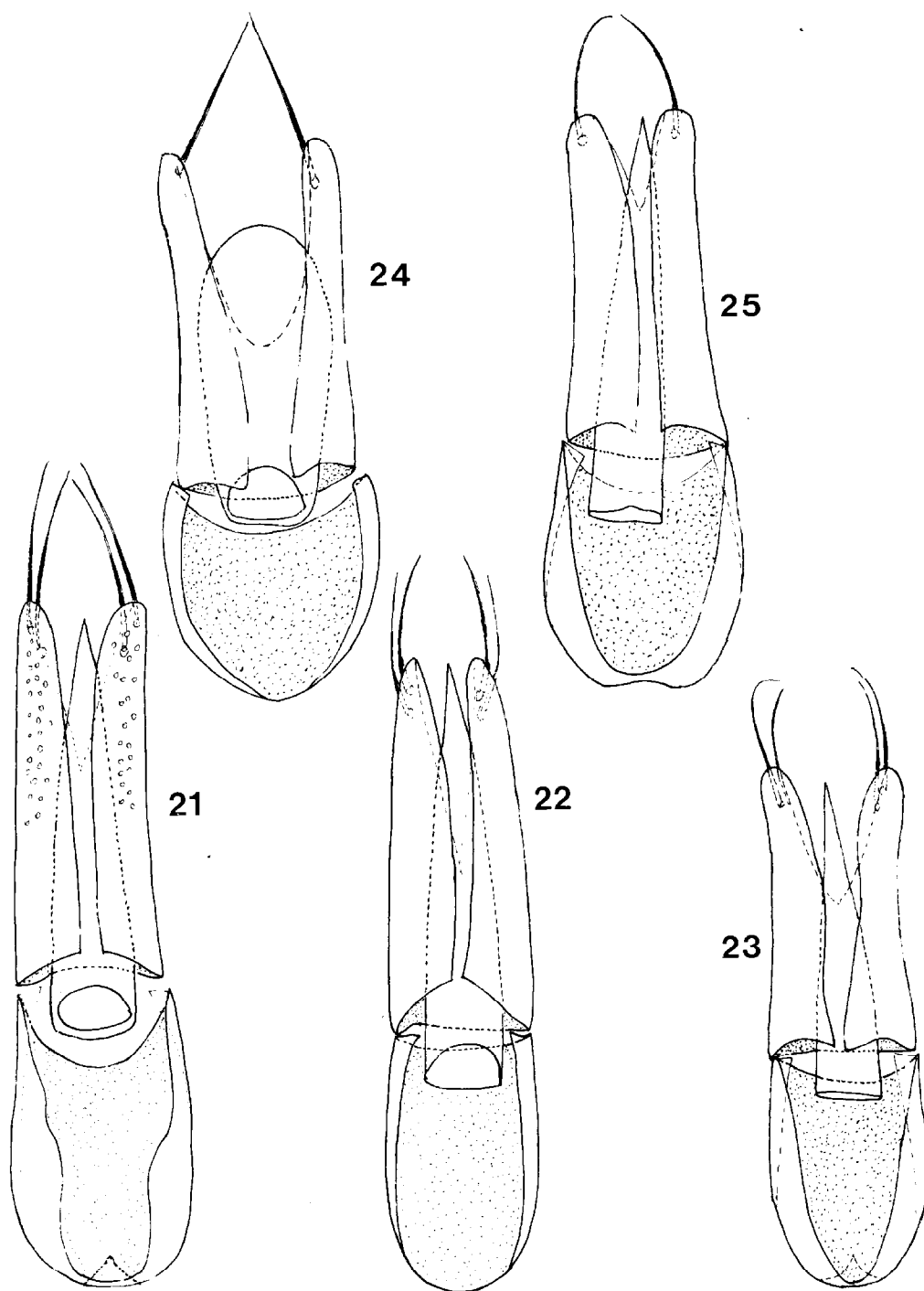


Fig. 21-25. *Pycnomerus* spp., male genitalia. 21) *P. annae*; 22) *P. biimpressus* 23) *P. darlingtoni*; 24) *P. infimus*; 25) *P. uniformis*.

11. Eye reduced (Fig. 1), approximately 13-15 facets, not extending below ventral edge of antennal insertion; antennal groove wide, shallow, well marked; submentum with small median ciliate fovea at anterior margin.

Pronotum (Fig. 1) nearly as wide as long, sides weakly bisinuate in dorsal view, distinctly sinuate in lateral view (Fig. 5); lateral margins distinctly crenulate, bordered above by a narrow sulcus, which is wider medially, making raised portion of disk narrowed medially; sulcus extending around anterior angles onto anterior margin; anterior angles distinctly produced, posterior angles rounded, not distinct; anterior margin distinctly bisinuate; posterior margin broadly rounded; disk distinctly impressed medially, with a longitudinal raised nearly impunctate callus dividing the depression into 2 impressed lines; a pair of large, confluent foveae, connected across base by a narrow sulcus present opposite elytral striae 3 and 4. Prosternum uniformly coarsely umbilicate punctate; metasternum short, subequal in length to mesofemur. Elytra 2X as long as broad, sides weakly rounded to subparallel from just behind humeri to declivity; humeral angles microdenticulate; striae punctures elongate, some slightly narrowed medially (Fig. 1, inset); intervals 2 and 8 not reaching anterior margin (Fig. 16); intervals 6-8 fused at level of hind coxae (Fig. 16); 4, 5, and 6 distinct and smooth in area of fusion (Fig. 16).

Abdomen coarsely umbilicate-punctate, punctures less coarse and dense medially on visible sternites 1-3; 4th visible sternite with swelling postero-medially, 5th distinctly concave. Genitalia as in Fig. 21.

Female: differs from male in lacking a ciliate fovea on submentum.

Length: 3.5-4.6 mm.

Holotype (male): Jamaica, 4000'; Hardwar Gap; VII-10-1966; A. T. Howden [CNCI].

Paratypes: JAMAICA: 9—same data as holotype [CNCI, IZPN, MAIC]. 1—*ibid.*, 24 VII 1966, A. T. Howden [CNCI]. 1—*ibid.*, 17 VII 1966, A. T. Howden [IZPN]. 1—*ibid.*, 7 VII 1966, Howden & Becker [CNCI]. 13—*ibid.*, 10 VII 1966, Howden & Becker [CNCI, IZPN, MAIC]. 1—*ibid.*, 29 VII 1966, Howden & Becker [CNCI]. 61—St. Andrew Par., 16 XII 1972, J. Peck [CNCI, IJAM, IZPN, MAIC]. 5—*ibid.*, 16 XII 1973, S. & J. Peck, under bark [CNCI, IZPN, MAIC]. 4—Portland Par., Hardwar Gap, 5 XII 1975, C. W. & L. O'Brien & Marshall [CASC]. 19—St. Andrew Par., Hardwar Gap, 6-8 XII 1975, G. F. Hevel [IZPN, MAIC, NMNH]. 7—Hardwar Gap, 13 XI 1966, A. B. Gurney [NMNH]. 11—Montego Bay, 15 III 1911, F2192 [AMNH, IZPN, MAIC]. 2—Cinchona, 26 II 1911, F2141 [AMNH]. 1—*ibid.*, 24 II 1911, F2134 [AMNH]. 1—*ibid.*, 10 V 1941, Chapin [NMNH]. 4—*ibid.*, 5000' I 1912, C. T. Brues [MCZC]. 1—*ibid.*, 16 VIII 1934, Darlington [MCZC].

Etymology: This species is named in honor of Anne T. Howden, of Ottawa, Canada, in honor of her extensive collecting of Jamaican beetles, including a portion of the type series of this species, and in recognition of her many courtesies over the years.

#### *Pycnomerus hottae* NEW SPECIES

(Fig. 4, 6, 17, 20)

Discussion. This species is known only from the heights of Mt. La Hotte, an isolated peak near the western end of the La Hotte Peninsula of southern Haiti. This is one of the most unique and remote areas in the West Indies, and undoubtedly worthy of protection from environmental degradation.

*Pycnomerus hottae* shares many similarities with *P. darlingtoni* of Jamaica, but whether this reflects phylogeny or convergence due to reduction of eyes and loss of wings is a matter of conjecture.

Diagnosis: The compact antennal club (Fig. 4), reduced eyes (Fig. 4), elytral intervals 2 (Fig. 4) and 8 not reaching the anterior margin, intervals 6-8 fused at the level of the 3rd visible sternite, and the confused, pustulate interval where 4-6 fuse will distinguish individuals of this species from those of all others known from the West Indies.

Description. Male: elongate oval, convex, shining rufo-castaneous, probably wingless, entire ventral surface with coarse umbilicate punctures.

Head (Fig. 4) with surface coarsely umbilicate-punctate; anterior margin straight, anterior angles subangulate; frons with distinct depressions mediad of suprantennal ridge; suprantennal ridge nearly impunctate, narrow before frontal depressions, wide between depressions and lateral margins. Antennae (Fig. 4) with compact club of antennomeres 10 and 11; 10 and 11 equal in size. Eye reduced (Fig. 4), approximately 10 facets; not extending below level of ventral edge of antennal insertion; antennal groove wide, shallow, and relatively high due to small eye. Submentum with medio-anterior ciliate fovea.

Pronotum (Fig. 4) as long as broad; sides weakly diverging to anterior 1/5, then weakly convergent; lateral margins crenulate, bordered above by narrow sulcus, weakly sinuate in lateral view (Fig. 6); anterior angles square; posterior angles obtuse; anterior margin bisinuate, without submarginal groove; posterior margin weakly lobed; disk coarsely umbilicate-punctate as on head; disk with median depression, divided near base by median longitudinal impunctate callus, resulting in 2 impressed lines on either side; a pair of very coarse, confluent foveae present opposite elytral striae 3 and 4. Prosternum uniformly punctate; metasternum shorter than mesofemur. Elytra approximately 2X as long as wide and 1.7-1.8X as long as pronotum, widest behind humeri, sides weakly arcuate; anterior margin not bordered; humeral angles microdenticulate; striae punctures elongate, narrowed medially on each side by a small denticle; intervals 2 and 8 not connected to anterior margin; intervals 6-8 fused at level of third visible sternite as in *P. darlingtoni* (Fig. 14); 4, 5 and 6 confusedly fused, intervals pustulate in this area.

Abdomen (Fig. 17) with swelling on hind margin of 4th visible sternite, 5th distinctly concave. Genitalia as in Fig. 20.

Female: unknown.

Length: 4.0-4.2 mm.

Holotype (male): Mt. La Hotte; 5-7800 ft.; Oct 6-7/ Haiti; 1934; Darlington. [MCZC].

Paratype: 1 male, same data as holotype [MCZC].

Etymology: Named for Mont La Hotte, on the La Hotte Peninsula of southern Haiti.

#### *Pycnomerus darlingtoni* NEW SPECIES

(Fig. 3, 7, 14, 15, 23)

Known only from the highest parts of the Blue Mountains of Jamaica, *P. darlingtoni* shares that island with *P. annae* and *P. biimpressus*. There seems to be some elevational stratification, with the widespread *biimpressus* in the lower areas, overlapping at the upper end of its range with the endemic mid-elevation *annae* and the endemic *darlingtoni* restricted to the highest elevations. Further collecting is required to document the full ranges of *Pycnomerus* species on Jamaica.

Diagnosis: the compact antennal club (Fig. 3), reduced eyes (Fig. 3), elytral intervals 2 (Fig. 3) and 8 (Fig. 14) not reaching anterior margin, and smooth intervals 4-6 fusing at the level of visible sternite 3 (Fig. 14) will distinguish members of this species from all others known to occur in the West Indies.

Description. Male: elongate oval, shining rufo-castaneous, probably wingless.

Head (Fig. 3) with surface moderately coarsely umbilicate-punctate above, more densely punctate to subrugose below; anterior margin very weakly bisinuate, angles weakly produced; frons with distinct depressions mediad of suprantennal ridges; suprantennal ridges nearly impunctate, narrow anterior to frontal depressions, wide between depressions and lateral margins. Antenna (Fig. 3) with compact club of antennomeres 10 and 11, 10 slightly larger than 11. Eyes (Fig. 3) reduced, approximately 20 facets,

not extending below level of ventral edge of antennal insertion; antennal groove wide, shallow, and relatively high due to small eye. Submentum medio-anteriorly with ciliate fovea.

Pronotum (Fig. 3) slightly longer than wide, sides diverging slightly from base to near anterior margin; lateral margins nearly straight in lateral view (Fig. 7), smooth to subcrenulate; bordered above by a narrow sulcus, which is wider medially, making raised portion of disk narrowed medially; this sulcus extending around anterior angles onto anterior margin; anterior and posterior angles rounded to angulate; anterior margin bisinuate; posterior margin nearly straight; disk coarsely umbilicate-punctate, medial punctures larger than those on head; disk with median depression, divided near base by median longitudinal callus, resulting in an impressed line on each side; a pair of very coarse, confluent foveae present opposite elytral striae 3 and 4, connected across base by a narrow sulcus. Prosternum uniformly coarsely umbilicate-punctate. Metasternum slightly shorter than mesofemur. Elytra 1.9X as long as wide, 2X as long as pronotum; sides weakly rounded, widest just behind humeri; humeral angles microdenticulate; striae punctures elongate, slightly or not narrowed medially; intervals 2 (Fig. 3) and 8 (Fig. 14) not connected to anterior margin; intervals 6-8 fused at level of third visible sternite (Fig. 14); 4, 5, and 6 distinct and smooth in area of fusion.

Abdomen (Fig. 15) coarsely umbilicate-punctate, with punctures less dense medially on 3rd visible sternite, medially impunctate on 4th; 4th visible sternite with swelling medially at posterior margin; 5th visible sternite deeply concave. Genitalia as in Fig. 23.

Female: differs from the male in lacking ciliate fovea on submentum.

Length: 4.4-4.8 mm.

Holotype (male): Main Range; Blue Mts; 5-7388 ft.; Aug 17-19/Jamaica; 1934; Darlington [MCZC].

Paratypes: 11 same data as holotype [IZPN, MCZC]; 4—Blue Mt.; Peak, Jan.; 12-13-90 [IZPN, MAIC, MCZC].

Etymology: This species is named for the collector of the holotype, Prof. P. J. Darlington, Jr., whose contributions to our knowledge of the beetle fauna of the Greater Antilles are so great as to require no further comment.

*Pycnomerus corpulentus* (Reitter) NEW COMBINATION

(Fig. 9, 19)

*Penthelispa corpulenta* Reitter 1877: 351 [Type locality "America mer?", here restricted to Puerto Rico; lectotype in MNHN]. Hetschko 1930: 65. Blackwelder 1945: 472.

*Penthelispa aequicollis* Reitter 878: 23 [Puerto Rico; Berlin?]. Hetschko 1930: 65.

Blackwelder 1945: 472. Wolcott 1951: 316. NEW SYNONYMY.

*Penthelispa aequicolle*; Leng and Mutchler 1914: 413 [part].

Distribution: Mountains of Puerto Rico.

Two syntypes of *P. corpulenta* are housed in the MNH, on the same pin, labeled "Penthis.; America/ typ Reitter; corpulenta m.". The upper specimen is here designated lectotype, and the lower paralectotype, and are so labeled. These specimens are identical to specimens from Puerto Rico.

*Penthelispa aequicollis* is synonymized on the basis of the description and type locality, as no types have been seen. The type should be in Berlin.

This species is related to the tight-clubed group, including *P. biimpressus*, with which it shares Puerto Rico, by the form of the elytral intervals. *Pycnomerus corpulentus* is superficially similar to *P. valentinei* from Hispaniola, but can be easily distinguished by the characters in the key and diagnoses.

Diagnosis: the loose antennal club (Fig. 9), coarsely punctate pronotum (Fig. 9), and 2nd elytral interval not reaching the anterior margin (Fig. 9) will distinguish this

species. Further characters include the concave last visible sternite, weakly bisinuate lateral pronotal margins (Fig. 9), and the 6th elytral interval lower than the 5th and 7th, although this last may be weak in some individuals. It is a relatively large species, length: 3.1-4.6 mm, male genitalia as in Fig. 19.

Material examined, in addition to types: PUERTO RICO: 10—El Yunque, 21 II [MCZC]. 5—Oeste Peak, 18 II 1968, L. Herman, rotting stump [AMNH, IZPN, MAIC]. 1—El Yunque, 2,100-2,200 ft., 15-24 II 1969, T. & B. Hlavac & L. Herman Jr. [AMNH]. 5—El Yunque Sta., Luquillo Forest, 2-16 VII 1969, H. & A. Howden [CNCI, IZPN]. 1—El Yunque, 16-17 VII 1958, M. W. Sanderson [INHS]. 1—Caribbean Nat. Forest, El Yunque, 2 VII 1979, M. A. Ivie [MAIC]. 1—Caribbean Nat. Forest, El Yunque trail, 610-1050 m, 23 IX 1987, M. A. Ivie, beating [MAIC]. 2—5 mi NE Jayuya, 17-19 VII 1969, H. & A. Howden [CNCI, MAIC]. 20—El Yunque, c. 3,000 ft. V 1938, Darlington [IZPN, MAIC, MCZC]. 2—Caribbean Nat. For., El Toro Negro D., Hwy 143, k16-18H4, 21 VII 1979, L. O'Brien & G. B. Marshall [IZPN]. 2—Villalba, Ins. Gov. Finca, 9 VII 1934, R. G. Oakley, in decaying wood.

*Pycnomerus valentinei* NEW SPECIES

(Fig. 8, 18)

The type series of *P. valentinei* is from various localities above 1,500 m in the Massif de la Selle of south-eastern Haiti and the Cordillera Central of the Dominican Republic. It is narrowly sympatric with *P. biimpressus*. A single male specimen from the lowland locality of Soledad (Cienfuegos Prov.), Cuba [MCZC], is 1 of only 2 representatives of the genus seen by us from Cuba (the other being *P. biimpressus*). It has the basic appearance of the upland Hispaniolan *P. valentinei*, and externally can be separated from that species only by the less strongly punctate prosternum. In the absence of more Cuban specimens, it is impossible to ascertain the extent of variation in such a potentially plastic character, and therefore this specimen is placed here, but not made part of the type series. One factor in this case is the fact that the provenance is a botanical garden, and as such, subject to adventive populations of introduced species. The El Aceitillar paratypes were taken on an unidentified fungus between the laminae of a wet, rotten pine log, ca. 1/2 meter in diameter, and associated with *Clinidium corbis* Bell (Rhysodidae) and phrenapatine tenebrionids near *Diodeus*.

Diagnosis: the loose antennal club (Fig. 8), flat elytral intervals all reaching the anterior margin (Fig. 8), and coarse pronotal punctation (Fig. 8) will distinguish this species. Further, the pattern of fusion of elytral intervals in the female is unique (see below). The flat last sternite characteristic of the species is subject to some variation. One male from Constanza, Dominican Republic [MCZC], has the last visible sternite slightly concave, but not nearly so distinctly so as in *P. corpulenta*.

Description. Male: elongate, parallel sided; rufo-brunneus; fully winged.

Head (Fig. 8) densely punctate, punctures moderately coarse; anterior margin distinctly emarginate; anterior angles rounded; frons on each side with distinct depressions mediad of antennal insertions, without differentiated supra-antennal ridge. Antenna (Fig. 8) with loose club of antennomeres 10 and 11, 10 subequal to 11. Eyes normal (Fig. 8), easily visible from below. Antennal groove narrow, short, distinct, directed 45° below anterior-posterior line. Submentum with a large median ciliate fovea at anterior margin.

Pronotum (Fig. 8) as wide as long, sides rounded to sinuate, lateral margins smooth; anterior angles indistinct to moderately produced, rounded; posterior angles obtuse; anterior margin nearly straight to weakly bisinuate, not bordered; posterior margin straight on each side, weakly obtusely angulate medially, narrowly bordered, with 1 (sometimes 2) larger separate punctures opposite stria 3 to 4; disk coarsely punctate,

with narrow impunctate longitudinal callus on posterior 2/3. Prosternum coarsely punctate, metasternum longer than mesofemur. Elytra 2.1-2.2X as long as wide, 2.3-2.5X as long as pronotum; sides subparallel; humeral angles distinct, smooth; striae punctures elongate, narrowed medially; all intervals reaching anterior margin (Fig. 8); intervals 4-8 fused as in *uniformis*.

Abdomen coarsely, uniformly punctate; 4th visible sternite with very slight swelling medially on hind margin; 5th flat. Genitalia as in Fig. 18.

Female: differs from male in lacking fovea on submentum, in having the pattern of fusion of elytral intervals  $((((8+7)+6)+5)+4)$  rather than  $((8+7+6)+5+4)$ , and in more strongly punctate head and pronotum.

Length: 4.2-5.2 mm.

Holotype male: Morne Guimby, 22 km.; SE Fond Verrettes; Haiti 18 JUL 1956; 6500' B. & B. Valentine/ Foret des Pines; Hardwood cloud; forest, beating [from MAIC, deposited in NMNH].

Paratypes: HISPANIOLA: Haiti: 1—Morne Guimby, Foret des Pines, 22 km SE Fond Verrettes, 6500' 18 VII 1956, B. & B. Valentine, beating in hardwood cloud forest [MAIC]. 1—Dept. l'Ouest, Fond Verrettes to Refuge, 28 V 1950, H. B. Mills [INHS]. 2—Dept. Sud-Oeste, Massif del La Selle, Morne d'Enfer, 1850 m., 16 V 1984, M. C. Thomas [FSCA, MAIC]. 14—Dept. Sud-Oeste, Parc National La Visite, vicinity park hdqtrs, 1880 m., 10 V 1984, M. C. Thomas, in rotten logs of *Pinus occidentalis* [FSCA, IZPN, MAIC]. 8—Dept. Sud-Oeste, Parc National La Visite, near park hdqtrs, 1880 m., 10 V 1984, M. C. Thomas, in rotten logs of *Pinus occidentalis* [FSCA, IZPN, MAIC]. 2—Dept. Sud-Oeste, Parc National La Visite, ca 1 km S. Roche Plat, 22 V 1984, M. C. Thomas, [FSCA, IZPN]. 1—La Visite & vic., La Selle Range, 5-7000 ft., 16-23 IX 1934, Darlington [MCZC]. HISPANIOLA: Dominican Republic: 1—vic. Valle Nuevo, VIII 1938, ca. 6000' cloudforest, Darlington [MCZC]. 2—Constanza to Jarabacoa, VIII 1938, Darlington [MCZC]. 4—LaVega Prov., 28 km SE Constanza, 4 VIII 1979, C. W. O'Brien [IZPN, MAIC, MHND]. 2—Prov. Pedernales, ca. 35 km N. Cabo Rojo, El Aceitillar, 1363 m. 26 VIII 1988, in rotten pine log, M. A. Ivie [MCZC].

Other Material Examined: 1—Cuba, Cienfuegos, Soledad, V-VI 1939, C. Parsons [MCZC] (see discussion above).

Etymology: Named in honor of its collector, Prof. Barry D. Valentine of The Ohio State University, and in recognition of his generous help in MAI's study of West Indian Coleoptera.

#### *Pycnomerus uniformis* NEW SPECIES

(Fig. 10, 25)

*Penthelispa aequeicolle*; Leng and Mutchler 1914: 413 [not Reitter] [part].

This species is unique among West Indian species in lacking any peculiar sculptural structure, and has a basically generalized form for the genus. This is the only 1 of the 3 known Lesser Antillean species (others are *P. biimpressus* and *P. infimus*) not known to occur on the South American mainland.

Diagnosis: the loose antennal club, finely punctate pronotum with round punctures, concave last visible sternite, and size (3.3-3.7 mm) will distinguish members of this species.

Description. Male: elongate, parallel sided; rufo-brunneus, probably winged.

Head (Fig. 10) evenly covered with moderate punctures of medium density; anterior margin emarginate, angles rounded; frons on each side with distinct depressions mediad of antennal insertions, lacking differentiated supra-antennal ridges. Antenna (Fig. 10) with moderately loose club of antennomeres 10 and 11; 11 longer but narrower than 10. Eyes normal (Fig. 10), easily visible from below; antennal groove narrow, short, di-

rected 45° below anterior-posterior line; submentum with very small median ciliate fovea just behind anterior margin.

Pronotum (Fig. 10) nearly as long as wide, sides nearly parallel, only slightly rounded; lateral margin smooth; disk moderately punctate, plane, evenly rounded to lateral margins; anterior angles weakly produced, posterior angles rounded; anterior margin weakly bisinuate, not bordered; posterior margin rounded, not bordered. Prosternum shining, with sparse punctures, most coarse laterally and posteriorly; metasternum longer than mesofemur. Elytra with sides parallel, 2.2-2.3X as long as wide, 2.4-2.5X as long as pronotum; humeral angles prominent, smooth; striae punctures elongate, linear; all intervals reaching anterior margin, intervals 4-5-6 and 6-7-8 fused at the level of the 3rd and 4th visible sternites respectively.

Abdomen coarsely, sparsely punctate, 4th visible sternite with a slight swelling medially on posterior margin, 5th concave. Genitalia as in Fig. 25.

Female: differs from male in lacking submental fovea.

Length: 3.3-3.7 mm.

Holotype (male): Acc. 4860; Gourbeyre; Guadeloupe [AMNH].

Paratypes: 5 (2 males, 3 females) same data as holotype [AMNH, IZPN, MAIC]. 2 (1 male, 1 female)—Guadeloupe, Trois Rivières, Dufau [NMNH]. 2 (1 male, 1 female)—Dominica, St. Joseph Par., Wet Area Exp. Sta., 800 ft., 31 XII 1978, M. A. & L. L. Ivie [MAIC, RSMC].

Etymology: The name refers to the flat and uninteresting form of this species.

*Pycnomerus infimus* (Grouvelle) NEW COMBINATION

(Fig. 11, 12, 13, 24)

*Penthelispa infima* Grouvelle 1902: 464 [Martinique; MNHN?]. Leng & Mutchler 1914: 413.

*Penthelispa longior* Grouvelle 1913: 294. [Guadeloupe; lectotype in MNHN]. Leng and Mutchler 1914: 413. NEW SYNONYMY.

*Pycnomerus longior*; Blackwelder 1945: 472.

*Penthelispa infirma* Blackwelder 1945: 472 [misspelling].

Distribution: Guadeloupe, Dominica, Martinique, Brazil.

Grouvelle (1902) based *infima* on 1 specimen each from Martinique and Bahia, Brazil, indicating the Martinique specimen as "def.", apparently a valid indication of holotype. This specimen has not been found in the Paris collection, but the Bahia paratype has been studied, and the synonymy based upon it. Of *longior*, 6 syntypes on 3 pins in the MNHN are labeled "Guadeloupe Dufau/type/ *Penthelispa longior* ty. Grouv." The left-hand specimen on the first card is here designated lectotype, the other 5 paralectotypes, and are so labeled.

This species can be expected on at least the high islands of the Windward Islands from St. Lucia to Grenada.

Diagnosis: the small size alone (2.0-2.4 mm) will distinguish individuals of this species among West Indian *Pycnomerus*. Further, the loose antennal club (Fig. 12); fine, elongate pronotal punctation (Fig. 11), and flat last visible sternite make this species highly distinctive.

Material examined, in addition to types: GUADELOUPE: 12—Guadeloupe, Dufau [MNHN]. DOMINICA: 3—5 mi E. Dublanc, 16 VIII 1986, C. W. & L. B. O'Brien [MAIC]. 1—Pt. Casse, ca 1500', 14 VIII 1986, C. W. & L. B. O'Brien [MAIC]. 1—3 mi NE Pt. Casse, Junc. Rosalie & Castle Bruce Rd., 18 VIII 1986, C. W. & L. B. O'Brien [MAIC]. 1—5 mi E. Dublanc, 1250', 20 VIII 1986, C. W. & L. B. O'Brien [MAIC]. 1—6 mi E. Dublanc, 1250', 20 VIII 1986, C. W. & L. B. O'Brien [MAIC].

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## FLASH BEHAVIOR AND ECOLOGY OF THAI *LUCIOLA* FIREFLIES (COLEOPTERA: LAMPYRIDAE)

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### ABSTRACT

The advertising flashes and general ecology of four species of *Luciola* fireflies from the Bangkok, tidal region of Thailand are reported, and comparisons made with other species. The general signal systems and aquatic life-histories found fit with what has been reported for other Asian and Australian Luciolinae.

### RESUMEN

Se reporta sobre los destellos de anuncio y de la ecología general de cuatro especies de *Luciola* en la región donde hay cambios de mareas en Bangkok, Tailandia, y se comparan con otras especies. El sistema general de señales e historias de la vida acuática se ha encontrado que concuerdan bien con lo que se ha reportado de otros Luciolinos de Asia y Australia.

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Thailand fireflies are known almost exclusively for the synchronous flashing behavior of a single, "superstar" species, *Pteroptyx malacca* Gorham, which, at least before its