

PHYLOGENY AND REVISION OF
THE *PLATYNUS DEGALLIERI*
SPECIES GROUP (COLEOPTERA:
CARABIDAE: PLATYNINI)

JAMES K. LIEBHERR

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
NUMBER 214
NEW YORK : 1992

Recent issues of the *Bulletin* may be purchased from the Museum. Lists of back issues of the *Bulletin*, *Novitates*, and *Anthropological Papers* published during the last five years are available free of charge. Address orders to: American Museum of Natural History Library, Department D, Central Park West at 79th St., New York, New York 10024.

PHYLOGENY AND REVISION OF
THE *PLATYNUS DEGALLIERI*
SPECIES GROUP (COLEOPTERA:
CARABIDAE: PLATYNINI)

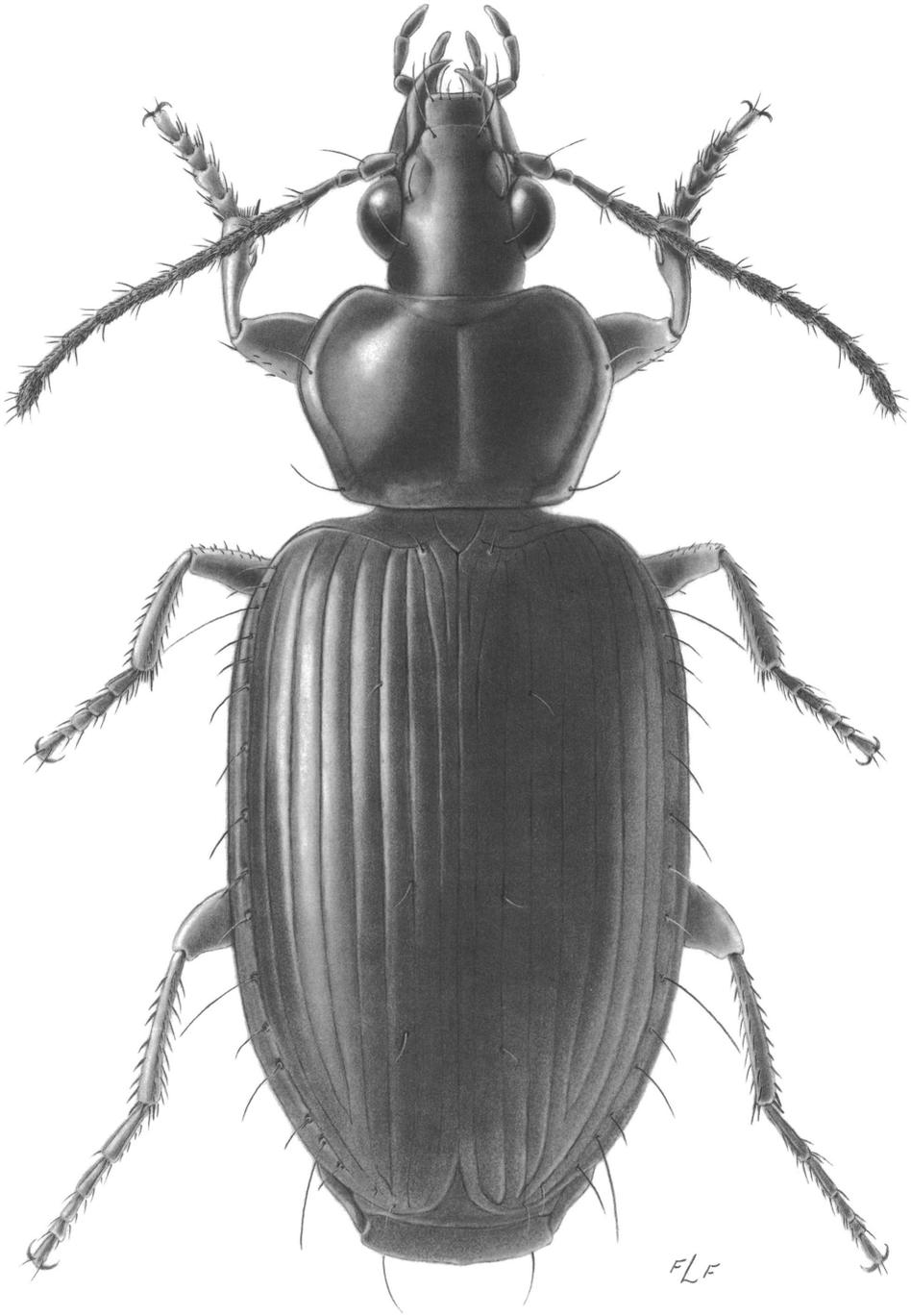
JAMES K. LIEBHERR
Associate Professor and Curator
Department of Entomology, Cornell University
Research Associate, Department of Entomology
American Museum of Natural History

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Number 214, 115 pages, 277 figures, 5 tables

Issued December 16, 1992

Price: \$9.70 a copy



© 1992, FRANKS L. FAULETT

Fig. 1. Dorsal habitus of *Platynus marginissimus*, n. sp., paratype ♂ (Veracruz: 1 km N Huatusco).

CONTENTS

Abstract	5
Introduction	5
Review of <i>degallieri</i> Group	6
Materials and Methods	7
Taxonomic Material	7
Methods	8
Taxonomic Treatment	10
<i>Platynus degallieri</i> Species Group	10
Monophyly of <i>degallieri</i> Group	16
Key to Adults of the <i>degallieri</i> Group	18
Species Descriptions	23
<i>Platynus robustulus</i> , new species	23
<i>Platynus bacatellus</i> , new species	25
<i>Platynus platynellus</i> , new species	28
<i>Platynus machetellus</i> , new species	29
<i>Platynus elliptolellus</i> , new species	30
<i>Platynus coptoderoides</i> (Darlington)	31
<i>Platynus baorucensis</i> , new species	34
<i>Platynus agonellus</i> (Darlington)	36
<i>Platynus sellensis</i> (Darlington)	37
<i>Platynus laetificus</i> (Darlington)	39
<i>Platynus metallosomus</i> Liebherr	39
<i>Platynus pavens</i> (Darlington)	41
<i>Platynus brunnellus</i> , new species	42
<i>Platynus caerulipennis</i> , new species	45
<i>Platynus ovatulus</i> (Bates)	47
<i>Platynus rotundatulus</i> , new species	49
<i>Platynus crypticulus</i> , new species	50
<i>Platynus minusculus</i> , new species	51
<i>Platynus nitidulus</i> , new species	53
<i>Platynus margaritulus</i> , new species	55
<i>Platynus degallieri</i> (Perrault)	57
<i>Platynus aeneipennis</i> (Dejean)	59
<i>Platynus rugulellus</i> , new species	60
<i>Platynus barbarellus</i> , new species	61
<i>Platynus imitativus</i> , new species	63
<i>Platynus stenophthalmus</i> , new species	66
<i>Platynus rufulus</i> (Bates)	66
<i>Platynus marginissimus</i> , new species	68
<i>Platynus decorellus</i> , new species	71
<i>Platynus woldai</i> , new species	72
<i>Platynus angustulus</i> , new species	73
<i>Platynus flavomarginatus</i> , new species	74
<i>Platynus dominicensis</i> (Bates)	75
<i>Platynus mimulus</i> , new species	77
<i>Platynus nevermanni</i> , new species	79
<i>Platynus purpurellus</i> , new species	80

Description of Adults of Outgroup Taxa 81

Platynus pygmaeus, new species 81

Platynus ballorum, new species 83

Platynus franiai, new species 85

Cladistic Analysis 86

 Taxa 87

 Characters 87

 Results 91

 Classificatory Consequences 95

Habitat and Dispersal 96

Biogeographic Analysis 102

 Area Relationships 102

 Habitat Relationships 108

Acknowledgments 111

References 111

Appendix 1 115

ABSTRACT

The 36 species of the *Platynus degallieri* species group are revised. Twenty-five species are newly described: *Platynus robustulus*, n. sp., *P. platynellus*, n. sp., *P. machetellus*, n. sp., *P. elliptolellus*, n. sp., *P. brunnellus*, n. sp., *P. caerulipennis*, n. sp., *P. rotundatulus*, n. sp., *P. minusculus*, n. sp., *P. stenophthalmus*, n. sp., *P. angustulus*, n. sp., and *P. decorellus*, n. sp. from México; *P. bacatellus*, n. sp., *P. crypticulus*, n. sp., and *P. imitativus*, n. sp. from México and Guatemala; *P. marginis-simus*, n. sp. from México, Guatemala, and El Salvador; *P. rugulellus*, n. sp., and *P. nevermanni*, n. sp. from Costa Rica; *P. margaritulus*, n. sp., *P. barbarellus*, n. sp., *P. woldai*, n. sp., *P. flavomarginatus*, n. sp., *P. mimulus*, n. sp., and *P. purpurellus*, n. sp. from Panamá; *P. nitidulus*, n. sp. from Costa Rica and Panamá; and *P. baorucensis*, n. sp. from Dominican Republic. *Acupalpus striatulus* Reiche, 1843 is synonymized with *Anchomenus aeneipennis* Dejean, 1831 [NEW SYNONYMY]. *Glyptolenopsis* Perrault, 1991 is considered a junior synonym of *Platynus* Bonelli, 1810 [NEW SYNONYMY]. New combinations include *Platynus degallieri* (Perrault) and *P. aeneipennis* (Dejean). A key for the identification of the species is provided, and each species treatment includes a synonymy, diagnosis, description, and distributional information.

Three Mexican species, close outgroups of the *degallieri* group, are also described: *Platynus pygmaeus*, n. sp. from Chiapas and Oaxaca; *P. ballorum*, n. sp. from Puebla; and *P. franiai*, n. sp. from Guerrero and Oaxaca.

Cladistic analysis based on 59 unit-coded characters is performed on the 36 ingroup taxa. Eleven outgroup taxa are included in the analysis to facilitate character polarization within the *degallieri* group, and to obtain a preliminary assessment of recent classificatory attempts on the Neotropical *Platynus*. Patterns of character state change are compared between male and female reproductive characters, and found to corroborate Eberhard's hypothesis of female choice as a determinant in genitalic evolution.

Areas of endemism are defined by the distributions of geographically restricted species within the aggregate species-group distributional range,

and include the Hispaniolan, Cuban-Bahamian, Mexican, Northern Mexican, Northern Central American, Lower Central American, and South American areas. Area relationships are determined using component analysis. The time of origin of the species group is hypothesized to be Miocene to Oligocene, based on the sister area relationship of Northern México with México plus Northern Central America—that relationship dated Miocene in the sympatric platynine carabid genus *Elliptoleus* Bates. The Antillean areas of endemism are ambiguously related either to the Mexican plus Northern Central American areas, or to the Lower Central American plus South American areas. An Oligocene to Miocene colonization of the Antilles at approximately the time of origin of the species group is consistent with these relationships. The Lower Central American diversification can be dated as post-Miocene, corresponding to the Talamancan orogeny in Costa Rica and Panamá. The South American area has been recently colonized by two widespread species of the group, and its area relationships are probably due more to recent range expansion than to an accretionary geological event.

Information on habitats occupied by the species is presented. Elevational ranges are used as a measure of the stability of habitats occupied by the various species. Brachypterous taxa are shown to occupy ecologically more stable, higher elevational habitats. This association is shown to be based on a relatively limited number of historical events whereby ancestral brachypterous taxa came to occupy high elevation habitats, with repeated vicariance without habitat change increasing the diversity of such clades. Habitat relationships are compared to those predicted under the taxon cycle and taxon pulse hypotheses. Three possible radiations—12 mainland and Antillean species, a subset of this clade comprising 7 Antillean species, and a clade of 19 mainland species of which 12 are found in Lower Central America—are tested for conformity to taxon cycle predictions using a randomization test. All sets of empirical data fail to demonstrate significant action of a taxon cycle during the ecological diversification of the group.

INTRODUCTION

The *degallieri* species group represents one of the taxonomically more difficult groups of Neotropical *Platynus*, as many of the species appear superficially similar based on external

characters. The adults are small for *Platynus*, adding to the impression that they are simply little black beetles when looked at with the naked eye. Upon closer examination, how-

ever, and with the aid of dissections of the male terminalia, 36 species are recognizable in the material examined for this study. Based on the geographically restricted distributions of many of the species, and the cryptic habits of the adults—they reside in deep leaf litter in montane temperate, rain, and cloud forests—many more species are likely to be found in México and Middle America. What follows is a taxonomic revision of the *degallieri* species group based on the adult stage. The classification is based on cladistic analysis including both the ingroup species and a diversity of outgroups. The geographic distributions and habitat preferences for the species in the *degallieri* group are then analyzed in light of the morphologically based cladistic hypothesis of relationships.

The subtribe Platyni of the Platynini has radiated extensively in the Neotropical and adjacent Nearctic montane regions of México. Within the borders of México alone there are more than 330 species assignable to this subtribe. Genera represented in the Mexican fauna include *Platynus* in the broad sense of Whitehead (1973) with over 285 species, *Onypterygia* with 15 species (Blackwelder, 1944), *Glyptolenus* with 2 species (Whitehead, 1974), *Agonum* with 15 species (Liebherr, unpubl. data), and *Anchomenus* (2 species), *Sericoda* (3 species), and *Elliptoleus* (11 species) (Liebherr, 1991a). With this study, approximately 139 Mexican species assignable to *Platynus* have been described. The bulk of these descriptions were published by Chaudoir (1859, 1878) and Bates (1882, 1884). The following revision is only the second to provide a cladistic hypothesis for any group of Mexican *Platynus* (see Liebherr, 1988, 1989 for the other).

The large number of Mexican species assignable to *Platynus* is repeated in the Middle and South American faunas. Such high levels of diversity have necessitated division of the effort into either revisionary studies of geographically restricted areas (e.g., Whitehead, 1973; Liebherr, 1987), or taxonomically restricted groups, usually the species group (e.g., Liebherr, 1989; Moret, 1989, 1990, 1991). Two nomenclatural approaches have been advocated during this recent period of description and revision. Whitehead (1973) advocated a broad taxonomic interpretation of

the taxa comprising the bulk of the Neotropical radiation, and considered that the Neotropical species should be placed in the genus *Platynus*. He stated “group names such as *Rhadine*, *Stenocnemus*, *Ophryodactylus*, and *Platynella* may well be applied to groups of subgeneric rank, but all such groups first need to be better defined” (Whitehead, 1973: 214). Recently, Moret (1989, 1990) and Perrault (1990, 1991) have adopted a very narrow generic concept for revisionary studies in the Neotropical fauna, and have proposed generic-level names for groups recognized by Chaudoir (1878) in his key to *Colpodes*.

In this study, formal recognition of new generic-level taxa in the Neotropical fauna is eschewed in favor of intense character analysis and development of a cladistic hypothesis for the ingroup species, and their immediate outgroups. It is anticipated that after the constituent species groups of the fauna have been adequately studied, the plesiomorphic ground-states for their characters may be compared, allowing a cladistic hypothesis for the fauna as a whole. This can be considered a “top-down” cladistic research program. At the time of cladistic analysis linking the various species groups, faunas of other parts of the world—i.e., Africa, Asia, South America—can be included. By this method, older biogeographic patterns linking various larger biogeographic regions may be recognized.

REVIEW OF *DEGALLIERI* GROUP

The first descriptions of *degallieri* group species illustrate the taxonomic difficulty of the group. Dejean (1831) described *Anchomenus aeneipennis*, that genus now considered Platynini, and 12 years later Reiche (1843) described the same species as *Acupalpus striatulus*, that genus now residing in the Harpalini. The next species of the group was not described until 1882, when Bates described *Anchomenus dominicensis*. Bates suggested that the eyes, dilated prothoracic margins, and iridescent elytra “give it the aspect of a *Colpodes*” (= *Platynus*) (Bates, 1882: 96). He believed the penultimate tarsomere to possess a simple apex, however, and placed the species in *Anchomenus*. Without the diagnostic information of internal terminalic

structures, Bates included representatives of five species in his type series of *Anchomenus dominicensis*; other species include the new species *Platynus barbarelus*, *P. crypticulus*, *P. imitativus*, and *P. marginissimus*. Bates (1884) subsequently described two species, *Anchomenus ovatulus* and *Colpodes rufulus* which are assigned to the *degallieri* group. Horn (1892) described *Platynus languidus*, a junior synonym of *ovatulus* Bates.

A long hiatus in descriptive activity ended with Darlington's (1935, 1937a, 1937b) revision of the West Indian carabid fauna. He described five of the seven known Antillean *degallieri* group species, and recognized a sixth. He placed *Agonum coptoderoides* and *Agonum laetificum* based on their metallic green dorsal body reflection. His other species—*agonellus*, *pavens*, and *sellensis*—were described in *Colpodes*, based on their more piceous integument and similarity to species

of the Cuban *baragua* group (Darlington, 1937a: 125). He collected a sixth species, and assumed it represented *Metallosomus metallescens* Motschulsky because he could not see the Motschulsky type at the time. Darlington's sixth species proved to be undescribed (Liebherr, 1987).

Whitehead (1973) recognized the affinities of *P. dominicensis* and *P. ovatulus*, and considered them to represent the *ovatulus* complex. Liebherr (1987) revised the six Antillean species known to Darlington, using the informal *ovatulus* group rank.

Most recently, Perrault (1991) described the genus *Glyptolenopsis*, and placed *Anchomenus aeneipennis* and his species *Glyptolenopsis degallieri* in it. He designated *G. degallieri* as type species, and noted the probable relationships of his included species to *P. ovatulus* and *P. dominicensis*.

MATERIALS AND METHODS

TAXONOMIC MATERIAL

This study was based on 2084 adult specimens of the *degallieri* group obtained through the courtesy of 19 institutional collections and 4 private collectors. Institutional codens used in the taxonomic treatment and cooperating curators are listed below.

AMNH	American Museum of Natural History, New York; Lee H. Herman	MAIC	Michael A. Ivie collection, Dept. of Entomology, Montana State University, Bozeman
BMNH	The Natural History Museum, London; S. J. Hine and N. E. Stork	MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, MA; A. F. Newton, Jr., J. M. Carpenter, S. R. Shaw, and D. G. Furth
CMNH	Carnegie Museum of Natural History, Pittsburgh; R. L. Davidson	MNHP	Muséum National d'Histoire Naturelle, Paris; T. Deuve
CNC	Canadian National Collection, Biosystematics Research Institute, Agriculture Canada, Ottawa; Y. Bousquet and A. Smetana	NMNH	National Museum of Natural History, Smithsonian Institution, Washington, D.C.; T.L. Erwin
CUIC	Cornell University Insect Collection, Ithaca	OHSU	Ohio State University, Columbus; C. A. Triplehorn
FSCA	Florida State Collection of Arthropods, Gainesville; M. C. Thomas	SBPC	Stewart B. Peck collection, Dept. of Biology, Carleton University, Ottawa
GGPC	Georges G. Perrault collection, Muséum National d'Histoire Naturelle, Paris	UARK	University of Arkansas, Fayetteville; R. T. Allen
HAHC	Henry A. Hespenheide collection, Dept. of Biology, University of California, Los Angeles	UASM	University of Alberta Strickland Museum, Edmonton; G. E. Ball and D. Shpeley
IREC	Institut des Recherches Entomolo-	UCD	University of California, Davis; R. O. Schuster
		UCR	University of California, Riverside; S. I. Frommer
		UCVM	Universidad Central de Venezuela, Maracay; L. J. Joly T.
		UKSM	University of Kansas Snow Museum, Lawrence; J. Pakaluk
			giques de la Caraïbe, Pointe-à-Pitre, Guadeloupe; F. Chalumeau

- UNAM Universidad Nacional Autonoma de México, Instituto de Biología, Mexico City; H. Brailovsky A.
ZMUH Zoological Museum, Helsinki; H. Silfverberg

METHODS

Taxonomic Methods: Whole adult specimens were examined at magnifications of 8–125 \times using a stereomicroscope and fiber-optics ringlight illumination. The ocular ratio, used to quantify head shape, is defined as the width of head across the widest portion of the eyes, divided by the narrowest width across the vertex between the eye margins. Body size was quantified using the standardized body length, i.e., the sum of: 1) the distance from apex of right mandible in closed position to cervical collar, 2) the median length of pronotum, 3) the distance from base of scutellum along suture to apex of left elytron.

Specimens were prepared for genitalic dissection by boiling in distilled water with mild detergent for 30 minutes. Entire female abdomens were removed and allowed to clear overnight in cold 10% KOH. The female reproductive tract, defensive glands, and hindgut were then acidified in weak acetic acid, dissected, and stained using Chlorazol Black suspended in methyl cellosolve. Defensive glands and associated abdominal sclerites, and the reproductive tract and associated sclerites were slide mounted separately in glycerin. Male terminalia were soaked overnight in 10% KOH, acidified in acetic acid, and dissected. The aedeagus was generally removed from its associated tergal apodemal ring, and the parameres were slightly distended to remove associated membranes from the surface of the median lobe. The aedeagal sac and its sclerites were drawn in the retracted position for each taxon. The sac was manually everted using modified minuten nadeln in at least one specimen of each taxon where sufficient material was available. After examination, all genitalic preparations were stored with the specimens in plastic genitalia vials.

Flight wings were examined in situ by relaxing specimens and raising the elytra. Venation was examined by detaching the wing, flattening it in water on a microslide, removing the water with a paper towel, and then

covering the wing with glycerin and a slide cover in a temporary mount. Wings were drawn using a microslide projector.

For scanning electron microscopy, specimens were relaxed in boiling water, dissected in alcohol, and then dehydrated using a 10% step series from 70% to pure ethanol. Structures were mounted on double-sided scotch tape, coated with gold or gold-palladium, and examined using an Amray 1000 scanning electron microscope at 5 kV. After examination, the gold-coated parts were reassociated with dissected specimens by mounting on card points.

A synonymy, diagnostic combination, and description are provided for each species. I have examined types of all senior and junior synonyms. Verbatim label data are provided for holotypes and lectotypes, with each label line delimited by “/”, and each label by “//.” Paratypical data include date, locality, collector, repository, and numbers of specimens of each sex. For previously described species, sex is not recorded.

Species were circumscribed using characteristics occurring in unique combinations within sets of specimens, these unique diagnostic combinations defining species that conform to the phylogenetic species concept (Rosen, 1979; Cracraft, 1989). Initial sorting was done using external characters, with at least one male dissection made for each larger series of specimens. Additional male dissections were made until an unambiguous species diagnosis was developed. Variability of characters resulting in overlap of character ranges between or among allopatric sets of populations resulted in consideration of those populations as conspecific.

Cladistic Methods: The character states for the cladistic analysis were polarized as primitive or derived by outgroup comparison (Watrous and Wheeler, 1981; Maddison et al., 1984). Two successively more inclusive levels of outgroups were established based on prior phylogenetic analysis of the Platynini (Liebherr, 1986). Monophyly was constrained in the analysis at two levels; at the level of ingroup relative to primary outgroups, and at the level of ingroup plus primary outgroups relative to the secondary outgroups. Character polarities relative to the ingroup were thus established under a global

criterion of parsimony for all taxa in the study set. Data were analyzed using the HENNIG86 computer program (Farris, 1988). In order to discover all islands of multiple equally parsimonious cladograms (Maddison, 1991), networks were initially constructed with the h, h*, m, m*, and tread options, followed in each case by the bb* branch and bound heuristic search for the shortest cladogram. The results of the HENNIG86 analysis were confirmed using multiple runs of the PAUP 3.0q computer program (Swofford, 1991), with randomly ordered sequences of taxa run repeatedly until each island was found in at least 10 replicated runs (D. R. Maddison, 1991, personal commun.).

Biogeographic Methods: Historical relationships of the areas of endemism inhabited by the *degallieri* group species were analyzed in the context of the cladistic relationships of the taxa. Using the protocol of cladistic biogeography (Nelson and Platnick, 1981; Humphries and Parenti, 1986), the taxonomic cladogram was converted to a taxon-area cladogram in which the terms represent all areas occupied by the species. This taxon-area cladogram was reduced to one or more equally parsimonious fundamental area cladograms that had each area of endemism represented once, using three sets of conditions called Assumptions 0, 1, and 2 (Wiley, 1987; Zandee and Roos, 1987; Page, 1989, 1990). For purposes of this discussion, I assume the Brooks Parsimony Analytical procedure of Wiley (1987) to represent Assumption 0.

Assumptions 0, 1, and 2 establish different conditions by which to interpret widespread species and areas redundantly represented on the taxon-area cladogram (Page, 1990). Under Assumption 0, widespread taxa occupying more than one area of endemism are assumed indicative of most recent ancestry of those areas; i.e., such widespread taxa indicate monophyletic area relationships. Under Assumption 1, widespread taxa may indicate recent ancestry of the set of areas occupied, but they may also indicate that the widespread taxa did not respond to vicariant events that influenced other taxa inhabiting those areas. Therefore, with Assumption 1, paraphyletic as well as strictly monophyletic area relationships may be indicated by a

widespread taxon. Assumption 2 has the least restrictive set of conditions. Widespread taxa may indicate: 1) recent ancestry of the areas occupied, 2) lack of response to vicariant events, 3) dispersal from one area to another. Thus the area relationships may be interpreted as monophyletic, paraphyletic, or polyphyletic.

For redundantly represented area distributions, Assumption 0 treats each representation as a relict, but it more heavily weights relationships of cladistically less inclusive representations; i.e., redundancy among sister species. As widespread distributions of species are most heavily weighted under Assumption 0, the presence of two or more completely sympatric widespread species may result in the areas they occupy being judged most closely related on the fundamental area cladogram. Assumption 1 treats each representation as a relict brought about by either response or nonresponse to vicariance. Assumption 2 is more flexible, allowing all but one of the area representations to be due to dispersal.

With regard to widespread taxa, the area cladograms generated under Assumption 0 are a subset of those found under Assumption 1, and those of Assumption 1 a subset of those found under Assumption 2. For redundant distributions this relationship does not hold. For taxon-area cladograms with high redundancy, any cladogram found under Assumption 0 will be found under Assumption 1, but sets of area relationships found under Assumptions 1 and 2 may be very different (Page, 1990; and results herein).

Fundamental area cladograms were determined using the COMPONENT program of Page (1989). This program allows the choice of cladistic biogeographic analysis under Assumptions 0, 1, or 2. The program requires a dichotomous taxon-area cladogram, necessitating input of the various resolutions of a taxon-area cladogram if trichotomies or polytomies are present. Multiple equally parsimonious area cladograms were summarized using strict and Nelson consensus cladograms (Bremer, 1990), options of the COMPONENT program. Identical area cladograms found using Assumptions 1 and 2 were identified using the Shared Trees command of COMPONENT.

The habitat relationships of the *degallieri* group species were investigated using the randomization test procedure of Liebherr and Hajek (1990). This procedure tests whether the pattern of habitat preference is random or conforms to a predetermined pattern. The taxon cladogram is first converted to a taxon-habitat cladogram in which the terms are represented by habitat values for habitats occupied by the various species. This taxon-habitat cladogram is then reduced to a habitat transformation series. The length of the empirical habitat transformation series is com-

pared to 100 transformation series derived from randomly assigned habitat values drawn from a distribution identical to the empirical distribution. Significance is assigned by the empirical series being shorter than 95% of the randomly derived series. Camin-Sokal optimization (Camin and Sokal, 1965) is used to assign habitat values to internal nodes of the cladogram when testing whether habitat types change in a progressive manner through phylogeny, i.e., in a manner compatible with the taxon cycle or taxon pulse hypotheses.

TAXONOMIC TREATMENT

PLATYNUS DEGALLIERI SPECIES GROUP

Platynus Bonelli, 1810: Tabula Synoptica (type species *Carabus angusticollis* F. [= *Platynus assimilis* (Paykull)] from Europe by subsequent monotypy [Germar, 1817: 303; Madge, 1975]), in part.

ovatulus group, Liebherr, 1987: 344 (informal species group with *Anchomenus ovatulus* Bates considered representative of the group).

Glyptolenopsis Perrault, 1991: 48 (type species *Glyptolenopsis degallieri* Perrault from South America, by original designation (NEW SYNONYMY)).

NOMENCLATURE NOTE: Whitehead (1973: 209) first recognized this group as the *ovatulus* complex, using the Mexican species as an informal moniker. Liebherr (1987) followed this precedent, applying the name *ovatulus* group. Perrault (1991) formalized the taxonomic concept of the group as the genus *Glyptolenopsis*, using *P. degallieri* as type species. Thus, even though *Glyptolenopsis* is synonymized under *Platynus*, and prior mention was made of the *ovatulus* group, the species group name should correspond to the appropriate type species name.

DIAGNOSIS: Small beetles, standardized body length ranging from 5.3 to 8.6 mm; neck not constricted, dorsum of head convex in lateral view; profemur lacking anteroventral setae (fig. 14), with 2 posteroventral setae (fig. 15); mesofemur with 2 anteroventral setae (fig. 16); metacoxa bisetose, inner seta lacking (fig. 17); metafemur with 2 anteroventral setae (figs. 18–20); 4th mesotarsomere with moderately elongate anterior apical lobe and

shorter posterior lobe (figs. 21–22), ventral surface with 2–3 rows of setae (fig. 22); metatarsomere 4 slightly lobate, posterior lobe slightly longer than anterior lobe (fig. 25), ventral setae in linear series (fig. 26).

DESCRIPTION: Head with shallow to deeply incised frontal grooves, if deep, grooves delimit a triangular to ovoid tubercle on anterolateral area of frons above antennae; vertex dorsally convex or flat behind eyes, therefore a constricted neck absent. Eyes variously developed and diagnostic for the species, ranging from large and strongly convex (fig. 2), to moderately convex (fig. 3), to small and little convex outwardly (fig. 4), ocular ratio varying from 1.39–1.85. Two supraorbital setae. Antennae of moderate proportions; scape with long dorsoapical seta, and a short ventroapical seta; pedicel with several seta on outer apical surface; 3rd antennomere glabrous except for apical ring of 6 setae; 4th antennomere glabrous in basal 1/3, pubescent apically, as are outer antennomeres. Mentum with a single median tooth, tooth variable, from finely acuminate to broadly rounded, and in several taxa blunt apically to medially indented; 2 setae at lateral base of mentum tooth. Submentum with 2 setae each side, a shorter outer seta and a longer inner seta.

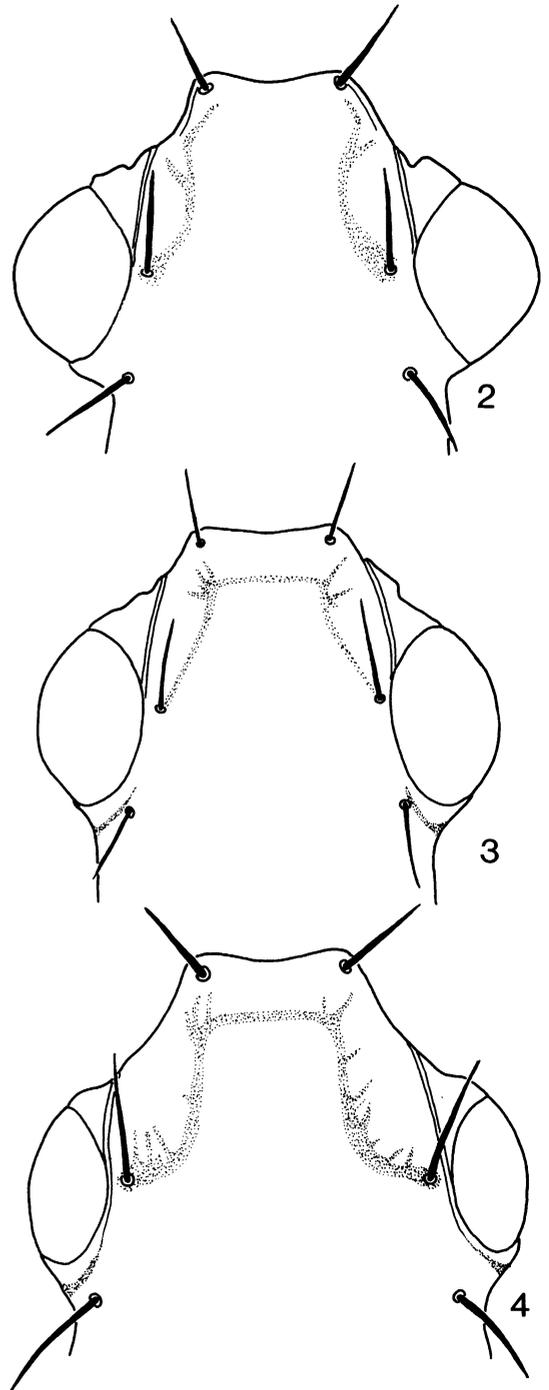
Mouthparts: Labrum quadrate, with slight-ly and broadly emarginate anterior margin bearing 6 setae (fig. 5); epipharynx with sinoid curve of epipharyngeal setae, medially surrounding a dorsally convex area bearing sensory pegs. Mandibles moderately elongate; right mandible with an anterior reticular tooth and 3 basal lobes in molar area

(fig. 6); left mandible lacks anterior retinacular tooth but has 3 basal molar lobes (fig. 7). Maxillae with finely acuminate lacinia, bearing larger setae along mesal margin, and a dorsal and ventral coating of fine setae (figs. 8–9); galea with fusiform apical segment; palps with fusiform apical segment with rounded apex. Labium with apically free paraglossae and a broadly truncate glossal sclerite bearing 2 setae (fig. 10); palps with bisetose anterior margin on penultimate segment, apical segment with minute trichoid sensilla.

Pronotum: Pronotal shape varies from quadrate with well-developed hind angles and sinuate basolateral margins (figs. 37, 42–44), to suborbicular, with obsolete hind angles and rounded basolateral margins (figs. 36, 49, 55–58). Laterobasal depressions smooth (figs. 37, 40, 56–58, 70) to densely punctate (figs. 50–54); median base smooth (fig. 40), or with irregular depressions (fig. 42), or with longitudinal wrinkles (figs. 56–58, 66); basal marginal bead usually continuous medially, but reduced or absent in some species; anterior transverse depression obsolete (fig. 39) to deep (figs. 43, 44); lateral depressions narrow throughout length (fig. 64) to broadly explanate, wide even at front angles (fig. 70).

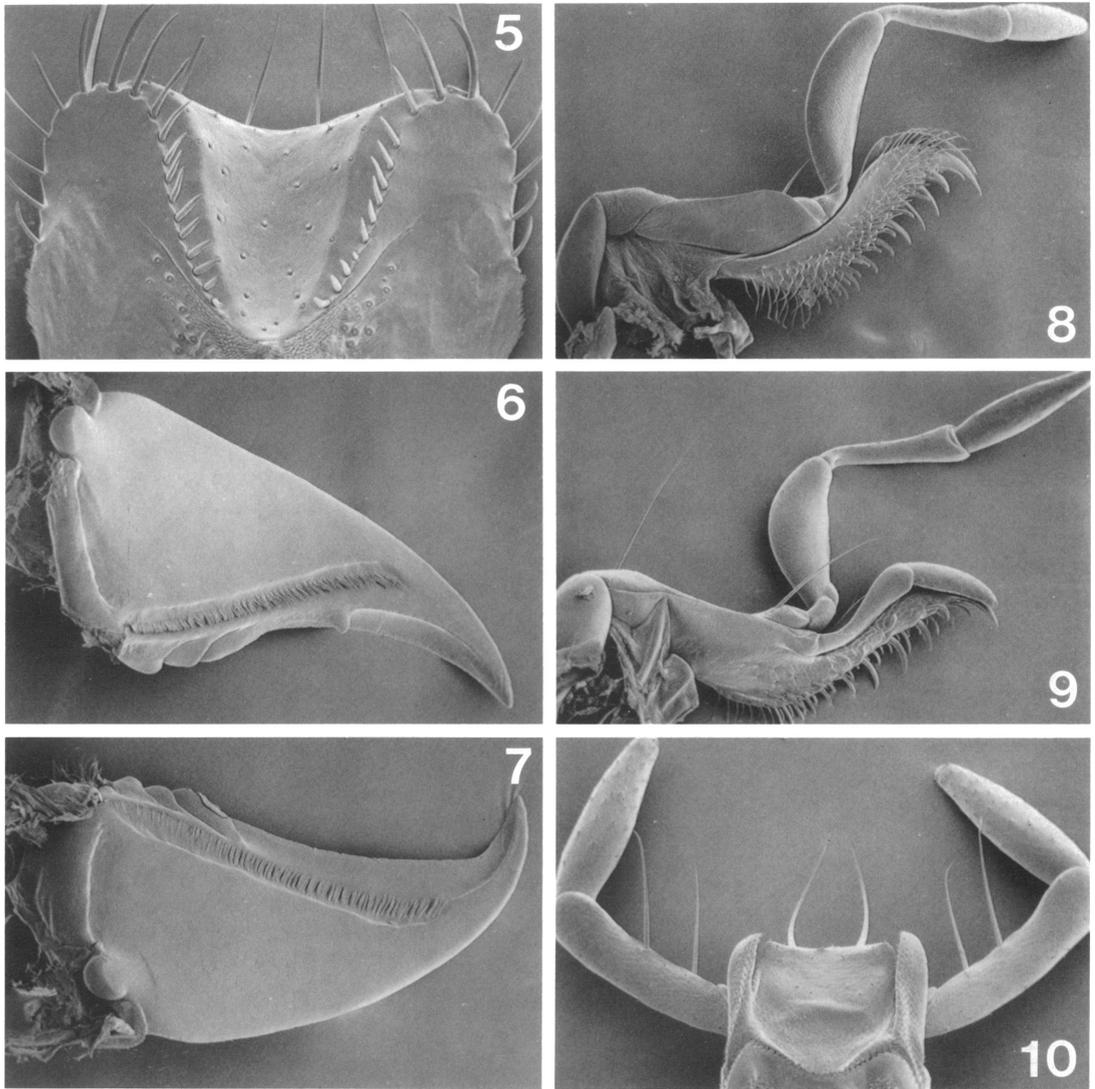
Elytra: Humeri broad in macropterous species, sometimes narrowed in species with reduced flight wings, sides correspondingly subparallel or convex; humeral angle rounded (figs. 80–81), obtuse-rounded (figs. 78, 79), or more strongly angulate (figs. 75–77). Elytral striae continuous on disc, usually smooth, but sometimes punctate in basal $\frac{1}{2}$ or $\frac{1}{3}$ of length. Elytral intervals flat to convex. Scutellar seta almost always present (absent only in *P. machetellus*, n. sp.); 3 dorsal elytral setae, anterior at basal $\frac{1}{4}$ of length associated with 3rd stria, posterior 2 setae associated with 2nd stria; 14–17 setae in 8th stria anterad subapical situation; 2 setae near elytral apex in 7th stria.

Metathoracic Wings: The flight wings may be fully developed (fig. 11), or variously reduced, with flight-wing configuration an intraspecific polymorphism. Wing reduction was categorized in 3 states; 1) brachyptery, in which the reflexed apex of wing is reduced so that wing is no longer folded under the elytra, and the apical venation is reduced or eliminated (fig. 12), 2) stenoptery, in which the wing is reduced to a straplike rudiment,



Figs. 2–4. Head capsule, dorsal view. 2. *P. degallieri*. 3. *P. dominicensis*. 4. *P. stenophthalmus*.

with venation reduced to undifferentiated remnants of subcosta, medius and cubitus (fig. 13), 3) vestigial wings, which are reduced

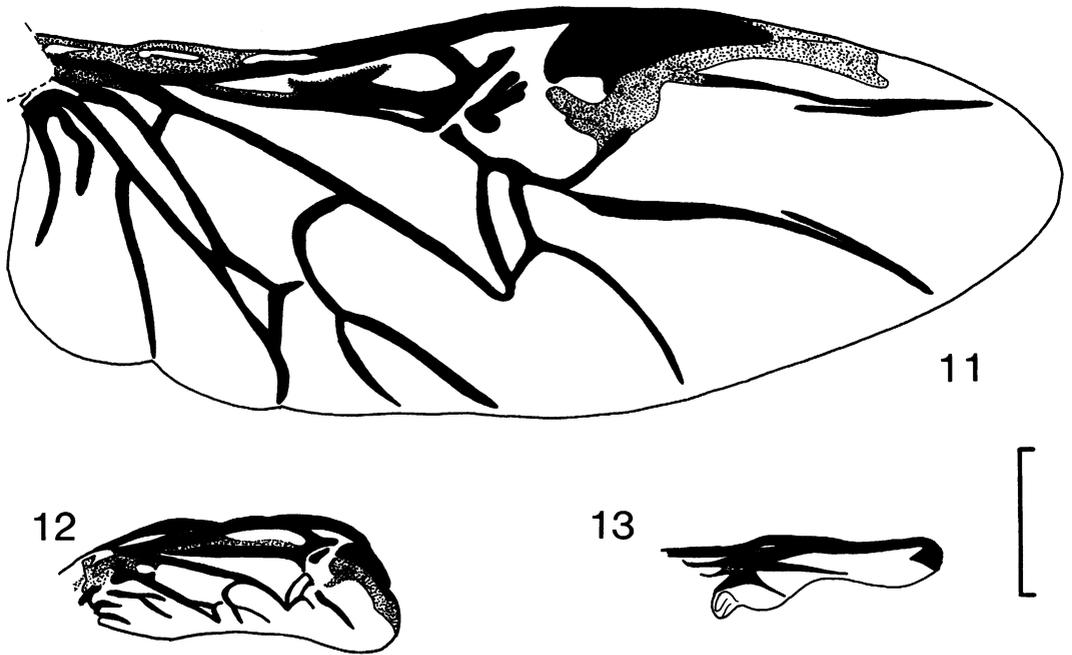


Figs. 5–10. Mouthparts of *P. degallieri*. 5. Epipharynx, ventral view ($\times 180$). 6. Right mandible, ventral view ($\times 132$). 7. Left mandible, ventral view ($\times 132$). 8. Left maxilla, dorsal view ($\times 76$). 9. Right maxilla, ventral view ($\times 75$). 10. Labium and palps, dorsal view ($\times 142$).

to a scalelike flap of wing tissue that does not extend beyond hind margin of metathorax.

Legs: Setation of legs homogeneous within the species group; prothorax with 1 ventral seta; profemur anteriorly with glabrous ventral surface and a series of dorsal setae on outer half of length (fig. 14); profemur posteriorly with 2 ventral setae and an apical seta (fig. 15); mesocoxa with 1 ridge seta and 1 ventral seta (fig. 16); mesofemur anteriorly with 2 ventral setae, 2–4 larger subdorsal se-

tae, and a series of smaller dorsal setae on outer half of length (fig. 16); metacoxa bisetose, with anterior and posterior outer setae (fig. 17); metatrochanter unisetose (figs. 18–20); metafemur with 2 anteroventral setae (figs. 18–20), with (fig. 20) or without (figs. 18, 19) anteroapical seta. Tarsi convex dorsally, with variously developed inner and outer dorsal sulci on basal tarsomeres, only *P. bacatellus*, n. sp., with a median dorsal sulcus, 4th tarsomere trisulcate. Protarsus



Figs. 11–13. Metathoracic flight wings of *degallieri* group species. 11. Macropterous wing, *P. dominicensis*. 12. Brachypterous wing, *P. brunnellus*. 13. Stenopterous wing, *P. crypticulus*. Scale bar = 1.0 mm.

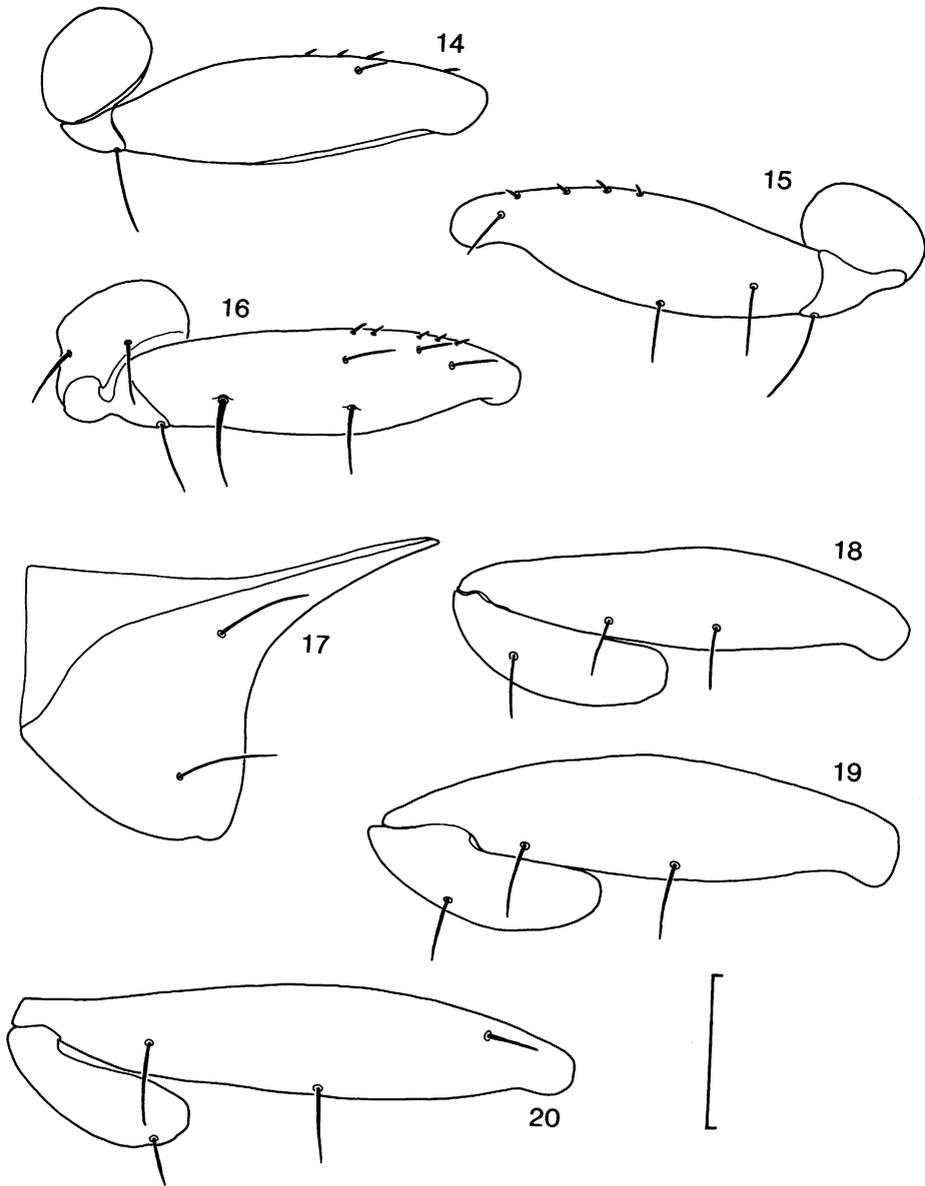
with anteriorly lobate 4th tarsomere (fig. 21), ventral setae cylindrical in basal portions of tarsomere, flattened on apical lobes (fig. 22). Protarsus of males with tarsomeres 1–3 laterally expanded, bearing 2 parallel series of squamose setae mesad the lateral spinose setae. Mesotarsus with anteriorly lobate 4th tarsomere (fig. 23), ventral setae arranged in 2 rows basally, 3 rows apically, setae cylindrical basally and flattened apically (fig. 24). Metatarsus with very small anterior lobe, and slightly elongate area basad posterior apical seta (fig. 25), ventral setae set in linear series, 4 setae anteriorly, 3 setae posteriorly (fig. 26). All 4th tarsomeres with anterior and posterior apical setae, apical setae on pro- and mesolegs at base of anterior lobe (figs. 21, 23). Tarsomere 5 with 2 dorsoapical setae (figs. 21, 23, 25) and 2 series of ventral setae, which may be short (fig. 27) or long (fig. 28); claws smooth internally.

Abdomen: The abdominal apex bears one apical seta each side in the males, and 2 setae each side in the females.

Microsculpture: Head dorsally with isodiametric to slightly transversely stretched iso-

diametric microsculpture, sculpticell margins ranging from deeply incised, giving cuticle a coriaceous appearance, to very shallow, with cuticle very shiny. Pronotal disc with transverse microsculpture, ranging from transversely stretched isodiametric mesh, to transverse lines joined by crosslines into a dense transverse mesh; laterobasal depressions, median base and median apex of pronotum with more isodiametric microsculpture than on disc. Elytral microsculpture ranging from transversely stretched isodiametric mesh (figs. 29, 30), to transverse mesh (figs. 31, 32), to dense transverse lines joined into a dense mesh (fig. 33, 34); sculpticells more isodiametric surrounding dorsal elytral setae (fig. 29) and in elytral striae (figs. 29–34).

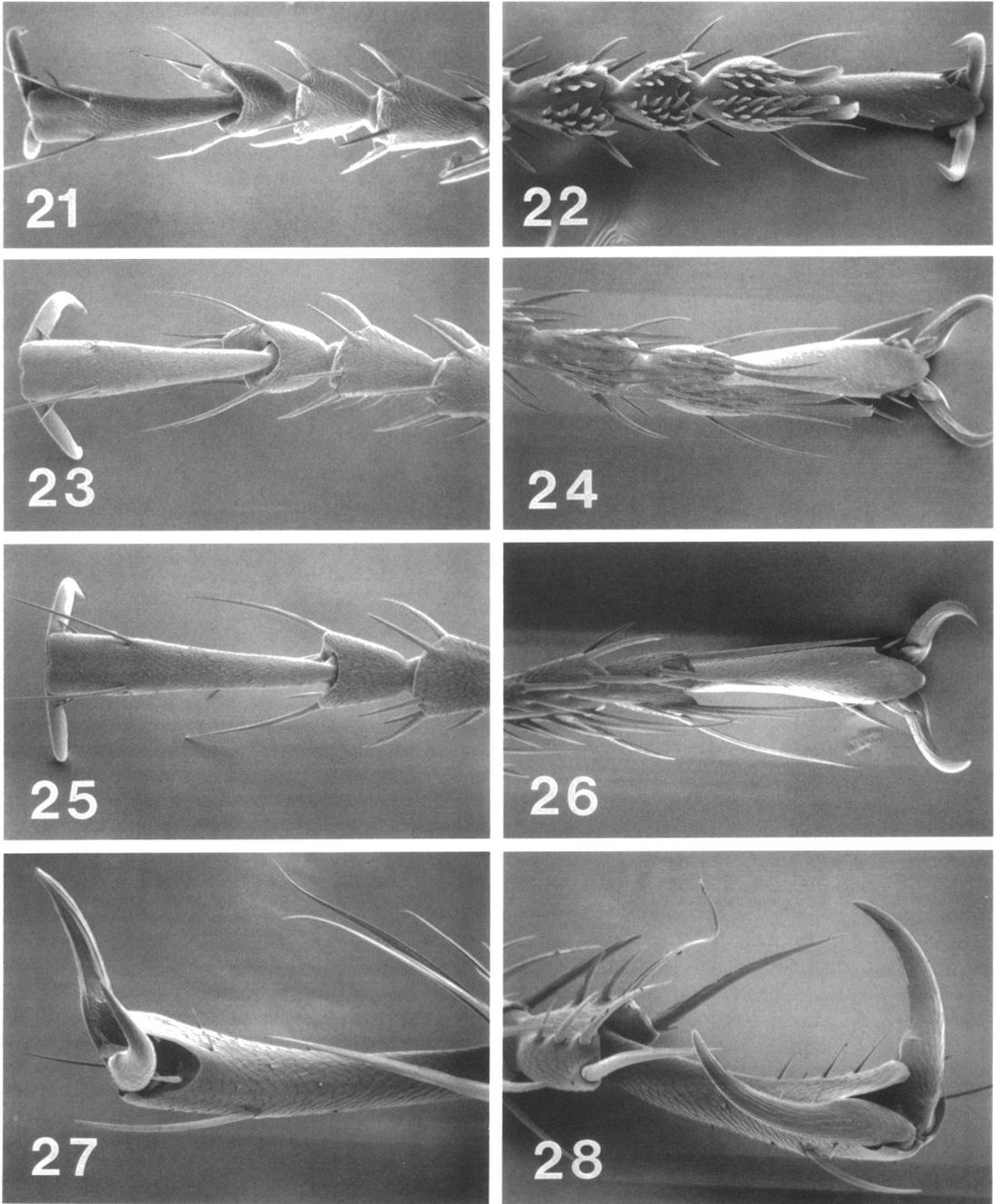
Body Size: The standardized body length is relatively uniform throughout group, ranging from 5.3–8.6 mm (fig. 35). Several species are noticeably smaller than the rest (*P. minusculus*, n. sp., *P. angustulus*, n. sp., *P. nevermanni*, n. sp., and *P. purpurellus*, n. sp.), their maximum size below 6.7 mm (see Cladistic Analysis section).



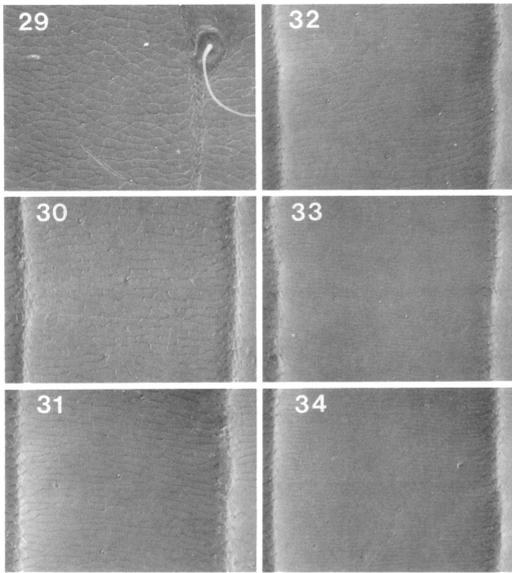
Figs. 14–18. Leg segments of *P. degallieri*. 14. Left profemur, anterior view. 15. Left profemur, posterior view. 16. Left mesofemur, anterior view. 17. Left metacoxa, ventral view. 18. Left metatrochanter and metafemur, ventral view. Fig. 19. Left metatrochanter and metafemur, *P. ovatulus*, ventral view. Fig. 20. Left metatrochanter and metafemur, *P. metallosomus*, ventral view. Scale bar = 0.5 mm for figs. 14–16, 17–20; scale bar = 0.31 mm for fig. 17.

Male Genitalia: Male aedeagus with glabrous parameres of the plesiomorphic Platyni type; right or ventral paramere (respectively for everted or relaxed position) is narrower than ovoid left or dorsal paramere.

Aedeagal median lobe may be finely acuminate apically (fig. 83), bluntly rounded (fig. 82), bluntly downturned (fig. 88), dorsally recurved (fig. 229), or with a minute hooklike projection (figs. 103, 104, 107). Aedeagal in-



Figs. 21–26. Apical portions of tarsus, *P. degallieri*. 21. Left protarsus, dorsal view ($\times 137$). 22. Right protarsus, ventral view ($\times 136$). 23. Left mesotarsus, dorsal view ($\times 135$). 24. Right mesotarsus, ventral view ($\times 136$). 25. Left metatarsus, dorsal view ($\times 135$). 26. Right metatarsus, ventral view ($\times 134$). Figs. 27–28. Metatarsomere 5 ventral setae, lateroventral view. 27. Short ventral setae, *P. marginissimus* ($\times 198$). 28. Long ventral setae, *P. ovatulus* ($\times 196$).



Figs. 29–34. Cuticular microsculpture of elytral disc near anterior dorsal elytral seta, third stria in right of view. 29. *P. ovatulus* ♀ (×175). 30. *P. caerulipennis* ♀ (×175). 31. *P. aeneipennis* ♀ (×175). 32. *P. baorucensis* ♂ (×175). 33. *P. degallieri* ♀ (×175). 34. *P. woldai* ♂ (×175).

ternal sac may be covered only with fine microtrichia (fig. 87) or it may bear various sclerotized features. Sclerotizations of sac may be in the shape of large spines (figs. 104, 140, 142, 192), rasplike structures with a scaly surface (figs. 84, 85, 89–92) herein called rasps, or a brush of long macrotrichia that may or may not be arranged in a linear series (figs. 107, 110, 113, 115). Sacral spines can be located apically, ventral, to right, and to left of gonopore (figs. 206, 208, 211), or spines may be located medially along sac, on right and left side (figs. 149, 150). Rasps may be located apically ventrad gonopore (fig. 142), apically to right of gonopore (fig. 90), medially on dorsum of sac (fig. 91), or basally on ventral surface of sac (figs. 136, 169). Bushy macrotrichia may be located dorsad gonopore (figs. 111, 113, 115) or ventrad gonopore (figs. 107, 111, 113). Aedeagal internal sac may be approximately the length of the median lobe from parameral articulation to apex (fig. 115), or it may be more elongate, its length ranging

from 1.25 to 3.25 × median lobe length (figs. 91, 110).

Female Ovipositor: The ovipositor is composed of paired 2-segmented gonocoxae (figs. 93, 120); basal gonocoxite with apical setae arranged in a single series; apical gonocoxite with 2–5 lateral ensiform setae, 1 dorsal ensiform seta, and 2 nematiform setae set in an apical sensory depression.

Female Reproductive Tract: Basad the gonocoxae, the internal reproductive tract consists of a narrow vagina little differentiated from a wider bursa copulatrix; the bursa usually apparently glabrous internally, but lined along the median of length with a ring of very short, fine microtrichia, visible only at ×400, in several species (*P. crypticulus*, n. sp., and *P. rotundatulus*, n. sp.) larger microtrichia are found on ventral and/or dorsal surface of bursa. Bursa copulatrix may have dorsal lobe, which may be unsclerotized (figs. 96, 98, 100) or sclerotized (figs. 118, 120, 121, 123), and may be broad (fig. 129) or narrow (figs. 118, 120, 123, 126, 132). Spermathecal apical reservoir elongate, joined either linearly (fig. 120) or angularly (fig. 155) to spermathecal duct; spermathecal duct may be narrower than apical reservoir (fig. 120), or may be of equal diameter (fig. 179).

MONOPHYLY OF *DEGALLIERI* GROUP

Based on cladistic analysis, the *degallieri* species group can be characterized by the following derived character states: 1) neck not constricted, 2) mesofemur with 2 anteroventral setae, 3) metafemur with 2 anteroventral setae, 4) pro- and mesotarsi with penultimate segment anteriorly lobate, 5) body microsculpture transverse, best compared on elytral disc, 6) body size small, 7) bursa copulatrix with very fine luminal microtrichia. The monophyly of the species group, relative to its closest outgroups within *Platynus* is based on synapomorphy 1 of the above list. A neck without constriction is considered a sympleiomorphy within Platynini at large, but in this case is judged a reversal, due to the presence of derived lobate tarsomeres in species of the *degallieri* group. These tarsal apomorphies indicate the *degallieri* group's relationship to other *Platynus* taxa, which are char-

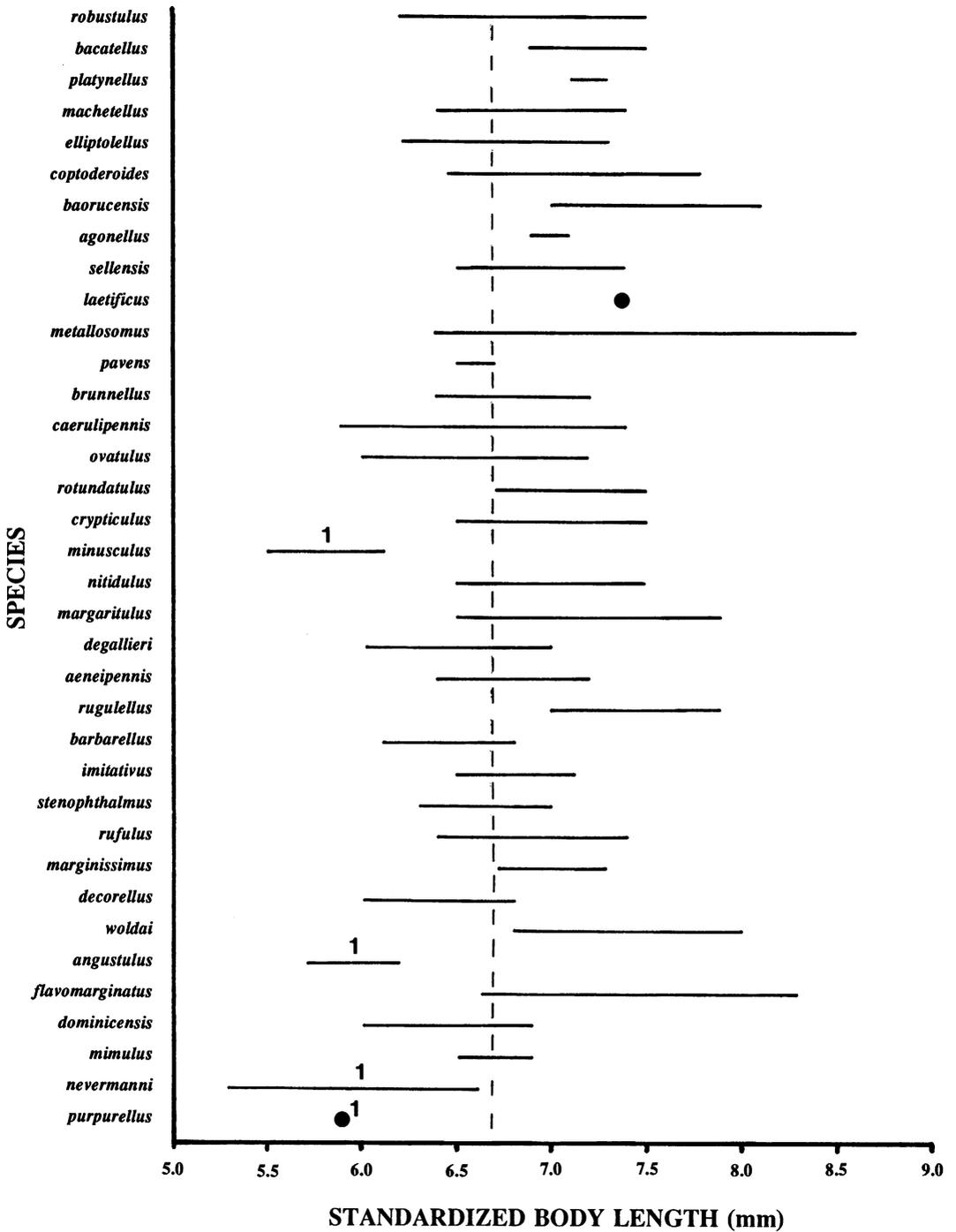


Fig. 35. Standardized body length for species of the *degallieri* group. Derived character state for body size (1) scored if all individuals of species are < 6.7 mm body length.

acterized by a constricted neck. (See Cladistic Analysis section for discussion of character analysis.)

KEY TO ADULTS OF THE DEGALLIERI GROUP

This key utilizes external characters for the identification of the species. In one case—couplet 17 separating *P. woldai*, n. sp., and *P. rugulellus*, n. sp.—external characters can be supplemented by male terminalic characters to provide an unambiguous determination. It is recommended that in all determinations, a male dissection—preferably with aedeagal internal sac distended—be used to confirm the identification. The male terminalic structures differ greatly among externally similar species, allowing trouble-free diagnosis. The preference for male specimens to confirm diagnoses runs counter to the description of *P. imitativus*, n. sp., which is based solely on females, and serves to emphasize the taxonomic difficulty of the group.

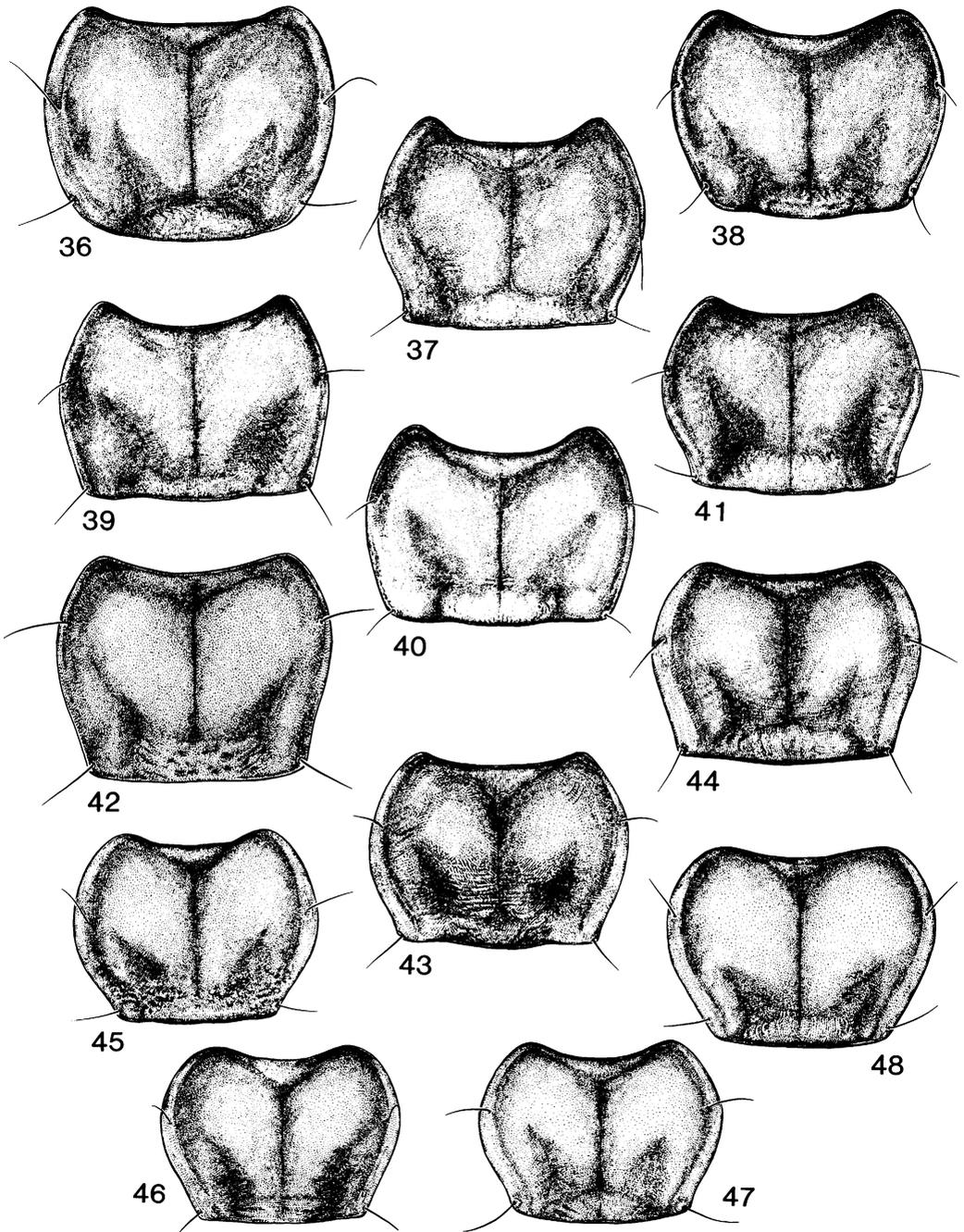
The development of the eyes is useful to diagnose species and is quantified by the ocular ratio, the ratio of maximum head width across eyes to minimum frons width between eyes.

The length of the ventral setae of the fifth tarsomere can distinguish certain taxa. The key specifies the setae on metatarsomere 5, but if those segments are missing, the setal lengths can be judged using the meso- or prothoracic tarsi. Ideally a number of specimens should be examined, as these setae are variable in length, presumably becoming worn during the life of the beetles. Their utility is judged on equally lengthed setae in series of young appearing beetles; i.e., little elytral scraping, teneral integument, etc.

In order to duplicate lighting conditions used during key development, specimens should be examined under bright halogen generated light with a frosted plastic diffuser ring around the specimen.

- 1. Metafemora with single seta on anterior surface near apex (fig. 20) 2
- Metafemoral apex glabrous anteriorly (figs. 18, 19) 6
- 2(1). Pronotal hind angles evident, either obtuse-rounded or distinctly angulate, with or without sinuate basolateral margin (figs. 37-40) 3

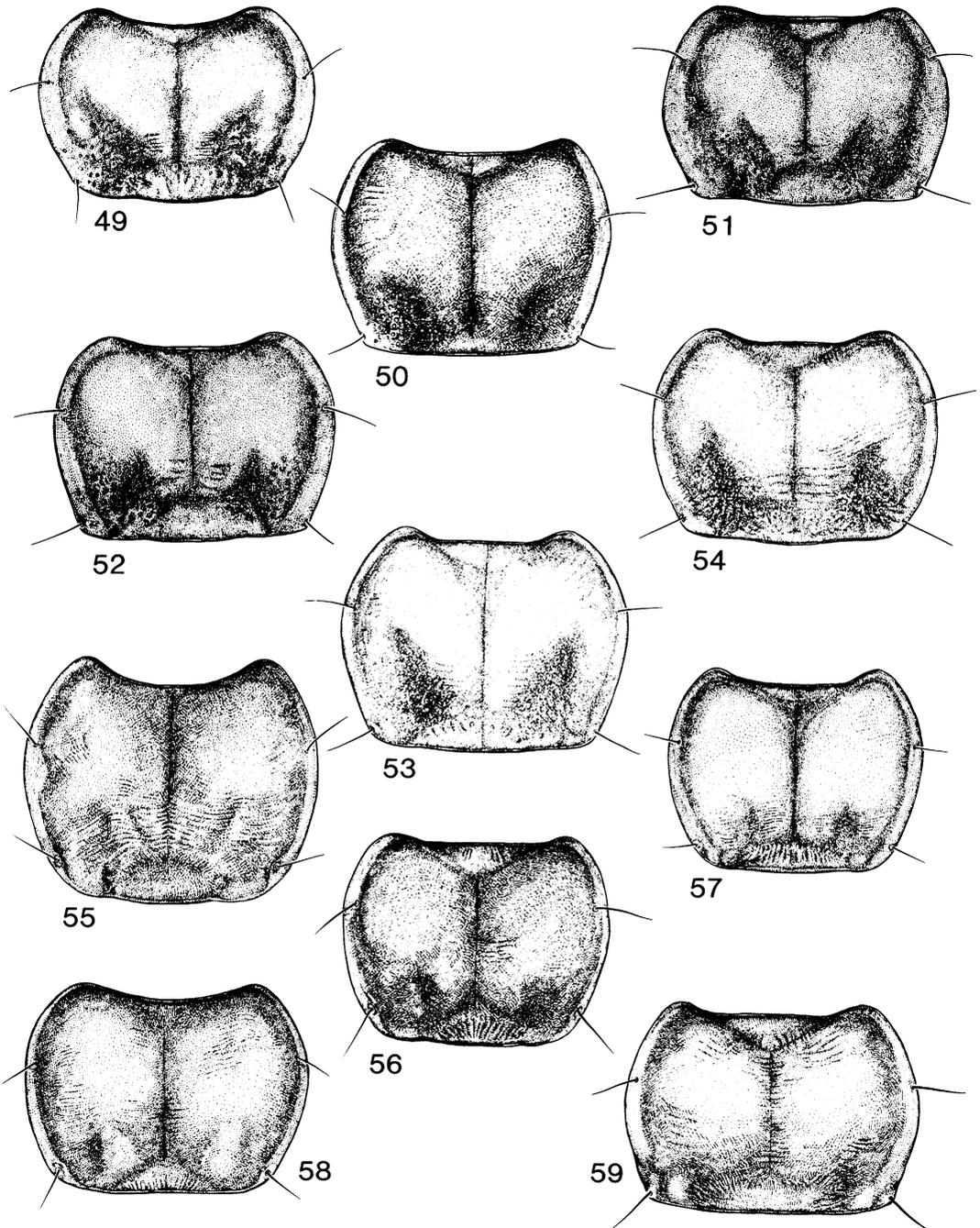
- Pronotal hind angles obsolete, hind angle indicated only by widening of marginal bead and location of basal setae (fig. 36) *P. laetificus* (p. 39)
- 3(2). Pronotal basolateral margin straight or convex before hind angles (figs. 38-40) 4
- Pronotal basolateral margin sinuate before well-defined, slightly obtuse hind angles (fig. 37) *P. pavens* (p. 41)
- 4(3). Metepisternum reduced, lateral margin length equal to or less than 1.5 x anterior margin 5
- Metepisternum less reduced, lateral margin length greater than 1.5 x anterior margin *P. metallosomus* (p. 39)
- 5(4). Pronotal hind angles distinctly angulate, the basolateral margin straight before obtuse hind angles (fig. 39) *P. agonellus* (p. 36)
- Pronotal hind angles evident but rounded (fig. 40) *P. sellensis* (p. 37)
- 6(1). Pronotal basolateral margin sinuate before well-defined hind angle (figs. 41-48) 7
- Pronotal basolateral margin straight to convexly curved before variously developed hind angles (figs. 49-74) 12
- 7(6). Pronotal and elytral disc piceous, may be alutaceous due to microsculpture but never green metallic 8
- Pronotal and elytral disc green metallic, sometimes with aeneous to purplish reflection *P. coptoderoides* (p. 31)
- 8(7). Metepisternum elongate, lateral margin length equal to or greater than 1.5 x anterior margin 9
- Metepisternum subquadrate, lateral margin length subequal to anterior margin, flight wings reduced to vestigial flaps *P. stenophthalmus*, n. sp. (p. 66)
- 9(8). Pronotal basolateral margin strongly sinuate before hind angle (figs. 43-45) 10
- Pronotal basolateral margin weakly sinuate before hind angle (figs. 46-48) 11
- 10(9). Pronotal disc with microsculpture of evident transverse lines forming a loose mesh; body length 6.0-6.9 mm *P. dominicensis* (p. 75)
- Pronotal disc glossy, microsculpture of faint transverse lines obscured by reflection of surface; body length 5.9 mm (♂) *P. purplellus*, n. sp. (p. 80)
- 11(9). Pronotal hind angles well defined, basal margin straight inside angles (figs. 46) *P. nevermanni*, n. sp. (p. 79)
- Pronotal hind angles more rounded, basal



Figs. 36–48. Pronota, dorsal view. 36. *P. laetificus*. 37. *P. pavens*. 38. *P. metallosomus*. 39. *P. agonellus*. 40. *P. sellensis*. 41. *P. coptoderoides*. 42. *P. stenophthalmus*. 43, 44. *P. dominicensis*. 45. *P. purpurellus*. 46. *P. nevermanni*. 47, 48. *P. imitativus*.

margin smoothly convex (fig. 47–48)
 *P. imitativus*, n. sp. (p. 63)
 12(6). Pronotal laterobasal depressions punctate, their surface with numerous dis-

tinct punctulae on at least the mesal margins (figs. 49–54) 13
 - Pronotal laterobasal depressions completely smooth to irregularly rugose or

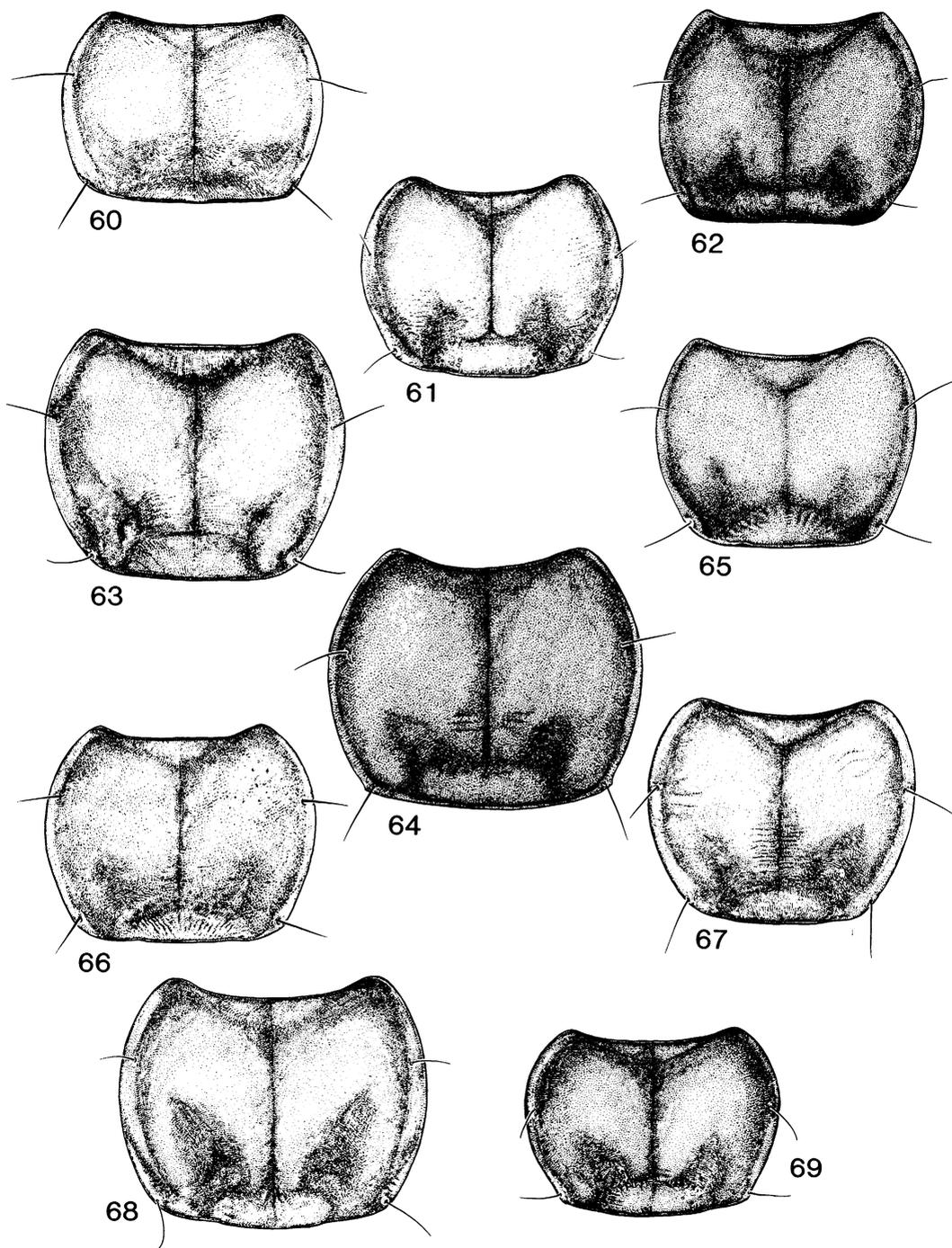


Figs. 49-59. Pronota, dorsal view. 49. *P. degallieri*. 50. *P. marginissimus*. 51. *P. aeneipennis*. 52. *P. mimulus*. 53. *P. woldai*. 54. *P. rugulellus*. 55. *P. rotundatulus*. 56. *P. crypticulus* (Chiapas-Oaxaca: 18.7 km W Rizo de Oro). 57. *P. crypticulus* (Oaxaca: Puerto Escondido). 58. *P. ovatulus*. 59. *P. rufulus*.

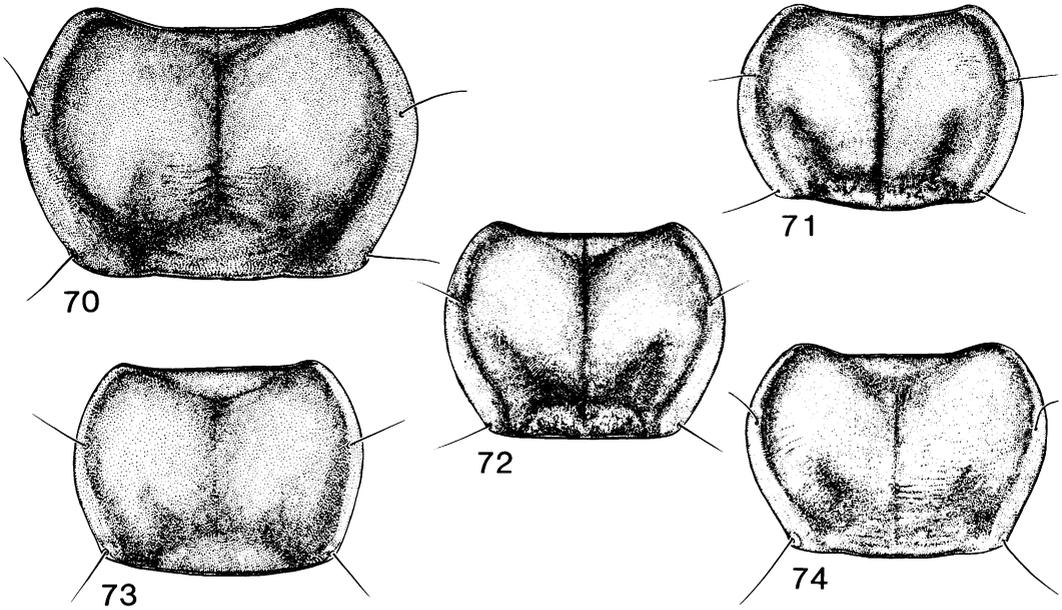
wrinkled, but never with distinct round punctulae surrounded by smooth cuticle (figs. 55-74) 18
 13(12). Elytra with well-developed metallic re-

flexion, either purplish or greenish; head and pronotum brunneous to piceous 14
 - Elytra may be alutaceous due to trans-

- verse mesh microsculpture, but reflection not distinctly more metallic than on forebody 15
- 14(13). Elytra with greenish metallic reflection; elytral striae with distinct punctures in basal half *P. degallieri* (p. 57)
- Elytra with bluish to purplish metallic reflection, sometimes with aeneous overtones; elytral striae may be irregular, wavering in basal half, but never distinctly punctate
 *P. marginissimus*, n. sp. (p. 68)
- 15(13). Pronotal disc and head piceous, not paler than elytral disc 16
- Pronotum with testaceous explanate margins and rufous disc, head rufous, elytra darker with at least a smoky cast
 *P. aeneipennis* (p. 59)
- 16(15). Eyes moderately convex, ocular ratio 1.60–1.75 17
- Eyes very convex, ocular ratio 1.85–1.90
 *P. mimulus*, n. sp. (p. 77)
- 17(16). Elytral striae distinctly punctate in basal half (best seen on sutural and 2nd striae); male aedeagal internal sac with trispinose apex (figs. 191, 192)
 *P. woldai*, n. sp. (p. 72)
- Elytral striae may be irregular, slightly wavering in basal half, but distinct punctures lacking; male aedeagal sac with apical rasp (figs. 184–186)
 *P. rugulellus*, n. sp. (p. 60)
- 18(12). Metatarsomere 5 with length of ventral setae subequal or longer than depth of tarsomere at setal positions (based on unworn specimens) 19
- Metatarsomere 5 with length of ventral setae very short to just less than tarsomere depth 21
- 19(18). Pronotal hind angles indicated by abrupt change of curvature at or posterad basal seta (figs. 56–58) 20
- Pronotal hind angles obsolete, indicated only by widened lateral margin at basal seta position (fig. 55)
 *P. rotundatulus*, n. sp. (p. 49)
- 20(19). Pronotal base narrower, basolateral margin upturned at hind angle, the margin distinctly differentiated from deepest part of laterobasal depression (figs. 56, 57) *P. crypticulus*, n. sp. (p. 50)
- Pronotal base broader, basolateral margin explanate, depressed, barely raised above laterobasal depression (fig. 58)
 *P. ovatulus* (p. 47)
- 21(18). Body variously colored, but elytra always piceous or metallic 22
- Body pallid, head and pronotal disc rufous, pronotal margins, antennae and femora testaceous, elytra rufous with a smoky cast *P. rufulus* (p. 66)
- 22(21). Pronotal disc concolorous with head and elytra, although elytra may have metallic reflection 23
- Pronotal disc rufous, paler than rufopiceous to piceous head and piceous elytra; elytra with weak to well-developed bluish metallic reflection
 *P. decorellus*, n. sp. (p. 71)
- 23(22). Pronotal laterobasal depressions smooth, without rugose wrinkles (figs. 62–74) 24
- Pronotal laterobasal depressions weakly to strongly rugose, hind angle obtuse, well developed (fig. 61)
 *P. margaritulus*, n. sp. (p. 55)
- 24(23). Basal groove of elytra strongly recurved from 4th to 7th stria, distinctly angulate to tightly rounded at humerus (figs. 75–79) 25
- Basal groove of elytra less strongly recurved, more broadly rounded at humerus (figs. 80, 81) 29
- 25(24). Ventral setae of tarsomere 5 short enough to be invisible except at high power ($\times 125$), length much less than $\frac{1}{2}$ tarsomere depth at setal positions . . . 26
- Ventral setae of tarsomere 5 clearly visible, length $\frac{1}{2}$ to subequal to tarsomere depth at setal positions 28
- 26(25). Pronotal basolateral margin distinctly angulate to obtuse-rounded at hind seta (figs. 63–66) 27
- Pronotal basolateral margin obtuse-rounded just behind basal seta, seta slightly removed from margin (fig. 62)
 *P. elliptolellus*, n. sp. (p. 30)
- 27(26). Pronotal lateral explanation broad in basal half, narrower before lateral seta (fig. 63); elytral scutellar seta absent (fig. 76)
 *P. machetellus*, n. sp. (p. 29)
- Pronotal lateral explanation narrow throughout length, only slightly wider near basal seta (fig. 64); elytral scutellar seta present (fig. 77)
 *P. robustulus*, n. sp. (p. 23)
- 28(25). Metepisternum subquadrate to slightly elongate, lateral margin length 1.0–1.5 \times anterior margin
 *P. brunnellus*, n. sp. (p. 42)
- Metepisternum elongate, lateral margin length greater than 1.5 \times anterior margin . . . *P. caerulipennis*, n. sp. (p. 45)
- 29(24). Metepisternum slightly elongate to quadrate, lateral margin length 1.0–1.5 \times anterior margin; pronotal basal bead often obsolete medially (fig. 67, 68) 30
- Metepisternum elongate, lateral margin



Figs. 60–69. Pronota, dorsal view. 60. *P. decorellus*. 61. *P. margaritulus*. 62. *P. elliptolellus*. 63. *P. machetellus*. 64. *P. robustulus*. 65. *P. brunnellus*. 66. *P. caerulipennis*. 67. *P. platynellus*. 68. *P. bacatellus*. 69. *P. baorucensis*.



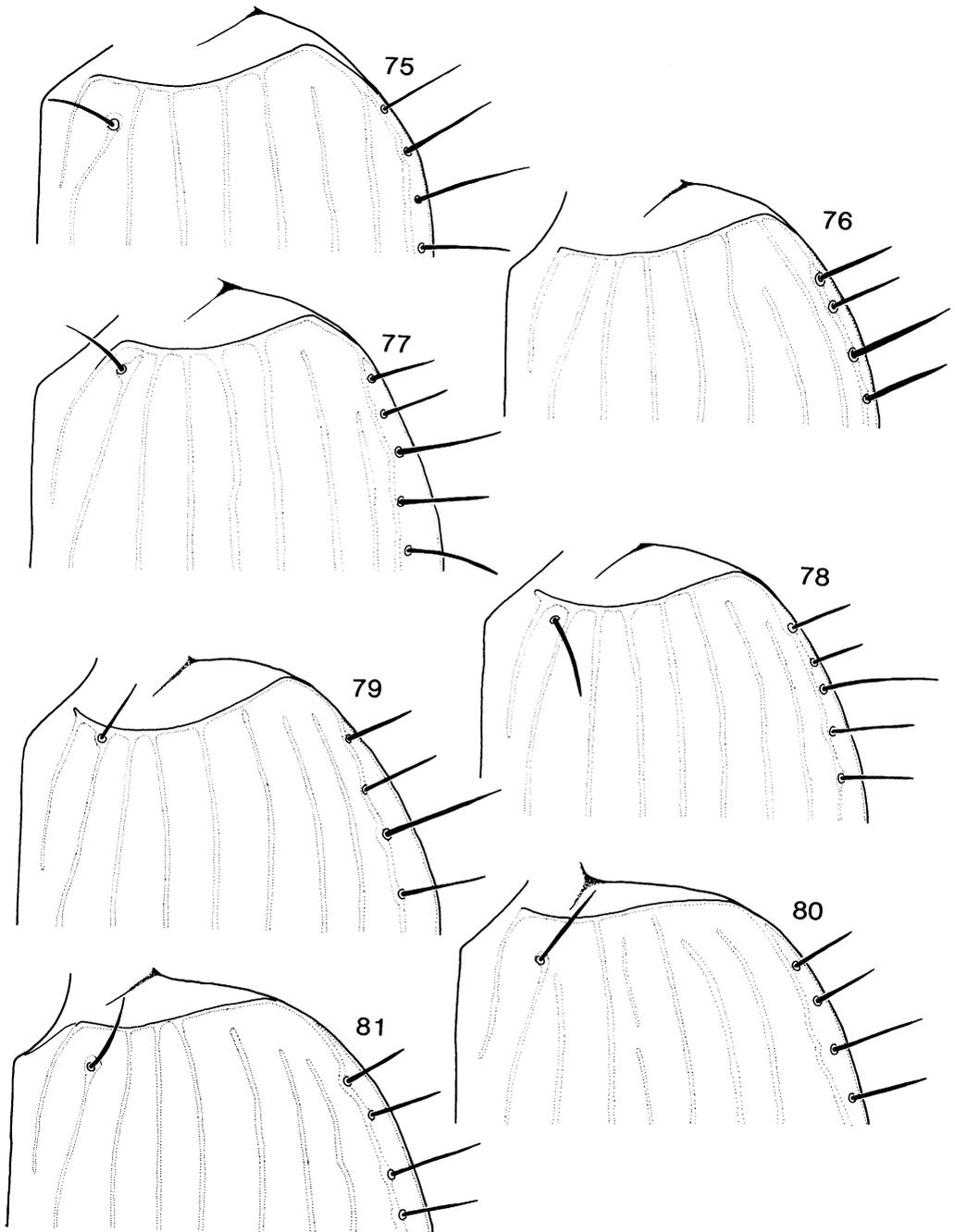
Figs. 70–74. Pronota, dorsal view. 70. *P. flavomarginatus*. 71. *P. minusculus*. 72. *P. angustulus*. 73. *P. barbarellus*. 74. *P. nitidulus*.

- length greater than 1.5 × anterior margin; pronotal basal bead continuous (figs. 69–74) 31
- 30(29). Pronotum narrower basally (fig. 67); elytral intervals nearly flat on disc
..... *P. platynellus*, n. sp. (p. 28)
- Pronotum broader basally (fig. 68); elytral intervals slightly to moderately convex on disc ... *P. bacatellus*, n. sp. (p. 25)
- 31(29). Legs and pronotal margins paler than pronotal disc, antennae more or less flavous, pronotal laterobasal depressions with microsculpture of transverse lines 32
- Appendages concolorous with body, pronotal lateral margins only faintly paler than disc, pronotal laterobasal depressions with well-developed, stretched isodiametric microsculpture
..... *P. baorucensis*, n. sp. (p. 34)
- 32(31). Pronotal lateral margins narrower anteriorly (figs. 71–74), only slightly paler than disc at base, humeri slightly angulate to rounded 33
- Pronotal lateral margins broadly explanate (fig. 70), flavous to base, humeri slightly angulate laterad sixth stria ...
..... *P. flavomarginatus*, n. sp. (p. 74)
- 33(32). Elytral microsculpture of dense transverse lines, surface reflection obscuring individuals lines 34
- Elytral microsculpture of transverse lines, forming a dense transverse mesh in females, and a dense series of transverse lines with limited cross lines in males, the individual lines visible through surface reflection
..... *P. minusculus*, n. sp. (p. 51)
- 34(33). Pronotal hind angles distinctly angulate at or just behind basal seta (figs. 73, 74) 35
- Pronotal hind angles tightly rounded at basal seta (fig. 72)
..... *P. angustulus*, n. sp. (p. 73)
- 35(34). Pronotal basal bead distinct and tightly raised behind laterobasal depressions, the bead continuous across base (fig. 73)
..... *P. barbarellus*, n. sp. (p. 61)
- Pronotal basal bead indistinct laterally, the margin smoothly and broadly elevated from laterobasal depressions (fig. 74) *P. nitidulus*, n. sp. (p. 53)

SPECIES DESCRIPTIONS

***Platynus robustulus*, new species**
(figs. 64, 77, 82, 93, 94, 102)

DIAGNOSIS: Pronotum broad relative to weakly developed, strongly angulate humeri; head and pronotal disc piceous, pronotal margins and base, and elytra rufopiceous; an-



Figs. 75–81. Right humerus, dorsal view. 75. *P. elliptolellus*. 76. *P. machetellus*. 77. *P. robustulus*. 78. *P. brunnellus*. 79. *P. caerulipennis*. 80. *P. platynellus*. 81. *P. bacatellus*.

tennae, legs and elytral epipleura rufotestaceous; eyes protruding little from head; pronotum with angulate hind angles, smooth laterobasal depressions margined by well-de-

fined bead (fig. 64); ventral setae of tarsomere 5 short enough to be visible only at high magnification ($\times 125$).

DESCRIPTION: Frontal grooves relatively

deep, well defined, deep wrinkle pointing anterad from anterior supraorbital setae, eyes relatively small, protruding little from head, ocular ratio 1.45 to 1.54. Pronotum with lateral margins sinuate just before angulate hind angles; laterobasal depressions smooth, well developed; basal marginal bead continuous across base, well defined behind laterobasal depressions; median base smooth with only faint irregularities; median longitudinal impression fine throughout length, in slight depression basally; anterior transverse depression nearly obsolete; anterior marginal bead well defined through width; front angles tightly rounded; lateral marginal depressions narrow before lateral setae, slightly wider basad setae. Elytral striae smooth, slightly wavering; elytral intervals slightly convex; basal groove evenly recurved from scutellar to 7th stria; humerus angulate (fig. 77); 14 lateral elytral setae in eighth stria. Metepisternum quadrate, lateral and anterior margins subequal; flight wings vestigial. Basal metatarsomere with shallow outer and nearly obsolete inner dorsal sulci, the median area convex. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with well-developed isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture, the sculpticells in regular rows; pronotal laterobasal depressions with swirling transverse mesh microsculpture, median base and apex with irregular isodiametric mesh; elytra with transverse mesh microsculpture, a mixture of stretched isodiametric and rectangular sculpticells. Head capsule rufopiceous, labrum and mandibles rufous, palps and antennae testaceous; pronotum rufopiceous, margin not paler; elytra rufobrunneous, base and sutural interval paler, flavobrunneous; ventral body surface rufobrunneous, legs and entire elytral epipleura rufotestaceous.

Standardized body length 6.2–7.5 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved, with short, bluntly rounded apex (fig. 82). Aedeagal internal sac with lightly sclerotized to well-developed rasp of uncertain position, situated medially along median lobe in unverted specimens.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 11 setae (fig. 93). Apical gonocoxite with 3 lateral and 1 dorsal

ensiform setae. Bursa copulatrix with broad unsclerotized dorsal lobe. Spermathecal duct narrow, apical reservoir and duct little angled (fig. 94).

TYPE: Holotype δ (UASM, deposited in NMNH): MEX. Tamaulipas/ Sierra de Guate-/ mala, Rancho del/ Cielo, 8 mi. n.w./ Gomez Farias./ 3800' X.6-10.65//George E. Ball/ D. R. Whitehead/ collectors. Allotype ♀ : same data and deposition.

PARATYPES: Same data as holotype (UASM, 4 δ , 9 ♀).

ETYMOLOGY: The diminutive form of the Latin *robustus*, meaning strong, denoting the broad pronotum of this diminutive *Platynus*.

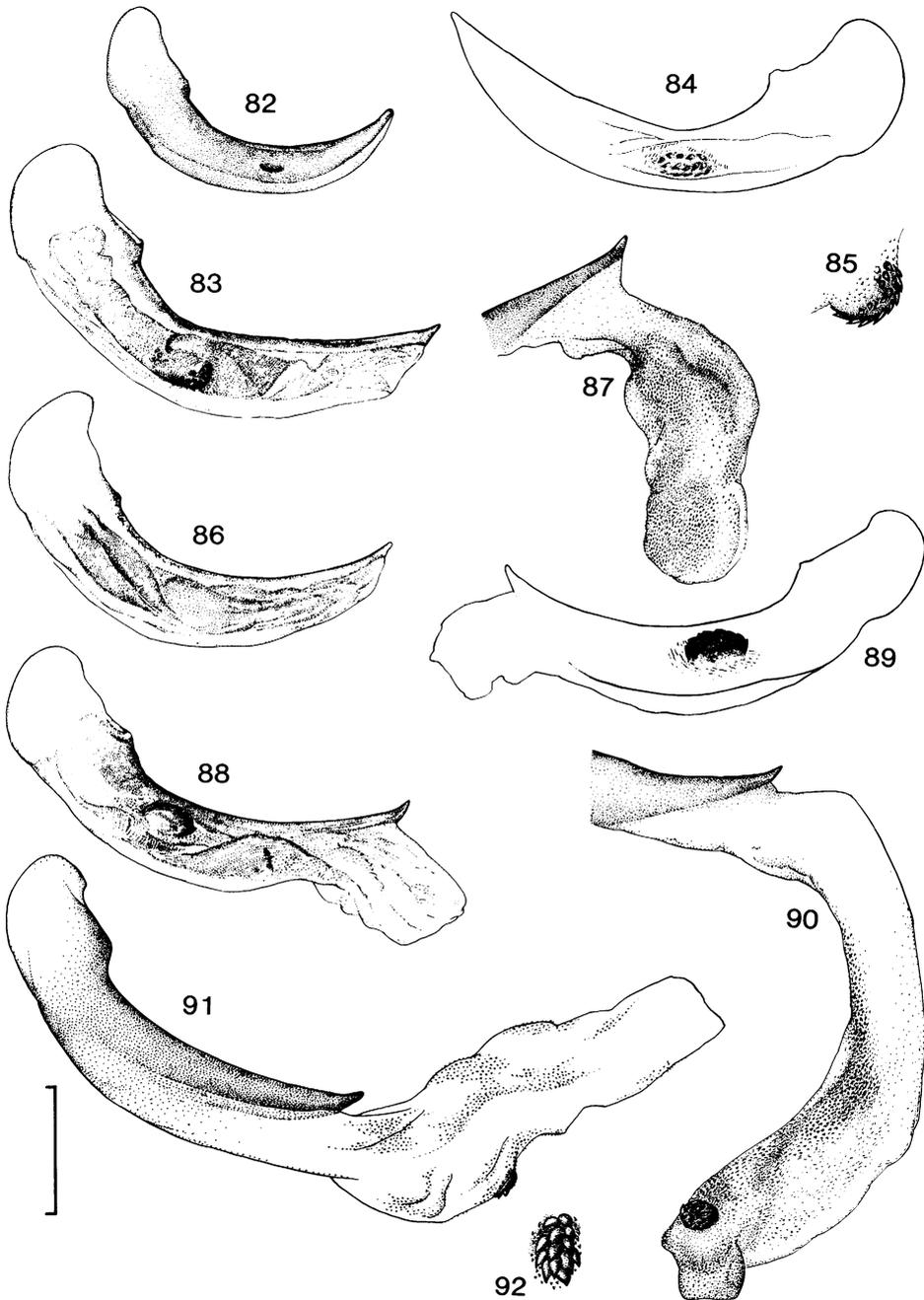
DISTRIBUTIONAL RANGE: Known only from the Sierra de Guatemala in the Mexican Sierra Madre Oriental (fig. 102).

Platynus bacatellus, new species

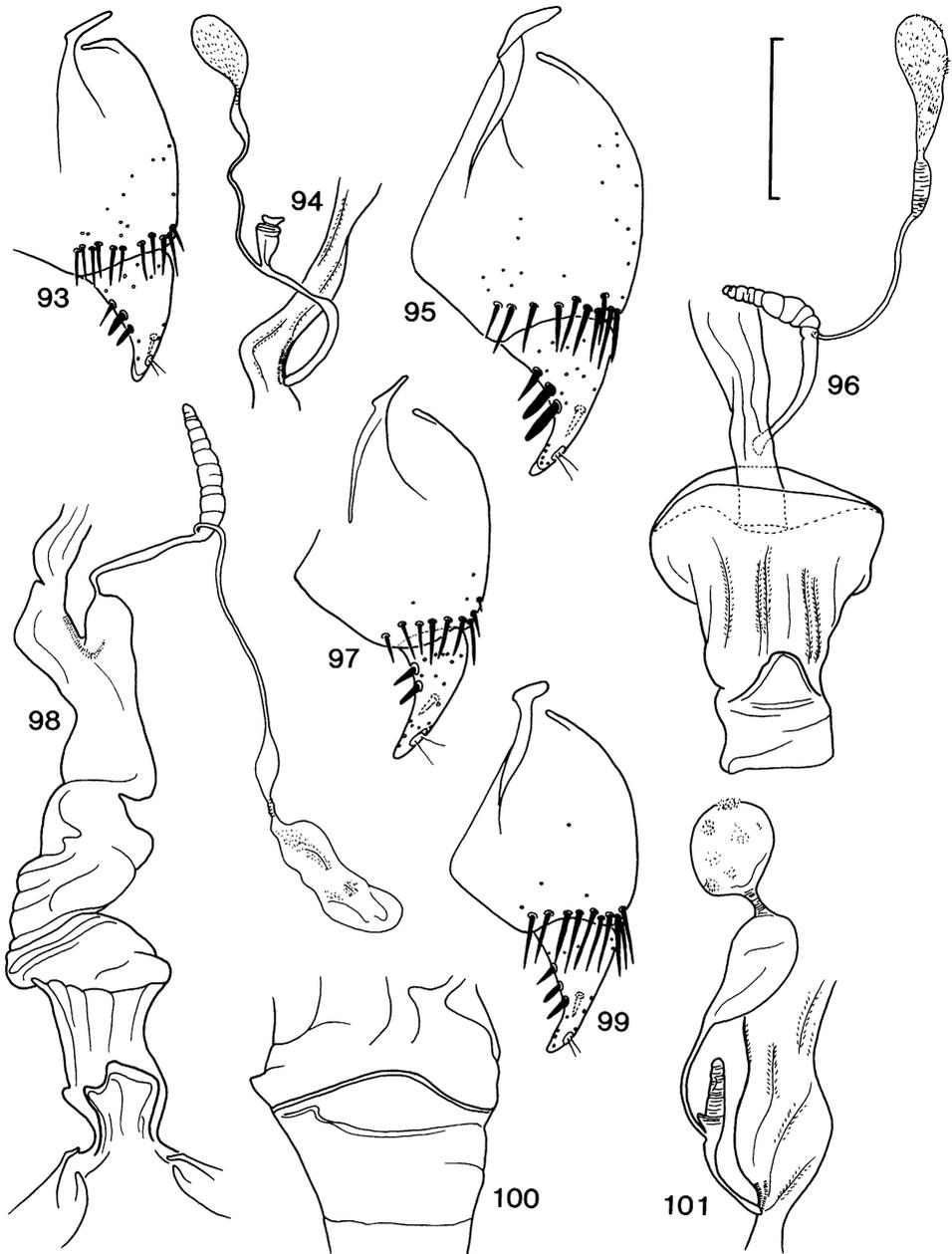
(figs. 68, 81, 83–85, 102)

DIAGNOSIS: Eyes small, little protruding from narrow head; pronotal lateral margins straight to slightly convex before obtuse hind angles (fig. 68), laterobasal depressions smooth and broad, basal marginal bead broadly obsolete medially, apical marginal bead continuous; basal elytral groove rounded on humeri (fig. 81); elytral intervals moderately convex on disc.

DESCRIPTION: Frontal grooves broad; eyes small, little protruding from head, ocular ratio 1.42 to 1.47. Pronotum broad relative to narrow humeri, hind angles obtuse (fig. 68); laterobasal depressions broad, smooth, sometimes with faint irregularities on inner surfaces; median base smooth; basal marginal bead broadly obsolete medially; median longitudinal impression well incised, extending nearly to front margin; anterior transverse depression broad, shallow, traceable $\frac{1}{3}$ distance to front angles; anterior marginal bead continuous medially; front angles tightly rounded to slightly angulate; lateral marginal depressions gradually widening behind lateral setae. Elytral striae deep, continuous, slightly wavering; elytral intervals moderately convex; basal groove moderately recurved to obtuse-rounded humerus (fig. 81); 16–17 lateral elytral setae in eighth stria. Metepisternum subquadrate, lateral and anterior margins subequal; flight wings stenopterous to vestigial. Basal metatarsomere trisulcate,



Figs. 82–92. Male aedeagi. 82. Median lobe, *P. robustulus*, dextroventral view. 83. Median lobe, *P. bacatellus*, dextroventral view. 84. Median lobe, *P. bacatellus*, detailing saccal rasp, levodorsal view. 85. Detail of saccal rasp, *P. bacatellus*. 86. Median lobe, *P. platynellus*, dextroventral view. 87. Everted internal sac, *P. platynellus*, dextroventral view. 88. Median lobe, *P. machetellus*, dextroventral view. 89. Median lobe, *P. machetellus*, detailing saccal rasp, levodorsal view. 90. Everted internal sac, *P. machetellus*, dextroventral view. 91. Median lobe, *P. elliptolellus*, dextroventral view. 92. Detail of saccal rasp of *P. elliptolellus*. Scale bar = 0.5 mm for figs. 82–91; scale bar = 0.125 mm for fig. 92.



Figs. 93–101. Female reproductive tract structures. 93. Right gonocoxa, *P. robustulus*, ventral view. 94. Common oviduct and spermatheca, *P. robustulus*, ventral view. 95. Right gonocoxa, *P. platynellus*, ventral view. 96. Bursa copulatrix with dorsal lobe, common oviduct, and spermatheca of *P. platynellus*, dorsal view. 97. Right gonocoxa, *P. machetellus*, ventral view. 98. Bursa copulatrix with dorsal lobe, common oviduct, and spermatheca of *P. machetellus*, dorsal view. 99. Right gonocoxa, *P. elliptolellus*, ventral view. 100. Dorsal lobe of bursa copulatrix, *P. elliptolellus*, dorsal view. 101. Common oviduct and spermatheca, *P. elliptolellus*, ventral view. Scale bar = 0.2 mm for figs. 93, 95, 97, 99, 100; scale bar = 0.5 mm for figs. 94, 96, 98, 101.

with deeply incised outer and inner dorsal sulci plus a depressed median groove. Tarsomere 5 with short ventral setae of length less than $\frac{1}{6}$ tarsomere depth at setal insertion.

Head with well developed, coriaceous isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture, the sculpticells regular; pronotal laterobasal depressions and median base with transversely stretched isodiametric microsculpture; elytra with shallow, elongate transverse mesh microsculpture, the sculpticells partially obscured by surface reflection. Head capsule rufopiceous, labrum and mandibles rufous, palps and antennae dusky rufotestaceous; pronotal disc slightly paler than head capsule, margins broadly rufobrunneous; elytra brunneous with vivid bluish to silvery metallic reflection; ventral body surface rufopiceous, pronotal epipleura flavobrunneous, elytral epipleura and legs paler, dusky rufotestaceous.

Standardized body length 6.9–7.5 mm.

MALE GENITALIA: Median aedeagal lobe straight apically, with bluntly downturned apex (fig. 83). Aedeagal internal sac elongate, with apical rasp on right side (figs. 83–85).

TYPE: Holotype ♂ (UASM, deposited in NMNH); MEX. CHIAPAS 9 km./ w. San Cristobal de/ las Casas, Rte. 190/ oak-pine for. Alnus/in litter 2390 m./ VI.29.1979 79-55//MEXICAN EXP. 1979/ J. S. Ashe, G. E. Ball,/ & D. Shpeley/ collectors.

PARATYPES: GUATEMALA. – **Huehuetenango:** San Mateo Ixtatan, 4.8 km E, 2560 m, 9-VIII-1974, Ball, Frania & Whitehead (NMNH, 1♂). MEXICO. – **Chiapas:** San Cristobal de las Casas, 9 km W, Rte. 190, 2390 m, oak-pine forest, in *Alnus* litter, 29-VI-1979, Ashe, Ball & Shpeley (NMNH, 3♂).

ETYMOLOGY: The diminutive form of the Latin *bacatus*, meaning adorned with pearls, denoting the vivid metallic reflection of the elytra.

DISTRIBUTIONAL RANGE: Known from the highland forests in Chiapas and Guatemala (fig. 102).

Platynus platynellus, new species
(figs. 67, 80, 86, 87, 95, 96, 102)

DIAGNOSIS: Elytral disc flattened; forebody rufopiceous, elytra piceous with bluish to sil-

very metallic reflection; eyes little protruding, frons broad; pronotum with rounded hind angles, laterobasal depressions smooth (fig. 67), basal marginal bead finely traceable to obsolete medially; metepisternum quadrate.

DESCRIPTION: Frontal grooves broad, shallow, areas laterad grooves depressed; eyes small, little protruding from head, frons broad, ocular ratio 1.42 to 1.51. Pronotum with tightly rounded hind angles (fig. 67); laterobasal depressions smooth, flat-bottomed; basal marginal bead weakly defined to obsolete medially, steeply elevated behind laterobasal depressions, broadly elevated from depressions at basal setae; median longitudinal impression fine on disc, obsolete in very shallow anterior transverse depression; anterior marginal bead broad, well defined medially, thinner at tightly rounded front angles; lateral marginal depressions equally broad from front angles to basal $\frac{1}{3}$ where they meet laterobasal depressions. Elytral striae shallow on disc, minute irregularities in basal portions giving impressions of punctulae; elytral intervals nearly flat on disc; humeri narrow, basal groove weakly recurved to rounded humerus (fig. 80); 15 lateral elytral setae in eighth stria. Metepisternum quadrate, lateral and anterior margins subequal; flight wings vestigial. Basal metatarsomere with broad, moderately deep outer and inner dorsal sulci, median area somewhat flat, subcarinate. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with shallow isodiametric microsculpture, largely obscured by surface reflection; pronotal disc with shallow transverse mesh microsculpture; pronotal laterobasal depressions with transversely stretched isodiametric to transverse mesh microsculpture parallel to outer margin; elytra with shallow microsculpture consisting of transverse lines joined in a loose mesh. Head capsule and labrum rufopiceous, mandibles rufobrunneous, palps and antennae rufotestaceous; pronotum rufopiceous, margins hardly paler, rufobrunneous; elytra piceous with bluish metallic reflection; ventral body surface including epipleura rufopiceous, legs slightly paler, rufous.

Standardized body length 7.1–7.3 mm.

MALE GENITALIA: Median aedeagal lobe strongly curved with short, bluntly rounded

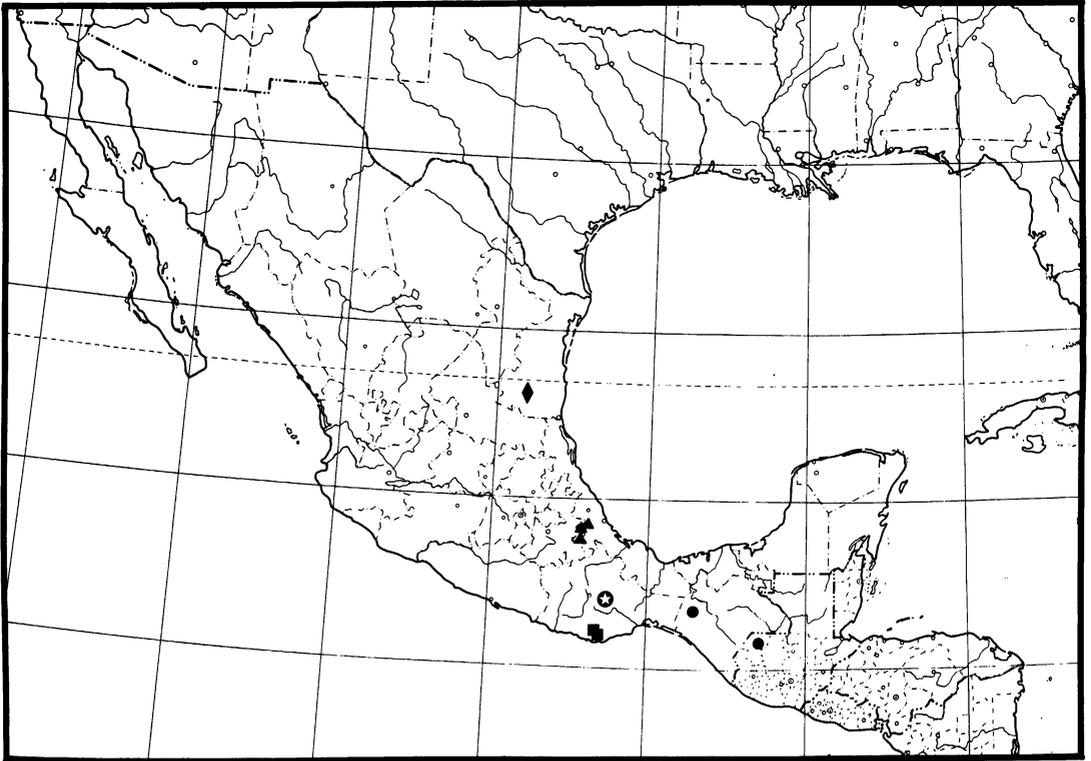


Fig. 102. Distributional records for *P. robustulus* (◆), *P. bacatellus* (●), *P. platynellus* (⊙), *P. machetellus* (▲), and *P. elliptotellus* (■).

apex (fig. 86). Aedeagal internal sac moderately elongate, $1.10 \times$ length median lobe from parameral articulation to apex; surface without spines, covered with fine microtrichia (fig. 87).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 10 setae (fig. 95). Apical gonocoxite with 3 lateral and 1 dorsal ensiform setae. Bursa copulatrix with evident unsclerotized dorsal lobe (fig. 96). Spermathecal duct narrow, angularly joining apical reservoir.

TYPE: Holotype ♂ (UASM, deposited in NMNH): MEX. OAXACA 16.6 km./ s. Toton-tepec cloud/ forest 2540 m./ in litter 79-35/ June 16, 1979// MEXICAN EXP. 1979/ J. S. Ashe, G. E. Ball, / & D. Shpeley/ collectors. Allotype ♀: same data and deposition.

PARATYPES: MÉXICO. – Oaxaca: Toton-tepec, 4.4 km S, 2090 m, cloud forest, in litter, 16-VI-1979, Ashe, Ball & Shpeley (UASM, 1♂), 13.4 km S, 2350 m, cloud forest, in litter, 16-VI-1979, Ashe, Ball & Shpeley

(UASM, 4♀), 16.6 km S, 2540 m, cloud forest, in litter, 16-VI-1979, Ashe, Ball & Shpeley (UASM, 2♂, 2♀).

ETYMOLOGY: The latinized diminutive form of the Greek *platys*, meaning flat or level, denoting the flat elytral disc.

DISTRIBUTIONAL RANGE: Known from highland cloud forests in eastern Oaxaca and Chiapas (fig. 102).

***Platynus machetellus*, new species**
(figs. 63, 76, 88–90, 97, 98, 102)

DIAGNOSIS: Pronotum large, broad as in *P. robustulus*, laterobasal depressions broad and smooth, marginal bead obsolete at basal setae (fig. 63); eyes small and flat, frons broad; basal groove of elytra strongly recurved to tightly rounded to angulate humerus (fig. 76); elytral scutellar seta absent (fig. 76); basal metatarsomere medially depressed, appearing weakly trisulcate.

DESCRIPTION: Frons broadly convex,

grooves broadly incised; eyes small, little protruding from head, ocular ratio 1.43 to 1.50. Pronotum broadly convex with moderately explanate lateral margins (fig. 63); hind angles defined by change of curvature at basal setae, lateral margin straight for shaft distance before setae; laterobasal depressions broad and smooth; basal marginal bead well defined medially, indistinctly raised behind laterobasal depressions, obsolete at basal setae; median longitudinal impression faint; anterior transverse depression broad and shallow; anterior marginal bead broad medially, narrower and taller at tightly rounded front angles; lateral margins slightly explanate, marginal depressions gradually widening from front angles to behind lateral setae, where they meet laterobasal depressions. Elytral striae well incised, slightly wavering; elytral intervals moderately convex; scutellar seta absent; basal groove moderately recurved beyond 4th stria, humerus tightly rounded (fig. 76); 15–16 lateral elytral setae in eighth stria. Metepisternum quadrate, lateral and anterior margins subequal; flight wings vestigial. Basal metatarsomere deeply incised outer and inner dorsal sulci, median area subdepressed, the tarsomere faintly trisulcate. Tarsomere 5 with short ventral setae, about $\frac{1}{4}$ tarsomere depth at setal insertion.

Head with well-developed isodiametric microsculpture; pronotal disc with shallow transverse mesh microsculpture, the sculpticells partially obscured by surface reflection and larger faint wrinkles traversing median longitudinal impression; pronotal laterobasal depressions with transverse mesh microsculpture, sculpticells aligned parallel with outer margin; elytra with microsculpture of very fine transverse lines intermittently joined by crosslines to form elongate transverse sculpticells. Head capsule piceous, labrum piceous with more rufous margins; mandibles, palps, and antennae rufous, antennomeres 4–11 with smoky cast; pronotum piceous, lateral margins rufobrunneous in anterior half, concolorous with disc in basal half; elytra piceous with silvery to bluish metallic reflection; ventral body surface rufopiceous, elytral epipleura and legs paler, brunneous.

Standardized body length 6.4–7.4 mm.

MALE GENITALIA: Median aedeagal lobe

straight in apical half, but with bluntly downturned apex (fig. 88). Aedeagal internal sac elongate, $1.80 \times$ length of median lobe from parameral articulation to apex; sac with apical rasp on right side (fig. 88–90).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9 setae (fig. 97). Apical gonocoxite with 2 lateral and 1 dorsal ensiform setae. Bursa copulatrix with broad, weakly sclerotized dorsal lobe (fig. 98). Spermathecal duct narrow, meeting apical reservoir at a right angle.

TYPE: Holotype δ (UASM, deposited in NMNH): MEX. Veracruz/ 13.2 mi. w. Cd./ Mendoza, 6600' / Rte. 150D VI.22.66// George E. Ball/ D. R. Whitehead/ collectors. Allotype ♀ : same data and deposition.

PARATYPES: MEXICO. – Veracruz: Ciudad Mendoza, 13.2 mi W, Rte. 150D, 6600 ft, 22-VI-1966, Ball & Whitehead (UASM, 3 δ , 1 ♀); Coscomatepec, 15.3 mi N, between Ixtapa & Cuiyachapa, 23–2400 m, cloud forest, 6-7-VII-1975, Ball & Frania (UASM, 2 δ); Huatusco, 8.8 km S, 7.7 km W on microondas road, 1798 m, 25-IV-1977, Ashe, Frania & Shpeley (UASM, 2 δ , 1 ♀).

ETYMOLOGY: The latinized diminutive of the Greek *machetes*, meaning fighter or swordsman, denoting the robust build of this small predator.

DISTRIBUTIONAL RANGE: Found on the Atlantic Versant of the Transverse Volcanic Sierra in Veracruz (fig. 102).

Platynus elliptolellus, new species
(figs. 62, 75, 91, 92, 99–101, 102)

DIAGNOSIS: A dark, broad beetle; head and pronotum piceous, narrowly explanate pronotal margin and elytra dark brunneous; eyes little protruding; pronotum broadly rounded, front angles angulate, hind angles rounded, laterobasal depressions smooth and shallow, basal setae before hind angles (fig. 62); metepisternum very short, lateral margin length $0.85\text{--}1.0 \times$ anterior margin.

DESCRIPTION: Frons broad, frontal grooves broad, moderately developed, eyes protruding little from head, ocular ratio 1.40 to 1.46. Pronotum broadly rounded, laterally depressed; hind angles rounded (fig. 62); laterobasal depressions very shallow, smooth, may

have broad tubercle in deepest part; basal marginal bead well developed behind laterobasal depressions, much weaker behind basal setae, obsolete medially; median longitudinal impression broad near median base, fine on disc, broad at evident anterior transverse depression; anterior marginal bead flat and broad medially, taller near angulate front angles; lateral marginal depressions narrow in apical $\frac{1}{2}$ of length, widened slightly behind lateral setae. Elytral striae continuous on disc, but shallow, irregularly wavering, 6th stria interrupted behind humerus, elytral intervals flat, their edges slightly rounded at striae; basal groove perpendicular to suture for inner 3 intervals, then linearly recurved to angulate humerus at 6th stria (fig. 75); 16 lateral elytral setae in eighth stria. Metepisternum very short, lateral margin length $0.85-1.0 \times$ anterior margin; flight wings vestigial. Basal metatarsomere with broad and deep outer and inner dorsal sulci, median area carinate. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with well-developed isodiametric microsculpture, slightly transversely stretched on neck; pronotal disc with shallow transverse mesh microsculpture, the lines partially obscured by surface reflection; pronotal laterobasal depressions with swirling transverse mesh microsculpture; median base with transversely stretched isodiametric microsculpture; elytra with microsculpture of fine transverse lines loosely joined into a mesh. Head capsule piceous, labrum and mandibles piceous to rufopiceous, palps and antennae rufotestaceous, antennomeres 4–11 infuscated; pronotum piceous with rufopiceous margin; elytra shiny, brunneous to piceous; ventral body surface piceous to rufopiceous, pronotal epipleura slightly paler and elytral epipleura paler, rufobrunneous to flavobrunneous, legs rufobrunneous to flavobrunneous.

Standardized body length 6.2–7.3 mm.

MALE GENITALIA: Median aedeagal lobe straight medially, apex bluntly acuminate (fig. 91). Aedeagal internal sac with medial sclerotized rasp on dorsum of sac (fig. 92).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 10 setae (fig. 99). Apical gonocoxite with 3 lateral and 1 dorsal

ensiform setae. Bursa copulatrix with broad, unsclerotized dorsal lobe (fig. 100). Spermathecal duct narrow, apical reservoir not angled with duct (fig. 101).

TYPE: Holotype δ (UASM, deposited in NMNH): MEX., Oax., 3 mi. N./Suchixtepec [= Suchiltepec], 9500' / 4-6.VI.71, S. Peck/Dung & carrion tr.

PARATYPE: MEXICO. – **Oaxaca:** Suchiltepec [= Suchixtepec], 16 km S, Rte. 175, 2570 m, JKL lot 88H15.7, 15-VIII-1988, Lieberr & Yager (CUIC, 1♀).

ETYMOLOGY: A modified diminutive form of the Latin *ellipsis*, meaning omission. *Elliptoleus* was the generic name chosen by Bates (1882) for a taxon of Mexican carabids with obsolete hind pronotal angles. The diminutive species epithet recalls the similarity of this species to those of Bates' genus.

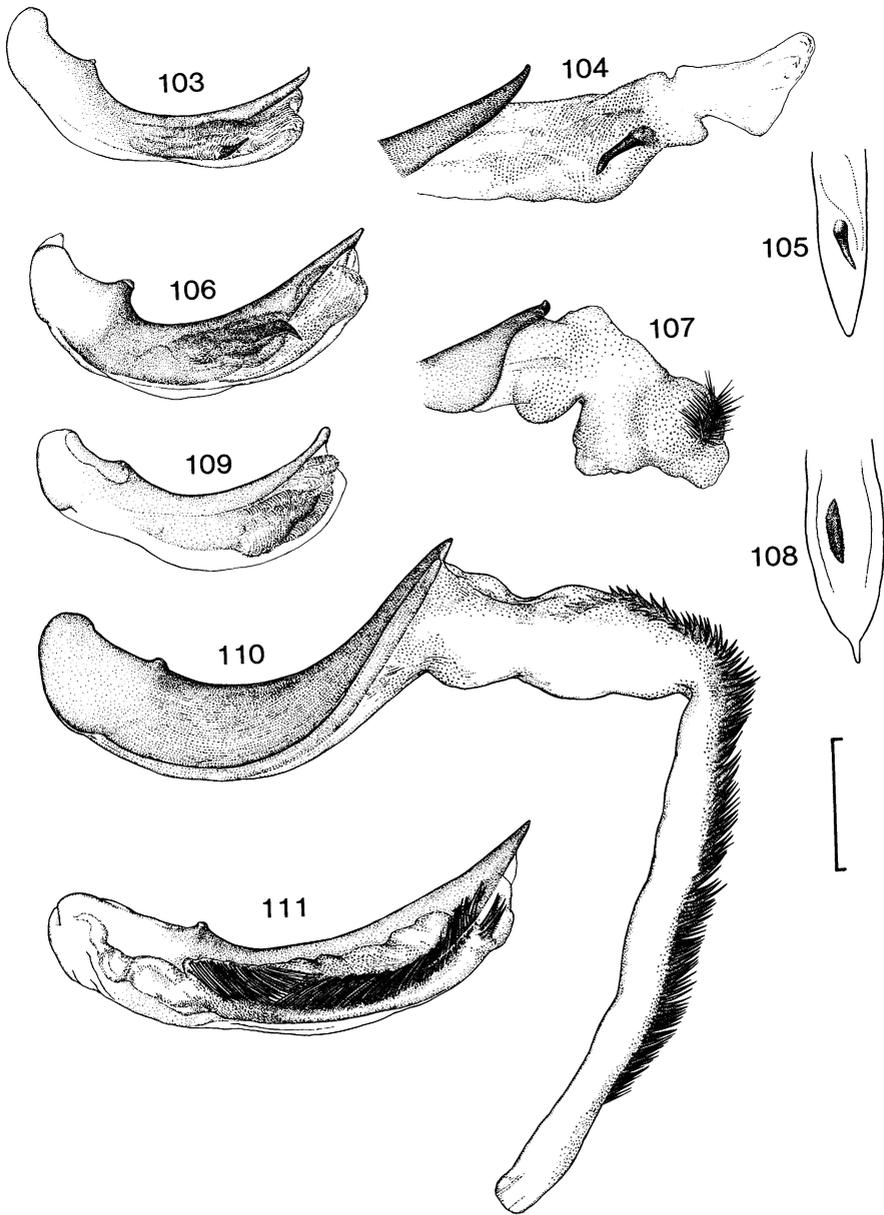
DISTRIBUTIONAL RANGE: Known only from the Sierra de Miahuatlan near the Oaxacan town of Suchiltepec (fig. 102).

Platynus coptoderoides (Darlington)
(figs. 41, 103–105, 116, 117–119)

Agonum coptoderoides Darlington, 1937a: 134.
Platynus coptoderoides: Lieberr, 1987: 345.

DIAGNOSIS: Pronotum with margins sinuate before obtuse hind angles (fig. 41); eyes moderately convex; upper body surface with brilliant green to rarely purplish metallic reflection, head and elytra usually greener, elytra usually with more golden reflection.

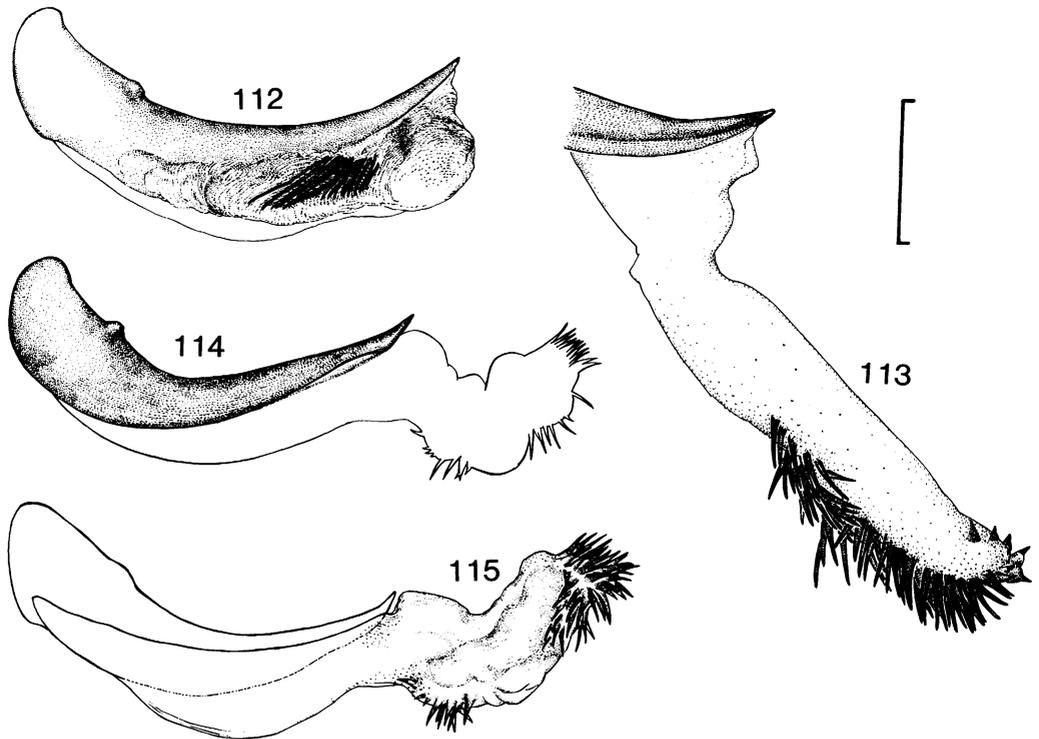
DESCRIPTION: Frontal grooves well incised, laterally delimiting triangular tubercles; eyes moderately convex, ocular ratio 1.65 to 1.73. Pronotum subcordate, with lateral margins sinuate before obtuse hind angles (fig. 41); laterobasal depressions broad, shallow, smooth-bottomed to rugose; median base usually with small longitudinal wrinkles, sometimes more rugose; basal marginal bead continuous medially to basal setae; median longitudinal impression fine throughout; anterior transverse depression shallow, traceable $\frac{1}{3}$ distance to front angles; anterior marginal bead continuous medially; front angles slightly angulate; lateral marginal depressions widening behind lateral setae. Elytral striae continuous, smooth, little wavering; elytral intervals slightly convex; basal groove re-



Figs. 103–111. Male aedeagi. **103.** Median lobe, *P. coptoderoides*, dextroventral view. **104.** Everted internal sac, *P. coptoderoides*, dextroventral view. **105.** Median lobe apex, *P. coptoderoides*, detailing internal sac spine, euventral view. **106.** Median lobe, *P. baorucensis*, dextroventral view. **107.** Everted internal sac, *P. baorucensis*, dextroventral view. **108.** Median lobe apex, *P. baorucensis*, detailing internal sac spination, euventral view. **109.** Median lobe, *P. agonellus*, dextroventral view. **110.** Median lobe with everted internal sac, *P. sellensis*, dextroventral view. **111.** Median lobe, *P. laetificus*, dextroventral view. Scale bar = 0.5 mm.

curved to rounded humerus; 17 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length 1.7 anterior margin; flight wings macropterous. Basal metatarso-

mere broad, shallow outer and inner dorsal sulci, median area convex. Tarsomere 5 with short ventral setae, less than 1/6 tarsomere depth at setal insertion.



Figs. 112–115. Male aedeagi. 112. Median lobe, *P. metallosomus*, dextroventral view. 113. Everted internal sac, *P. metallosomus*, dextroventral view. 114. Median lobe, *P. pavens*, ventral view, with outline of everted internal sac. 115. Detail of everted internal sac, *P. pavens*. Scale bar = 0.5 mm.

Head with well-developed isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture; pronotal laterobasal depressions and median base with mixture of transversely stretched isodiametric and transverse mesh microsculpture; elytra with strong transverse mesh microsculpture, sculpticells 2–8× wide as long. Head capsule and pronotum shiny green to purple, with golden metallic reflection; labrum and mandibles brunneous, palps and antennae rufotestaceous, with smoky infuscation; elytra shiny green with strong purplish to golden metallic reflection; ventral body surface uniformly rufobrunneous, femora slightly darker.

Standardized body length 6.6–7.8 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved, slender apically, with finely acuminate hooklike apex (fig. 103). Aedeagal internal sac elongate, length 1.65 length of median lobe from parameral articulation to apex (fig. 104); sac with single spine medially on right side (figs. 104, 105).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 7 setae (fig. 117). Apical gonocoxite with 3–4 lateral and 1 dorsal ensiform setae. Bursa copulatrix with hemi-ovoid, sclerotized dorsal lobe (fig. 118). Spermathecal duct narrow, linearly joining apical reservoir (fig. 119).

TYPE: Holotype ♂ (MCZ): Oriente/ Maisi/ July 17, 1936// Cuba 1936/ Darlington/ Collector.

DISTRIBUTIONAL RANGE: Found throughout the island of Cuba and the Bahamas (fig. 116).

MATERIAL EXAMINED: BAHAMAS. – **Andros Is.:** Forfar Field Sta., SE of Stafford Ck. Bridge, 11-VIII-1980, Weintraub (MCZ, 1), London Ridge, high interior coppice, black light, 87-120J, 24-VII-1987, Browne (SBPC, 2). **Great Exuma Is.:** Simon's Pt., 14-I-1980, Teal (UKSM, 1). **Nassau:** Blue Hills, 15-VII-1909, Worthington (CMNH, 1). **South Bimini Is.:** V-1951, Cazier & Gertsch (MCZ, 3; AMNH, 2), VII-1951, C. & P. Vaurie (AMNH, 1), 16-VII-1951, C. & P. Vaurie,

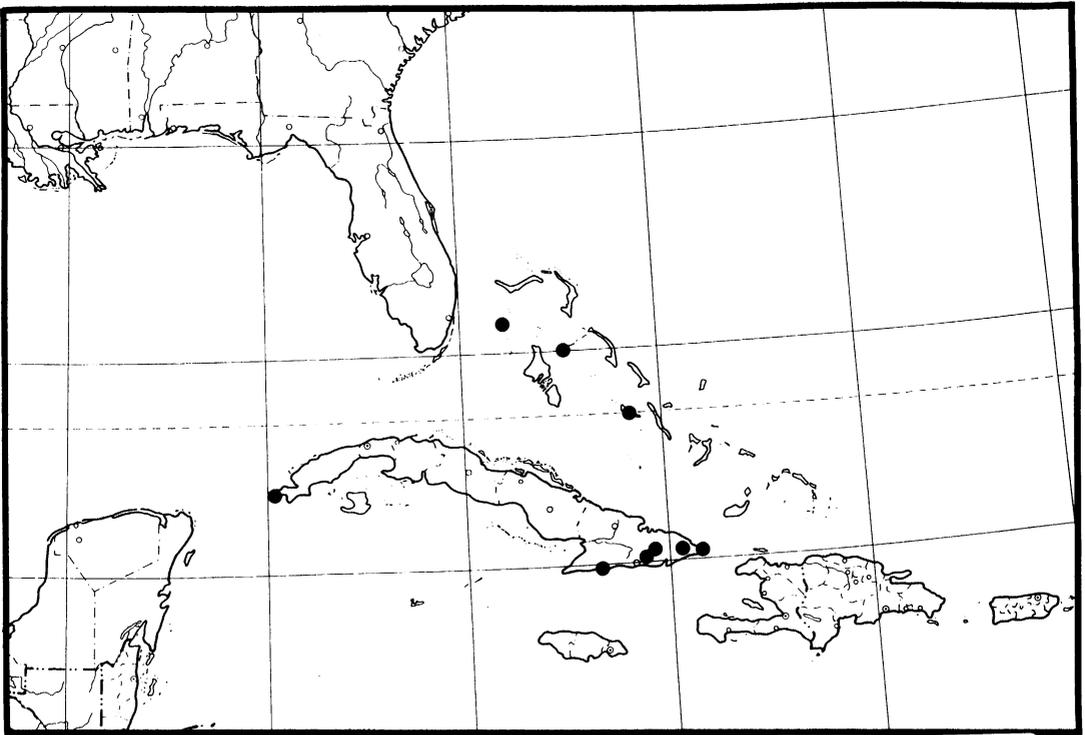


Fig. 116. Distributional records of *P. coptoderoides*.

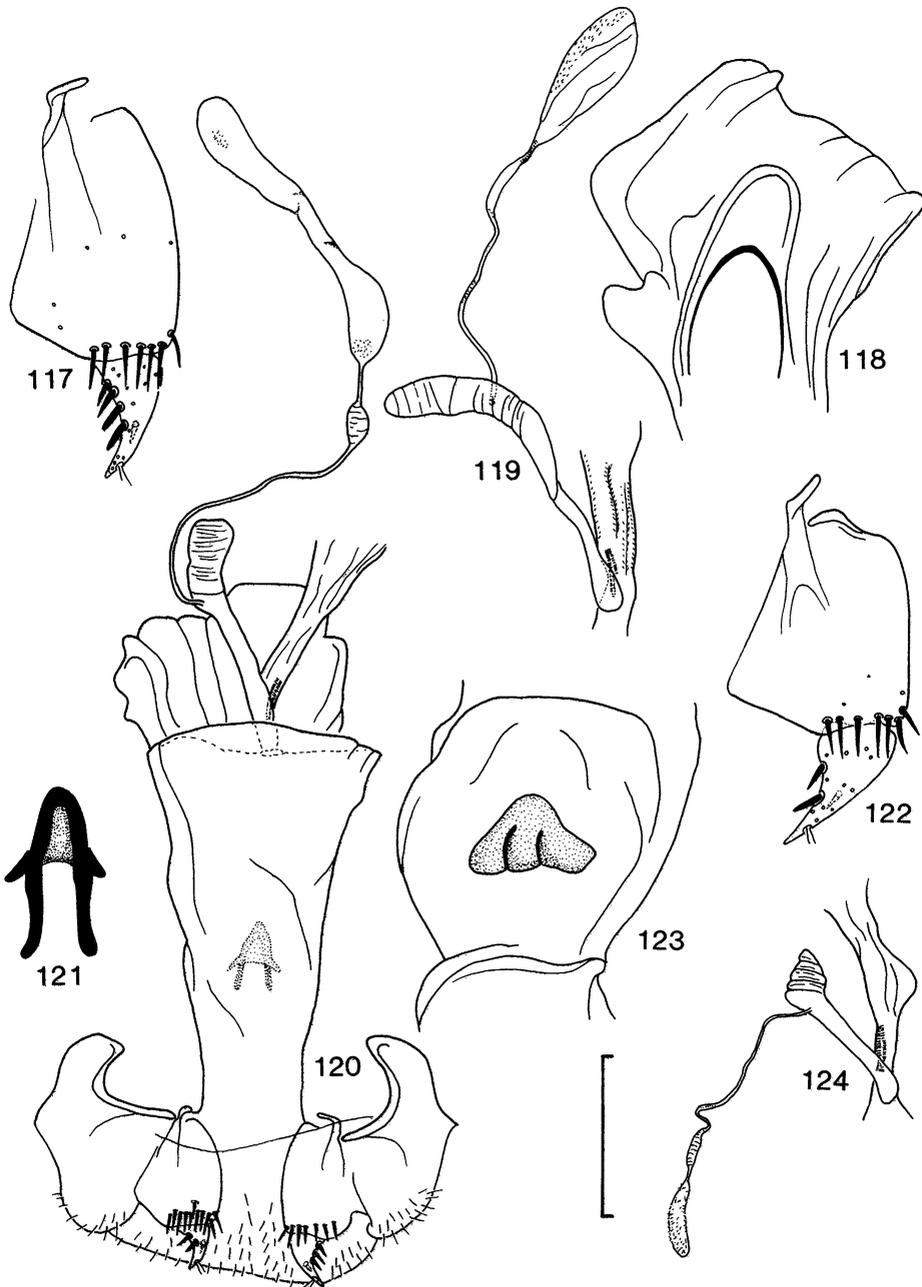
(MCZ, 1), 27-VII-1951, C. & P. Vaurie (AMNH, 1), 31-VII-1951, C. & P. Vaurie (AMNH, 1), VIII-1951, C. & P. Vaurie (AMNH, 4), 4-VIII-1951, C. & P. Vaurie (AMNH, 1), 7-VIII-1951, C. & P. Vaurie (MCZ, 1), 10-VIII-1951, C. & P. Vaurie (MCZ, 1), 18-VIII-1951, C. & P. Vaurie (AMNH, 1), 21-22-VIII-1951, C. & P. Vaurie (AMNH, 2). CUBA. — Oriente: Ceiba, 2-3-VII-1955, Archer (MCZ, 1); coast below Pico Turquino, 26-30-VI-1936, Darlington (MCZ, 1); Loma del Gato, 3000 ft, 3-7-VII-1936, Darlington (MCZ, 1); Cabo Maisi, 17-VII-1936, Darlington (MCZ, 1); Sierra Cristal, VI-1959, de Zayas (MCZ, 1). Pinal del Rio: Peninsula Guanacahabibes, VII-1935, de Zayas (MCZ, 1).

Platynus baorucensis, new species
(figs. 32, 69, 106-108, 120, 121, 134)

DIAGNOSIS: Body uniformly dark, piceous, antennae and legs hardly paler, rufopiceous;

eyes moderately convex; pronotum with lateral margins straight before obtuse hind angles, laterobasal depressions smooth, basal marginal bead continuous laterally to basal setae (fig. 69); elytral striae smooth; flight wings fully developed; body size larger, standardized length 7.0-8.1 mm.

DESCRIPTION: Frontal grooves broad, not extended onto clypeus; eyes moderately convex, ocular ratio 1.54 to 1.63. Pronotum transverse, surface smooth, sides straight before obtuse hind angles (fig. 69); laterobasal depressions broad, shallow, very smooth; median base with only faint irregularities in surface; basal marginal bead continuous across base, well defined behind entire laterobasal depressions; median longitudinal impression fine, extending to anterior margin; anterior transverse depression shallow, nearly obsolete; anterior marginal bead broad and continuous medially; front angles rounded; lateral marginal depressions broad throughout length. Elytral striae well incised, contin-



Figs. 117–124. Female reproductive tract structures. 117. Right gonocoxa, *P. coptoderoides*, ventral view. 118. Dorsal lobe of bursa copulatrix, *P. coptoderoides*, dorsal view. 119. Common oviduct and spermatheca, *P. coptoderoides*, ventral view. 120. Female reproductive tract, *P. baorucensis*, ventral view. 121. Sclerotized dorsal lobe of bursa copulatrix, *P. baorucensis*, dorsal view. 122. Right gonocoxa, *P. agonellus*, ventral view. 123. Dorsal lobe of bursa copulatrix, *P. agonellus*, dorsal view. 124. Common oviduct and spermatheca, *P. agonellus*, ventral view. Scale bar = 0.2 mm for figs. 117, 121, 122; scale bar = 0.5 mm for figs. 118, 119, 120, 124; scale bar = 0.31 mm for fig. 123.

uous; elytral intervals nearly flat; basal groove weakly recurved to rounded humerus; 16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length $1.5 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with deep, broad outer dorsal sulcus, shallower inner dorsal sulcus, the median area carinate. Tarsomere 5 with short ventral setae, length less than $\frac{1}{6}$ tarsomere depth at setal insertion.

Head with well-developed isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture; pronotal laterobasal depressions and median base with transversely stretched isodiametric microsculpture; elytra with well-developed transverse mesh microsculpture, sculpticell width $2-6 \times$ sculpticell length (fig. 32). Head capsule, pronotal disc, and elytra piceous; labrum, mandibles, palps, and antennae rufopiceous to brunneous; pronotal margins slightly paler than disc, reflexed margin rufopiceous; elytra with bluish to cupreous metallic reflection; ventral body surface dark, piceous to rufopiceous, except for paler brunneous elytral epipleura.

Standardized body length 7.0–8.1 mm.

MALE GENITALIA: Median aedeagal lobe straight apically, with finely hooked, bilaterally pinched apex (figs. 106, 108). Aedeagal internal sac with brush of spikelike macrotrichia ventrad gonopore (fig. 107).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 7–11 setae (fig. 120). Apical gonocoxite with 2–3 lateral and 1 dorsal ensiform setae. Bursa copulatrix with heavily sclerotized, narrow, elongate dorsal lobe (fig. 121). Spermathecal duct narrow, linearly joining apical reservoir.

TYPE: Holotype δ (CMNH): DOMINICAN REPUBLIC:/ Pedernales, La Abeja/ 38 km NNW Cabo Rojo, (18-09N, 71-38W)// 1250 m, 15 July 1987/ John E. Rawlins and/ Robert L. Davidson. Allotype ♀ : same data and deposition.

PARATYPES: DOMINICAN REPUBLIC. – **Pedernales:** La Abeja, 38 km NNW Cabo Rojo, 1250 m, 13-VII-1987, Rawlins & Davidson (CMNH, 1 ♀); Las Abejas, ca. 35 km N Cabo Rojo, 1250 m, flight intercept trap, 26-VIII-9-IX-88, Ivie, Phillips & Johnson, (MAIC, 40 δ , 62 ♀).

ETYMOLOGY: The latinization of *Baoruco*,

denoting the Sierra de Baoruco, the mountain system to which this species is restricted.

DISTRIBUTIONAL RANGE: Known only from the Sierra de Baoruco, in southwestern Dominican Republic (fig. 134).

Platynus agonellus (Darlington)

(figs. 39, 109, 122–124, 134)

Colpodes agonellus Darlington, 1935: 187.

Platynus agonellus: Liebherr, 1987: 345.

DIAGNOSIS: Eyes small, little protruding from head; pronotum broad basally, with broad, shallow, smooth laterobasal depressions and obtuse hind angles (fig. 39); metafemur anteriorly with single apical seta (as in fig. 20).

DESCRIPTION: Frontal grooves broad, shallow; eyes small, little convex, ocular ratio 1.41 to 1.51. Pronotum broad basally, hind angles obtuse (fig. 39); laterobasal depressions broad, shallow, and smooth; median base smooth; basal marginal bead continuous medially to basal setae, well defined behind laterobasal depressions; median longitudinal impression well incised basally, finer apically; anterior transverse depression broad, shallow; anterior marginal bead continuous medially; front angles tightly rounded, protruding; lateral marginal depressions gradually widening from front angles to laterobasal depressions. Elytral striae deep, continuous, slightly wavering; elytral intervals moderately convex; basal groove hardly recurved before rounded humerus; 16 lateral elytral setae in eighth stria. Metepisternum slightly elongate, lateral margin length $1.3 \times$ anterior margin; flight wings brachypterous. Metafemur anteriorly with single apical seta (as in fig. 20). Basal metatarsomere broad, well-incised outer dorsal sulcus and finer, shallower inner dorsal sulcus, the median area convex. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with well-developed isodiametric microsculpture; pronotal disc with well-developed microsculpture, a mixture of transversely stretched isodiametric and transverse sculpticells; pronotal laterobasal depressions with transversely stretched isodiametric microsculpture; median base with isodiametric microsculpture; elytra with transverse microsculpture, a mixture of transversely

stretched isodiametric and transverse sculpticells. Head capsule, pronotum, and elytra rufobrunneous, mandibles hardly paler, palps and antennae rufotestaceous; ventral body surface rufobrunneous, pronotal and elytral epipleura more flavous, legs rufotestaceous, slightly redder than antennae.

Standardized body length 6.9–7.1 mm.

MALE GENITALIA: Median aedeagal lobe tightly curved before bluntly rounded apex (fig. 109). Aedeagal internal sac with fields of microtrichia but without spines.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 7 setae (fig. 122). Apical gonocoxite with 2 lateral and 1 dorsal ensiform setae. Bursa copulatrix with well-sclerotized dorsal lobe, with narrow median slot (fig. 123). Spermathecal duct narrower than apical reservoir, duct joining reservoir at slight angle (fig. 124).

TYPE: Holotype ♂ (MCZ): La Visite & vic/ La Selle Range/ 5-7000 ft./ Sept. 16-23// Haiti/ 1934/ Darlington.

DISTRIBUTIONAL RANGE: Known only from the Massif de la Selle in the southern peninsula of Haiti (fig. 134).

MATERIAL EXAMINED: SANTO DOMINGO (locality probably equals Hispaniola). – (no other data) Jaeger (ZMUH, 1). HAITI. – **Sud-Oeste:** La Visite and vic., 5000–7000 ft, 16-23-IX-1934, Darlington (MCZ, 81).

Platynus sellensis (Darlington)
(figs. 40, 110, 125–127, 134)

Colpodes sellensis Darlington, 1937b: 122.

Platynus sellensis: Liebherr, 1987: 350.

DIAGNOSIS: Eyes small, little convex; pronotum with convex lateral margins before obtuse-rounded hind angles, laterobasal depressions broad, shallow, smooth (fig. 40); flight wings variable, brachypterous to stenopterous; metafemur anteriorly with single apical seta (as in fig. 20); head, pronotum, and elytra concolorous rufobrunneous with faint purple metallic reflection.

DESCRIPTION: Frontal grooves broad, shallow; eyes somewhat reduced, little protruding from head, ocular ratio 1.42 to 1.50. Pronotal lateral margins straight before obtuse-rounded hind angles (fig. 40); laterobasal depressions broad, shallow, smooth, with a faint tubercle in middle; median base smooth, faint

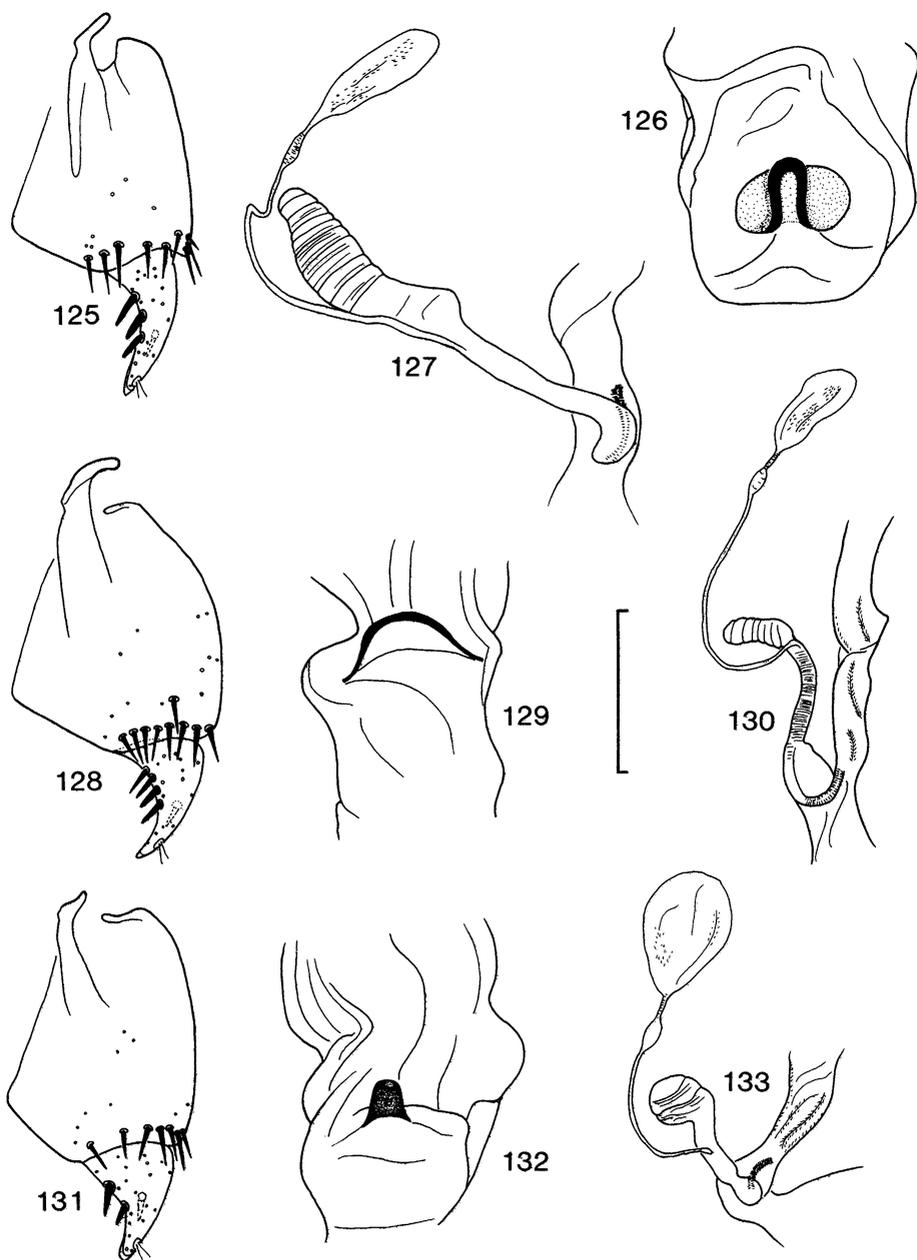
wrinkles mesad laterobasal depressions; basal marginal bead continuous to basal setae, faint but traceable medially; median longitudinal impression fine, slightly wavering, extending to anterior margin; anterior transverse depression shallow, nearly obsolete; anterior marginal bead faint but traceable medially; front angles tightly rounded; lateral marginal depressions gradually widening from front angles to laterobasal depressions. Elytral striae deep, smooth; elytral intervals nearly flat; basal groove moderately recurved to narrowly rounded humerus; 14–15 lateral elytral setae in eighth stria. Metepisternum moderately elongate, lateral margin length 1.4× anterior margin; flight wings variable, micropterous to stenopterous. Metafemur anteriorly with single apical seta (as in fig. 20). Basal metatarsomere with broad, deep outer and inner dorsal sulci, median area subcarinate. Tarsomere 5 with very short ventral setae, visible only at high magnification (×125).

Head with well-developed isodiametric microsculpture; pronotal disc with transverse mesh microsculpture, a mixture of transverse and transversely stretched isodiametric sculpticells; pronotal laterobasal depressions with transverse mesh microsculpture, sculpticells more isodiametric near basal margin; median base with isodiametric microsculpture; elytra with dense transverse mesh microsculpture, sculpticells partially obscured by surface reflection. Head capsule rufobrunneous, labrum and mandibles flavobrunneous, palps and antennae rufotestaceous with a brunneous cast; pronotal disc shiny, rufobrunneous, with faint purplish to silvery metallic reflection, lateral margins slightly paler, more flavous; elytra rufobrunneous with purple to silvery metallic reflection; ventral body surface rufobrunneous, elytral epipleura and trochanters paler, flavobrunneous.

Standardized body length 6.5–7.4 mm.

MALE GENITALIA: Median aedeagal lobe straight before acuminate apex (fig. 110). Aedeagal internal sac elongate, sac length 3.2× median lobe length from parameral articulation to apex; sac with mane of spikelike macrotrichia on ventral surface from near gonopore to near base.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9 setae (fig. 125).



Figs. 125–133. Female reproductive tract structures. 125. Right gonocoxa, *P. sellensis*, ventral view. 126. Dorsal lobe of bursa copulatrix, *P. sellensis*, dorsal view. 127. Common oviduct and spermatheca, *P. sellensis*, ventral view. 128. Right gonocoxa, *P. metallosomus*, ventral view. 129. Dorsal lobe of bursa copulatrix, *P. metallosomus*, dorsal view. 130. Common oviduct and spermatheca, *P. metallosomus*, ventral view. 131. Right gonocoxa, *P. pavens*, ventral view. 132. Dorsal lobe of bursa copulatrix, *P. pavens*, dorsal view. 133. Common oviduct and spermatheca, *P. pavens*, ventral view. Scale bar = 0.2 mm for figs. 125, 128, 131; scale bar = 0.5 mm for figs. 127, 130, 133; scale bar = 0.31 mm for figs. 126, 129, 132.

Apical gonocoxite with 3 lateral and 1 dorsal ensiform setae. Bursa copulatrix with sclerotized dorsal lobe comprised of an ovoid plate with a narrow tubelike evagination arising basally (fig. 126). Spermathecal duct narrower than apical reservoir, duct linearly joining reservoir (fig. 127).

TYPE: Holotype ♀ (MCZ): La Visite & vic/ La Selle Range/ 5-7000 ft./ Sept. 16-23// Haiti/ 1934/ Darlington.

DISTRIBUTIONAL RANGE: Known from the la Selle Range in the southern peninsula of Haiti (fig. 134).

MATERIAL EXAMINED: HAITI. – **Sud-Oeste:** Massif de la Selle, La Visite and vic., 5000–7000 ft, 16-23-IX-1934, Darlington (MCZ, 4), Morne d'Enfer, 1850 m, 15-V-1984, Thomas (FSCA, 1).

Platynus laetificus (Darlington)
(figs. 36, 111, 134)

Agonum laetificum Darlington, 1935: 200.

Platynus laetificus: Liebherr, 1987: 346.

DIAGNOSIS: Eyes small, little protruding from head; pronotum with rounded hind angles, laterobasal depressions broad, smooth (fig. 36); metafemur anteriorly with single apical seta (as in fig. 20).

DESCRIPTION: Frontal grooves shallow, laterally delimiting weak triangular tubercles; eyes small, little convex, ocular ratio 1.51. Pronotum orbicular, hind angles obsolete (fig. 36); laterobasal depressions broad, smooth; median base smooth, with faint pitlike irregularities near laterobasal depressions; basal marginal bead continuous, to basal setae; median longitudinal impression fine; anterior transverse depression shallow; anterior marginal bead continuous medially; front angles tightly rounded; lateral marginal depressions of equal moderate width from front angles to lateral setae, gradually widening behind lateral setae to laterobasal depressions. Elytral striae well incised, smooth; elytral intervals slightly convex; basal groove moderately recurved to tightly rounded humerus; 15–16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length 1.55 × anterior margin; flight wings macropterous. Metafemur anteriorly with single apical seta

(as in fig. 20). Basal metatarsomere shallow, broad outer and inner dorsal sulci, median area convex. Tarsomere 5 with very short ventral setae, visible only at high magnification (×125).

Head with well-developed isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture; pronotal laterobasal depressions with transverse mesh on inner portions, isodiametric sculpticells close to margin; median base with isodiametric microsculpture; elytra with dense transverse mesh microsculpture, the sculpticells partially obscured by surface reflection. Head capsule and pronotal disc rufopiceous with blue-green metallic reflection; labrum rufopiceous, mandibles rufous, palps and antennae rufotestaceous with smoky infuscation; pronotum slightly paler, rufous to rufotestaceous, lacking strong metallic reflection; elytra brunneous with green to golden metallic reflection; ventral body surface rufopiceous, elytral epipleura and legs paler, rufobrunneous.

Standardized body length 7.4 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved to finely acuminate apex (fig. 111). Aedeagal internal sac with apical brushes of long spikelike macrotrichia ventrad and dorsad gonopore.

TYPE: Holotype ♂ (MCZ): Mt. Basil/ N Haiti/ 4700 ft./ Sept. 9// 1934/ Darlington.

DISTRIBUTIONAL RANGE: Known only from the single type collected at Mt. Basil, in the western Cordillera Central of Hispaniola (fig. 134).

Platynus metallosomus Liebherr
(figs. 20, 38, 112, 113, 128–130, 134)

Platynus metallosomus Liebherr, 1987: 346.

DIAGNOSIS: Body with well-developed purple metallic reflection; eyes little convex; pronotal lateral margins straight before obtuse-rounded hind angles, laterobasal depressions smooth (fig. 38); flight wings variable, macropterous, or brachypterous; metafemur anteriorly with single apical seta (fig. 20).

DESCRIPTION: Frontal grooves shallow; eyes rather small, little protruding from head, oc-

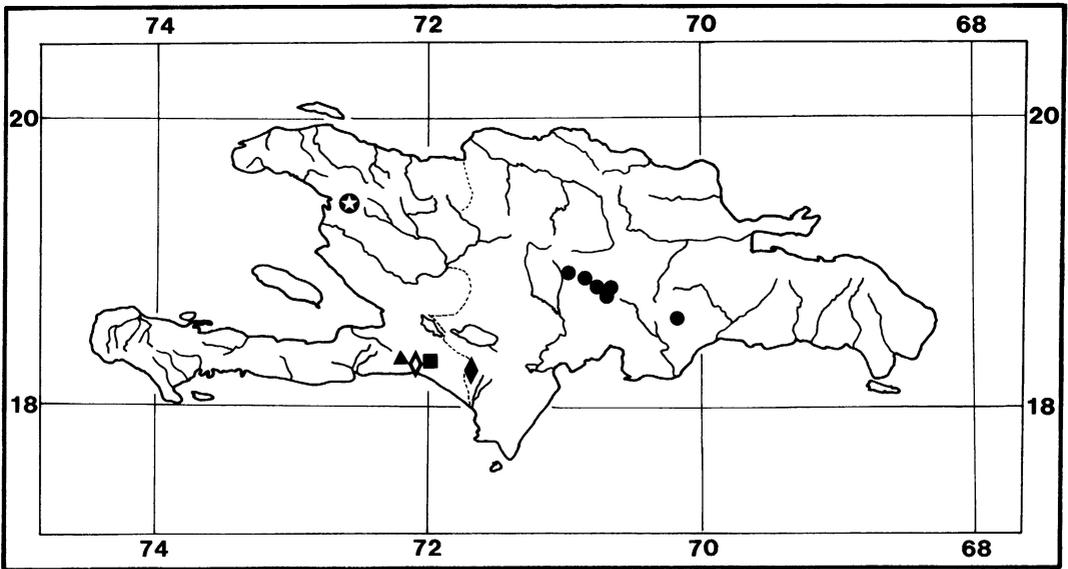


Fig. 134. Distributional records of *P. baorucensis* (◆), *P. agonellus* (◇), *P. sellensis* (■), *P. laetificus* (⊙), *P. metallosomus* (●), and *P. pavens* (▲).

ular ratio 1.50 to 1.55. Pronotal lateral margins straight before obtuse-rounded hind angles (fig. 38); laterobasal depressions moderately shallow, smooth; median base smooth; basal marginal bead continuous laterally behind laterobasal depression, may be weak to obsolete just behind median longitudinal impression, which is fine throughout length; anterior transverse depression shallow, nearly obsolete; anterior marginal bead flattened, difficult to trace medially; front angles tightly rounded to slightly angulate; lateral marginal depressions narrow before lateral setae, widening behind to meet laterobasal depression. Elytral striae well incised, continuous, slightly wavering; elytral intervals nearly flat; basal groove moderately recurved to tightly rounded, narrow humerus; 15–16 lateral elytral setae in eighth stria. Metepisternum moderately elongate, lateral margin length $1.45 \times$ anterior margin; flight wings variable, macropterous or brachypterous. Metafemur anteriorly with single apical seta (fig. 20). Basal metatarsomere with broad shallow outer and inner dorsal sulci, median area convex. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with shallow isodiametric micro-

sculpture, the sculpticells partially obscured by surface reflection; pronotal disc with dense transverse mesh microsculpture; pronotal laterobasal depressions with transverse mesh microsculpture; median base with isodiametric microsculpture; elytra with dense transverse mesh microsculpture. Head capsule and pronotum rufopiceous with purplish to silvery metallic reflection; labrum rufopiceous, mandibles rufobrunneous, palps and antennae rufotestaceous, antennomeres 4–11 darker; elytra rufobrunneous with purplish metallic reflection; ventral body surface rufobrunneous, pronotal and elytral epipleura darker, more piceous, legs dusky rufotestaceous.

Standardized body length 6.4–8.6 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved to finely acuminate apex (fig. 112). Aedeagal internal sac elongate, sac length $1.9 \times$ length of medium lobe from parameral articulation to apex; sac with shorter, squatter, spinose macrotrichia ventrad gonopore, and longer, thinner spikelike macrotrichia in a long row dorsad gonopore (fig. 113).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9 setae (fig. 128). Apical gonocoxite with 3–4 lateral and 1 dor-

sal ensiform setae. Bursa copulatrix with broadly curved, sclerotized dorsal lobe (fig. 129). Spermathecal duct slightly narrower than apical reservoir, duct linearly joining reservoir (fig. 130).

TYPE: Holotype ♂ (MCZ): cloudforest/ vic. Valle Nuevo/ Aug '38, Dom. Rep./ c. 6,000 ft, Darl[ington].

DISTRIBUTIONAL RANGE: Found along the Cordillera Central of the Dominican Republic (fig. 134).

MATERIAL EXAMINED: SANTO DOMINGO. – (locality probably equals Hispaniola), Thomson coll. (BMNH, 2). DOMINICAN REPUBLIC. – **La Vega**: Constanza, 3000–4000 ft, VIII-1938, Darlington (MCZ, 13), 1-VIII-1978, Schuster & Schlinger (UCD, 1); Constanza vic., 1300 m, 12-VII-1978, Chalumeau (IREC, 1); El Convento, 1 km NE, 1250 m, 23-VII-1987, Rawlins & Davidson (CMNH, 1); Loma de la Pena NW Constanza, 5000 ft, VIII-1938, Darlington (MCZ, 6). **Santiago**: Loma Rucilla and mts. N, 5000–8000 ft, VI-1938, Darlington (MCZ, 2); Valle Nuevo vic., 6000 ft, cloud for., VIII-1938, Darlington (MCZ, 80). **Distrito Nacional**: Villa Altagracia, VII-1938, Darlington (MCZ, 3).

Platynus pavens (Darlington)
(figs. 37, 114, 115, 131–133, 134)

Colpodes pavens Darlington, 1935: 188.

Platynus pavens: Liebherr, 1987: 348.

DIAGNOSIS: Eyes small, little protruding from head; pronotum with sinuate lateral margins before sharp, slightly obtuse hind angles (fig. 37), laterobasal depressions and median base very smooth, anterior marginal bead obsolete medially, front angles protruding; metafemur anteriorly with single apical seta (as in fig. 20).

DESCRIPTION: Frontal grooves broad, laterally defining ovoid tubercles; eyes small, little convex, ocular ratio 1.42 to 1.49. Pronotum broadly cordate, lateral margins strongly sinuate before sharp, slightly obtuse hind angles (fig. 37); laterobasal depressions very smooth, broadly depressed to raised lateral bead; median base smooth; basal marginal bead continuous to basal setae; median

longitudinal impression well incised, extending to anterior margin; anterior transverse depression shallow, broad; anterior marginal bead obsolete medially; front angles tightly rounded, protruding; lateral marginal depressions moderately narrow before lateral setae, widening behind setae to join laterobasal depressions. Elytral striae deep, smooth; elytral intervals broadly convex; basal groove recurved to rounded humerus; 14 lateral elytral setae in eighth stria. Metepisternum slightly elongate, lateral margin length 1.3 × anterior margin; flight wings brachypterous to micropterous. Metafemur anteriorly with single apical seta (as in fig. 20). Basal metatarsomere with broad, deep outer dorsal sulcus and finer inner dorsal sulcus, median area convex. Tarsomere 5 with very short ventral setae, visible only at high magnification (× 125).

Head with shallow isodiametric microsculpture; pronotal disc with transverse mesh microsculpture and very fine micropunctures; pronotal laterobasal depressions with transversely stretched isodiametric microsculpture, sculpticells more isodiametric near basal margin; median base with isodiametric microsculpture; elytra with dense transverse mesh microsculpture, sculpticells partially obscured by surface reflection. Head capsule, labrum, mandibles, and pronotum rufobrunneous, palps and antennae rufotestaceous; elytra rufobrunneous with vivid purple metallic reflection; ventral body surface rufous, pronotal and elytral epipleura, and metatrochanters paler, more flavous.

Standardized body length 6.5–6.7 mm.

MALE GENITALIA: Median aedeagal lobe straight apically before finely acuminate apex (fig. 114). Aedeagal internal sac with brush of spikelike macrotrichia ventrad gonopore, and small brush of spikelike macrotrichia near base on dorsal side (fig. 115).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 7 setae (fig. 131). Apical gonocoxite with 2 lateral and 1 dorsal ensiform setae. Bursa copulatrix with narrow, tubelike, sclerotized dorsal lobe (fig. 132). Spermathecal duct narrower than apical reservoir, duct linearly joining reservoir (fig. 133).

TYPE: Holotype ♂ (MCZ): La Visite & vic/

La Selle Range/ 5-7000 ft./ Sept. 16-23// Haiti/ 1934/ Darlington.

DISTRIBUTIONAL RANGE: Known only from the Massif de la Selle in the southern peninsula of Haiti (fig. 134).

MATERIAL EXAMINED: HAITI. — **Sud-Oeste:** La Visite and vic., La Selle Rge., 5000–7000 ft, 16-23-IX-1934, Darlington (MCZ, 4).

Platynus brunnellus, new species

(figs. 12, 65, 78, 135–138, 151, 152, 160)

DIAGNOSIS: Pronotum and elytra dark brunneous, head capsule piceous; eyes moderately convex; pronotum with smooth laterobasal depressions, hind angles rounded, basolateral margins widest at basal setae (fig. 65); metepisternum short, lateral margin length slightly less than $1.5\times$ anterior margin.

DESCRIPTION: Frons smooth, frontal grooves shallow with irregular wrinkles; eyes moderately convex, not strongly protruding from head capsule, ocular ratio 1.58 to 1.60. Pronotum with rounded angulate hind angles (fig. 65); laterobasal depressions smooth with fine wrinkles near basal bead; basal marginal bead well defined behind laterobasal depressions, less well defined medially; median base with irregular, shallow longitudinal wrinkles or rounder indentations; median longitudinal impression fine throughout length, interrupted in basal half; anterior transverse depression nearly obsolete; anterior marginal bead apparent medially, more well developed on tightly rounded front angles; lateral marginal depressions narrow before lateral setae, gradually widening in basal half; lateral marginal bead broadly elevated at basal seta. Elytral striae deep, well defined, only slightly wavering; elytral intervals slightly to moderately convex; basal groove moderately strongly recurved anteriorly, tightly rounded to slightly angulate on humerus; 16 lateral elytral setae in eighth stria. Metepisternum moderately reduced, lateral margin length $1.4\text{--}1.5\times$ anterior margin, flight wings brachypterous, the reflexed apex reduced (fig. 12). Basal metatarsomere with deep, well defined outer and inner dorsal sulci, the median area flat. Tarsomere 5 with ventral setae subequal in length to tarsomere depth at setal insertion.

Head with well-developed isodiametric

microsculpture; pronotal disc with irregular transverse mesh microsculpture, shallow enough to be obscured by surface reflection; pronotal laterobasal depressions with well-developed isodiametric microsculpture; elytra with well developed microsculpture a mixture of slightly transversely stretched isodiametric sculpticells and transverse sculpticells in females, transverse brick-shaped sculpticells in males. Head capsule piceous, labrum and mandibles ferruginous, palps and antennae rufotestaceous; pronotal disc brunneous, lateral margins paler, lateral margin ferruginous; elytra brunneous with silvery metallic reflection; ventral body surface smoky ferruginous, legs rufotestaceous.

Standardized body length 6.4–7.2 mm.

MALE GENITALIA: Median aedeagal lobe with elongate upturned apex (fig. 135). Aedeagal internal sac bispinose (fig. 136) or trispinose (figs. 137, 138), always with spine on right and left side of sac, but with shorter dorsal spine absent or present.

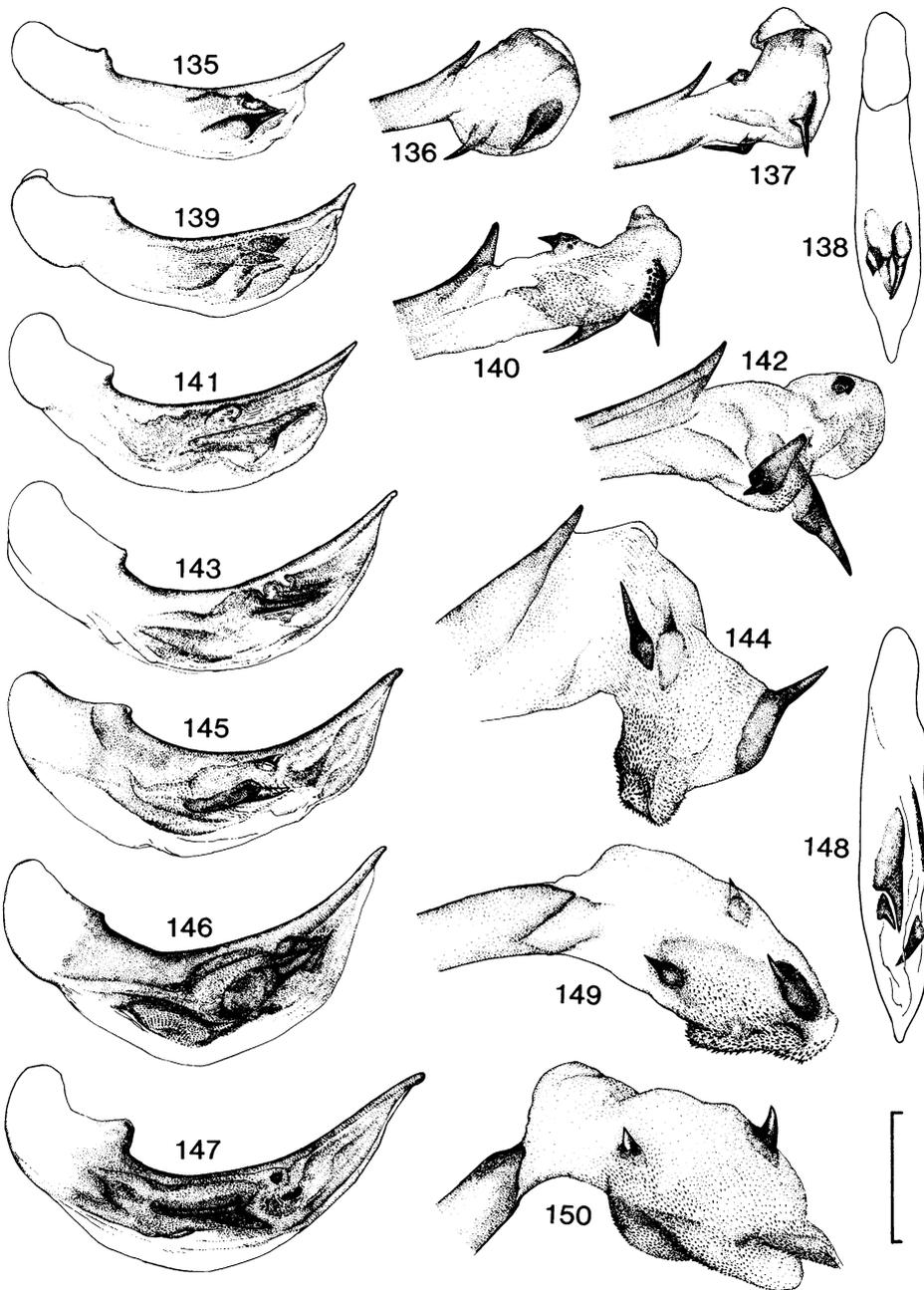
FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of approximately 9 setae (fig. 151). Apical gonocoxite with 3–4 lateral and 1 dorsal ensiform setae. Spermathecal duct narrow, inserted at angle to apical reservoir (fig. 152).

TYPE: Holotype δ (UASM, deposited in NMNH): MEXICO. San Luis/ Potosi. 4.3–17.9/ mi. e. Ciudad del/ Maiz. Rte. 80./ 3700–4300'/ VII. 9-10. 1966// George E. Ball/ D. R. Whitehead/ collectors. Allotype ♀ : same data and deposition.

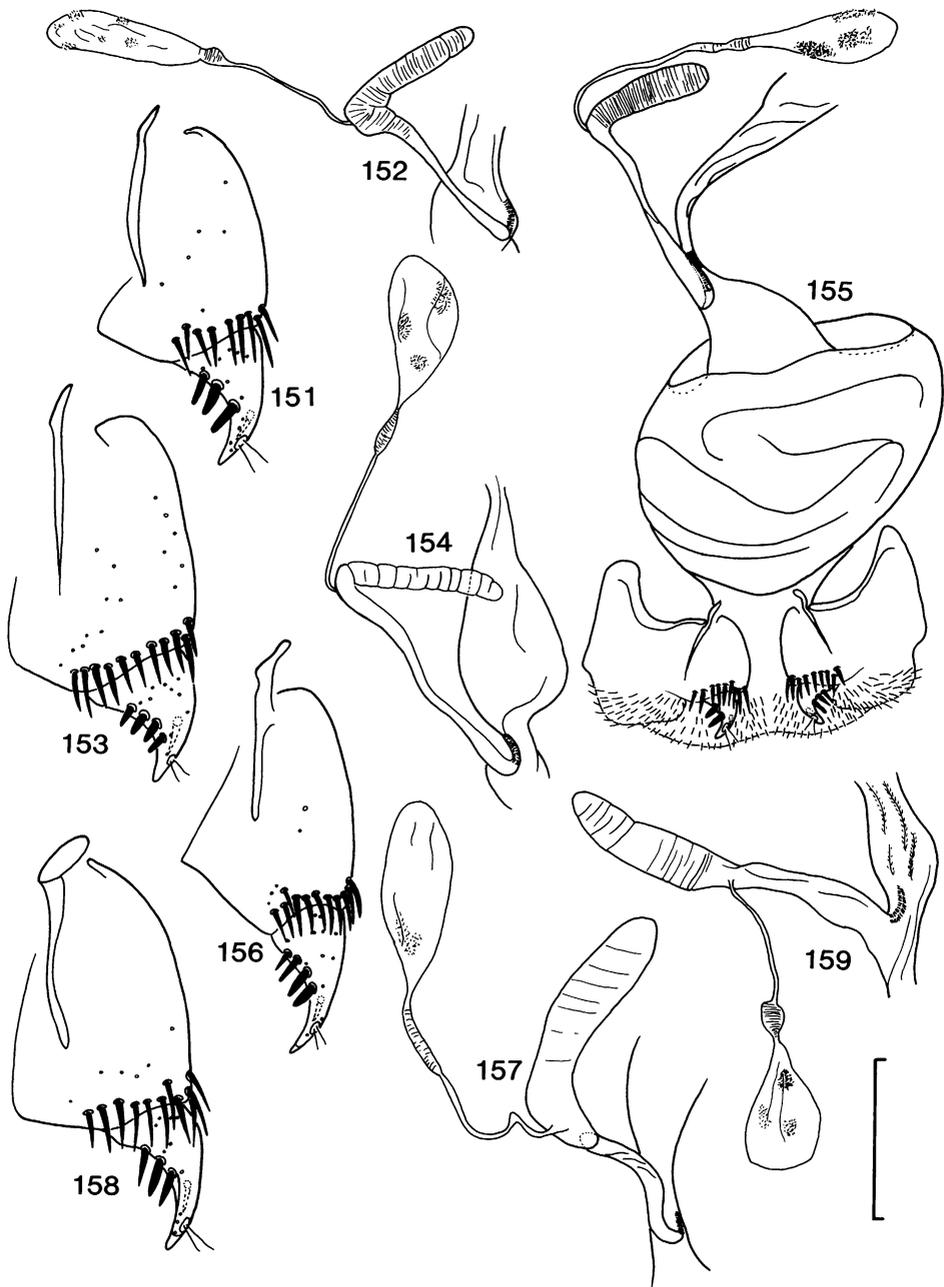
PARATYPES: MEXICO. — **Oaxaca:** Sola de Vega, 76.1 km S, 1870 m, oak-pine for. (humid), litter, 15-VII-1979, Ashe, Ball & Shpeley (UASM, 1 δ). **Queretaro:** Landa de Matamoros, 17.8 km S, 5300 ft, 17-18-XI-1965, Ball & Whitehead (UASM, 10 δ , 15 ♀), 21.8 km S, 1400 m, oak, arroyo, 20-VIII-1985, Frania & Shpeley (UASM, 2 δ). **San Luis Potosi:** Ciudad del Maiz, 4.3–17.9 mi E, Rte. 80, 3700–4300 ft, 9-10-VII-1966, Ball & Whitehead (UASM, 33 δ , 34 ♀); El Naranjo, 42.5 km E, Rte. 80, 1300 m, oak forest, 19-VI-1975, Ball & Frania (UASM, 3 δ , 5 ♀).

ETYMOLOGY: The diminutive of the Latin *brunneus*, meaning brown, denoting the body color.

DISTRIBUTIONAL RANGE: Known from the southern Sierra Madre Oriental, with an ap-



Figs. 135–150. Male aedeagi. 135. Median lobe, *P. brunnellus*, dextroventral view. 136, 137. Everted internal sac, *P. brunnellus* (San Luis Potosí: Ciudad del Maiz), dextroventral view. 138. Median lobe, *P. brunnellus*, detailing internal sac spination, euventral view. 139. Median lobe, *P. caerulipennis*, dextroventral view. 140. Everted internal sac, *P. caerulipennis*, dextroventral view. 141. Median lobe, *P. ovatulus*, dextroventral view. 142. Everted internal sac, *P. ovatulus*, dextroventral view. 143. Median lobe, *P. rotundatulus*, dextroventral view. 144. Everted internal sac, *P. rotundatulus*, dextroventral view. 145–147. Median lobe, *P. crypticulus*, dextroventral view. 145. Chiapas-Oaxaca: 18.7 km W Rizo de Oro. 146. Oaxaca: Puerto Escondido. 147. Guatemala City. 148. Median lobe, *P. crypticulus*, detailing internal sac spination, euventral view. 149, 150. Everted internal sac, *P. crypticulus* (Chiapas-Oaxaca: 18.7 km W Rizo de Oro), euventral view. Scale bar = 0.5 mm.



Figs. 151–159. Female reproductive tract structures. 151. Right gonocoxa, *P. brunnellus*, ventral view. 152. Common oviduct and spermatheca, *P. brunnellus*, ventral view. 153. Right gonocoxa, *P. caerulipennis*, ventral view. 154. Common oviduct and spermatheca, *P. caerulipennis*, ventral view. 155. Female reproductive tract, *P. ovatulus*, ventral view. 156. Right gonocoxa, *P. rotundatulus*, ventral view. 157. Common oviduct and spermatheca, *P. rotundatulus*, ventral view. 158. Right gonocoxa, *P. crypticulus*, ventral view. 159. Common oviduct and spermatheca, *P. crypticulus*, ventral view. Scale bar = 0.2 mm for figs. 151, 153, 156, 158; scale bar = 0.5 mm for figs. 152, 154, 155, 157, 159.

parently isolated population in the Sierra Madre del Sur (fig. 160).

Platynus caerulipennis, new species

(figs. 30, 66, 79, 139, 140,
153, 154, 160)

DIAGNOSIS: Head, pronotal disc, and elytra piceous, pronotal lateral margins narrowly paler, legs infuscated brunneous; pronotal hind angles rounded, laterobasal depressions shallow, smooth (fig. 66); humeri angulate; metepisternum subquadrate, lateral margin $1.25\text{--}1.35\times$ as long as anterior margin; tarsomere 5 with ventral setae subequal in length to tarsomere depth at setal insertion.

DESCRIPTION: Frons with broad, shallow frontal grooves, eyes moderately convex, ocular ratio 1.56 to 1.65. Pronotum with rounded, almost obsolete hind angles (fig. 66); laterobasal depressions shallow, smooth; basal marginal bead continuous from basal seta nearly to middle, may or may not be interrupted medially; median base smooth, with only very weak longitudinal irregularities; median longitudinal impression fine throughout length; anterior transverse depression evident, extending $\frac{1}{3}$ to $\frac{1}{2}$ distance to front angles; anterior marginal bead fine medially, larger on tightly rounded front angles; lateral marginal depressions narrow from front angles to lateral setae, gradually widening to basal $\frac{1}{4}$ of length at laterobasal depressions. Elytral striae continuous, smooth, only slightly wavering; elytral intervals only slightly convex; basal groove strongly recurved from 2nd to 7th stria, tightly rounded to obtusely angulate on humerus; 15–16 lateral elytral setae in eighth stria. Metepisternum subquadrate, lateral margin length $1.25\text{--}1.35\times$ anterior margin; flight wings variable, macropterous or brachypterous (as in figs. 11, 12). Basal metatarsomere with well-developed, sharply incised outer and inner dorsal sulci, median area flat. Tarsomere 5 with ventral setae subequal in length to tarsomere depth at setal insertion.

Head with well-developed, coriaceous isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture; pronotal laterobasal depressions and median base with irregular isodiametric mi-

crosculpture; elytra with slightly stretched transverse mesh microsculpture (fig. 30), containing some isodiametric sculpticells in females, slightly more transversely stretched in males. Head capsule piceous, mandibles infuscated rufopiceous, palps and antennae rufotestaceous with heavy infuscation; pronotum piceous, only lateral margins slightly paler, narrowly rufopiceous; elytra piceous with silvery to bluish metallic reflection; ventral body surface rufopiceous, legs only slightly paler.

Standardized body length 5.9–7.4 mm.

MALE GENITALIA: Median aedeagal lobe with moderately elongate upturned apex (fig. 139). Aedeagal internal sac trispinose, with spines on the ventral, right, and left sides of the sac about midlength (fig. 140).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 12 setae (fig. 153). Apical gonocoxite with 3–4 lateral and 1 dorsal ensiform setae. Spermathecal duct narrow; apical reservoir angularly joining duct (fig. 154).

TYPE: Holotype δ (UASM, deposited in NMNH): MEX. Jalisco/El Rincon, 30.5/ mi. n.w. Los/ Volcanes, 5400' / August 10, 1967// Ball, T. L. Erwin/ R. E. Leech/ collectors. Allotype ♀ : same data and deposition.

PARATYPES: MEXICO. – **Durango:** Durango, 44 km W, 2270 m, arroyo, oak-pine, 22-VII-1985, Frania & Shpeley (UASM, 2 δ), 72 km W, Rte. 40, 2540 m, oak-pine, 19-VIII-1983, Frania, Jaagumagi, & Shpeley (UASM, 1 δ); Huejuquilla el Alto (Jalisco), 72.9 km W on rd. to Jesus Maria (Nayarit), 2540 m, oak-pine litter under logs, 28-VII-1985, Frania & Shpeley (UASM, 3 ♀). **Guerrero:** Chilpancingo, 12.1 mi W, 6100 ft, 13-14-VII-1966, Ball & Whitehead (UASM, 13 δ , 7 ♀), 13.9 mi W, 6300 ft, 16-VII-1966, Ball & Whitehead (UASM, 2 δ , 2 ♀); Filo de Caballo, road to 21.2 km NW jct. Rte 195, 1580 m, oak-acacia-palmetto arroyo, litter, 7-8-VIII-1983, Frania & Jaagumagi (UASM, 1 ♀); jct. Rte. 200, 78.5 km N on Rte. 134, ridge-top, 1770 m, oak-pine, 11-VIII-1985, Frania & Shpeley (UASM, 1 δ , 1 ♀). **Jalisco:** Ajijic, agricultural area N, 6200 ft, can traps, syrup, 12-VIII-1964, Nutting & sons (UASM, 1 δ , 2 ♀); Aatlan, 13.3 km S, 1260 m, ridge top oak forest,

4-VIII-1985, Frania & Shpeley (UASM, 1♂), 8.3 mi S, Rte. 80, 3800 ft, 5-VIII-1966, Ball & Whitehead (UASM, 1♂); Colima, 79.4 km S, Rte. 110, 1220 m, oak-pine litter, under rocks, 5-VIII-1985, Frania & Shpeley (UASM, 2♂); Cuautla, 5.5 mi NW, 6600 ft, 6-7-VIII-1967, Ball, Erwin & Leech (UASM, 7♂, 1♀), 8.8 km NW, 1750 m, oak-pine litter, 2-VIII-1985, Frania & Shpeley (UASM, 2♂, 2♀), 10.6 km NW, 1710 m, arroyo, pine-oak, 2-VIII-1985, Frania & Shpeley (UASM, 1♂, 1♀), 9.1 mi NW, 5500 ft, 7-VIII-1967, Ball, Erwin & Leech (UASM, 1♂), 42.4 km NW, 1760 m, oak-pine litter, 3-VIII-1985, Frania & Shpeley (UASM, 1♂, 1♀); El Rincon, 30.5 mi NW Los Volcanes, 5400 ft, 10-VIII-1967, Ball, Erwin & Leech (UASM, 9♂, 8♀), 35.7 mi NW Los Volcanes, 5400 ft, 11-VIII-1967, Ball, Erwin & Leech (UASM, 1♂, 1♀), 11-12-VIII-1967, Ball, Erwin & Leech (UASM, 3♂, 1♀); Mazamitla, 7.6 mi S, Rte. 110, 5700 ft, 6-VIII-1966, Ball & Whitehead (UASM, 10♀); Talpa de Allende, 6.5 mi S, 4340 ft, 9-VIII-1967, Ball, Erwin & Leech (UASM, 2♂), 10.8 mi S, 4900 ft, 8-VIII-1967, Ball, Erwin & Leech (UASM, 2♂, 1♀); Tecalitlan, 12.4 mi S, 5300 ft, 4-VIII-1967, Ball, Erwin & Leech (UASM, 7♂, 2♀), 32.5 mi S, 5170 ft, creek margin, 4-VIII-1967, Ball, Erwin & Leech (UASM, 1♀); Tequila, 5.3 km S on microondas rd., 1560 m, oak forest, litter, 25-VII-1985, Frania & Shpeley (UASM, 1♂, 3♀), 9.6 km S on microondas rd., 1970 m, oak-pine litter, 26-VII-1985, Frania & Shpeley (UASM, 1♂, 2♀), 14.4 km S Tequila on rd. to microondas, 2410 m, oak forest, litter, 26-VII-1985, Frania & Shpeley (UASM, 1♀); Rio Molino, 5 km S Valle de Bravo, 2195 m, oak-pine litter, 2-VIII-1983, Frania & Jaagumagi (UASM, 1♂); Temascaltepec, 2.7 km NE, Rte. 130, 1765 m, stream arroyo, oak litter, 3-VIII-1983, Frania & Jaagumagi (UASM, 2♂); Tenancingo, 6.4 km S, Rte. 55, 2164 m, avocado orchard, leaf litter, 5-VIII-1983, Frania & Jaagumagi (UASM, 1♂). **Michoacán:** Apatzingam, 96.7 km W on rd. to Dos Aguas, 1640 m, oak-pine litter, 8-VIII-1985, Frania & Shpeley (UASM, 2♂, 1♀); Jacona, 16.5 km SW, 2150 m, oak-pine arroyo, litter, 18-VIII-1983, Frania & Jaagumagi (UASM, 2♂). **Morelos:** Juchiltepec, 9.0 mi S, pine-oak, 29-VI-1982, Withrow (OHSU, 1♀), tropical, 29-VI-1982, Withrow (OHSU, 1♂). **Nayarit:** Hue-

juquilla el Alto (Jalisco), 122.5 km W on rd. to Jesus Maria, 1460 m, arroyo, oak-pine litter, 29-VII-1985, Frania & Shpeley (UASM, 1♀); Jala, 13 km W, Volcan Ceboruco, 1930-70 m, oak forest, few pine, 24-VII-1983, Frania, Jaagumagi, & Shpeley (UASM, 4♂, 3♀). **Oaxaca:** Capulalpam, 1.6 mi W, wet oak-pine forest, 13-VIII-1972, Meyer & Ball (UASM, 3♂), 2 km W, 2010 m, dry oak-pine forest, in litter, 13-VI-1979, Ashe, Ball & Shpeley (UASM, 4♂, 2♀); Catarina Juquila, 12.8 mi E, pine-oak forest, 14-VII-1972, Meyer & Ball (UASM, 1♂, 1♀); El Camaron, microondas San Cristobal 10.2 km SE, 1120 m, riparian oak-pine for., 21-22-VI-1979, Ashe, Ball & Shpeley (UASM, 1♀), 1390 m, dry oak-pine forest, 22-VI-1979, Ashe, Ball & Shpeley (UASM, 4♂, 5♀), microondas San Cristobal, 11 km SE, Rte. 190, 1250 m, JKL lot 88H19.2, 19-VIII-1988, Liebherr & Yager (CUIC, 6♂, 2♀), 8.4 mi E, Rte. 190, 3500 ft, dry oak-pine forest, 21-VII&6-VIII-72, Meyer & Ball (UASM, 2♂, 4♀); Guelatao, 18.3 km S, 7.5 km N El Punto, Rte. 175, 2200 m, JKL lot 88H16.4, 16-VIII-1988, Liebherr & Yager (CUIC, 4♂); Huajuapam de Leon, microondas 2 km W Rte. 90, 9.7 km N, 2000 m, oak-acacia, 9-VI-1979, Ashe, Ball & Shpeley (UASM, 3♂, 1♀); Huitzo, Rte. 135, 23.6 km N Jct. Rte. 190, 2210 m, JKL lot 88H20.1, 20-VIII-1988, Liebherr & Yager (CUIC, 1♂, 3♀); Ixtlan de Juarez, 14.3 km E, 2030 m, dry oak-pine forest, 21-VII-1975, Ball & Frania (UASM, 1♂, 3♀); Juchatengo, 20.9 mi S, 6300 ft, 20-VII-1966, Ball & Whitehead (UASM, 1♂), 21.4 mi N, Rte. 131, 6400 ft, pine-oak forest, 7-VIII-1972, Meyer & Ball (UASM, 1♀), 21.8 mi N, 7100 ft, 18-19-VII-1966, Ball & Whitehead (UASM, 6♂, 1♀), 21.8 mi N, Rte. 131, wet pine-oak forest, 11-VII-1972, Meyer & Ball (UASM, 2♂, 1♀), 51.3 mi S, Rte. 131, oak forest, 16-17-VII-1972, Meyer & Ball (UASM, 1♂); Mitla, 14 km E, rd. to Zacotepec, 2150 m, JKL lots 88H13.2, 88H17.2, 88H17.3, 17-VIII-1988, Liebherr & Yager (CUIC, 7♂, 5♀); Nochixtlan, 17.1 km SE, 2170 m, oak arroyo, 15-VIII-1985, Frania & Shpeley (UASM, 1♂), 29.1 km SE, 2050 m, pine-oak, 15-VIII-1985, Frania & Shpeley (UASM, 6♂, 8♀); Oaxaca, 5 km N, 1700 m, sifted oak litter, 20-VI-1979, Howden & Howden (UASM, 1♀), 64.4 km NW, Rte. 131, oak forest, 17-VII-1975,

Ball & Frania (UASM, 11♂, 5♀); Ojo de Agua road 15.7 km S Rte. 190, 2320 m, oak-pine zone, litter near stream, 12-VI-1979, Ashe, Ball & Shpeley (UASM, 1♀); Puerto de Soledad, 24.5 km E Teotitlan, 2240 m, cloud forest, 15-VII-1975, Ball & Frania (UASM, 1♂); San Pedro y San Pablo Ayutla, 10.5 km S, Rte. 179, 1720 m, oak-pine forest (dry), in litter, 18-VI-1979, Ashe, Ball, & Shpeley (UASM, 12♂, 3♀), 1870 m, dry oak-pine forest, in litter, 18-VI-1979, Ashe, Ball & Shpeley (UASM, 2♂, 4♀); Santa Maria Nizavaguiti [16°41'N 95°50'W] 1935 m, oak-pine forest (dry), in litter, 20-VI-1979, Ashe, Ball, & Shpeley (UASM, 1♂), 1670 m, dry oak-pine for., ck. with *Alnus*, 20-VI-1979, Ashe, Ball & Shpeley (UASM, 1♂); Sola de Vega, 9.3 mi S, 6000 ft, 18-VII-1966, Ball & Whitehead (UASM, 1♂, 1♀); Suchixtepec [Suchiltepec], 3 mi N, Hwy. 175, 9500 ft, 4-VI-1971, Bright (UASM, 1♂), 3.4 mi S, Rte. 175, 8-9-VIII-1972, Meyer & Ball (UASM, 1♀), 3.4 mi S, Rte. 175, 7100 ft, 7-8-VII-1972, Meyer & Ball (UASM, 1♀). **Sinaloa:** El Palmito, 40.2 km W, Rte. 40, 1020 m, tropical deciduous arroyo, 24-VII-1985, Frania & Shpeley (UASM, 1♂, 1♀); Mazatlan, 113 km E, Rte. 40, 1980 m, pine-oak litter, 21-VII-1983, Frania, Jaagumagi, & Shpeley (UASM, 1♂, 1♀), 125.5 km E, Rte. 40, 2000 m, pine-oak litter, 21-VII-1983, Frania, Jaagumagi, & Shpeley (UASM, 1♂). **Zacatecas:** Huejuquilla el Alto (Jalisco), 58.2 km W on rd. to Jesus Maria, 1820 m, arroyo, oak-pine litter, 28-VII-1985, Frania & Shpeley (UASM, 2♂, 2♀); Tlaltenango, 27.6 km W, jct. Rte. 54, 2350 m, oak forest litter, 31-VII-1985, Frania & Shpeley (UASM, 3♂, 2♀).

ETYMOLOGY: A combination of the Latin *caeruleus*, meaning dark blue, and *penna*, meaning wing. The name denotes the piceous elytra with blue metallic reflection.

DISTRIBUTIONAL RANGE: Found along the Pacific Coast of México from Oaxaca northward to southern Sinaloa, eastward to México and Morelos States (fig. 160).

Platynus ovatulus (Bates)

(figs. 19, 28, 29, 58, 141, 142, 155, 160)

Anchomenus ovatulus Bates, 1884: 281.

Agonum ovatulum: Csiki, 1931: 847.

Platynus ovatulus: Whitehead, 1973: 205.

Platynus languidus Horn, 1892: 42; Liebherr, 1991c: 121 (synonymy).

Agonum languidum: Csiki, 1931: 843.

DIAGNOSIS: Pronotum transverse, hind angles nearly obsolete, lateral margins straight just before basal setae (fig. 58); eyes somewhat small, not strongly protruding from head; head piceous, pronotum and elytra rufopiceous, antennae and legs rufotestaceous; tarsomere 5 with ventral setae longer than tarsomere depth at setal insertion.

DESCRIPTION: Frontal grooves broad and shallow, smooth; eyes only moderately protruding, ocular ratio 1.52 to 1.57. Pronotum transverse, maximum width 1.5× median length; hind angles nearly obsolete, defined by straight lateral margin before basal seta; laterobasal depressions smooth; median base with numerous longitudinal wrinkles; basal marginal bead continuous medially, stronger laterally, basal setae set on abruptly elevated portion of marginal bead; median longitudinal impression fine throughout length; anterior transverse depression well developed medially, evident almost ½ distance to front angles; anterior marginal bead flat medially, slightly taller on rounded front angles; lateral marginal depressions narrow in apical ⅓ of length, slightly broader near laterobasal depressions. Elytral striae clearly incised, slight irregularities giving impression of fine punctures; elytral intervals nearly flat; basal groove evenly and moderately recurved to the weakly angulate humerus; 16 lateral elytral setae in eighth stria. Metepisternum somewhat reduced, lateral margin length 1.33× anterior margin; flight wings variable, macropterous or brachypterous. Basal metatarsomere with well-developed outer and inner dorsal sulci, the median area convex. Tarsomere 5 with ventral setae longer than tarsomere depth at setal insertion (fig. 28).

Head with well-developed isodiametric microsculpture; pronotal disc with shallow transverse mesh microsculpture, the sculpticells obscured by surface reflection; pronotal laterobasal depressions and base with slightly transversely stretched isodiametric mesh microsculpture; elytra with irregularly transverse microsculpture (fig. 29), the sculpticells a mixture of transversely stretched isodiametric and transverse facets in males, or isodiametric and transversely stretched iso-

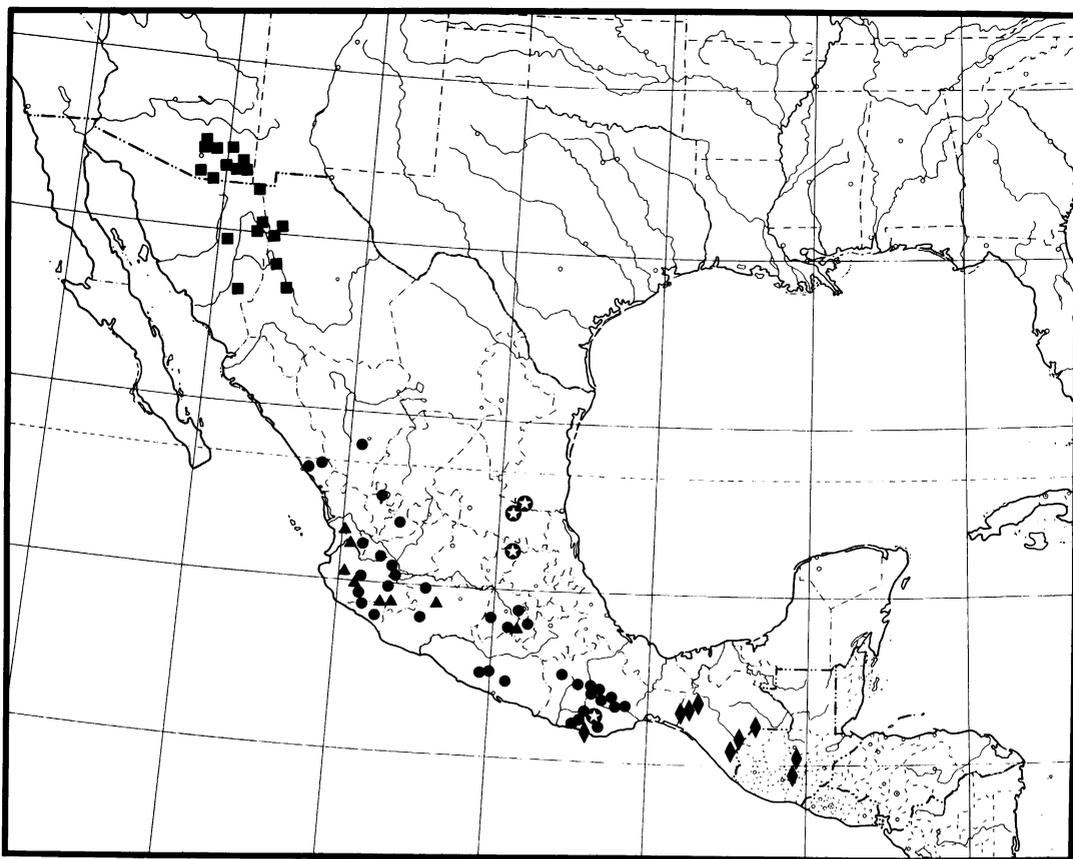


Fig. 160. Distributional records of *P. brunnellus* (●), *P. caerulipennis* (◐), *P. ovatulus* (■), *P. rotundatus* (▲), and *P. crypticus* (◆).

diametric facets in females. Head capsule piceous, clypeus, labrum and mandibles rufopiceous, palps and antennae rufotestaceous; pronotal disc rufopiceous, lateral and basal margins broadly paler, more rufous; elytra rufopiceous, often with paler sutural interval and base; ventral body surface brunnescens, pronotal and elytral epipleura, and legs paler, more flavous.

Standardized body length 6.0–7.2 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved with finely acuminate apex (fig. 141). Aedeagal internal sac with an apical rasp on the ventral side of the gonopore, and medial spines on left and right side (fig. 142).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9 setae (fig. 155). Apical gonocoxite with 2–5 lateral and 1 dorsal ensiform setae. Spermathecal duct narrow, angularly joining apical reservoir.

TYPES: Of *ovatulus* Bates, lectotype ♀ designated by Whitehead (1973) (BMNH): Type/H.T. [red-bordered circle]// Pinos Altos, Chihuahua, Mexico./ Buchan-Hepburn./ Colpodes ♀/ **LECTOTYPE**/ det. D. R. Whitehead/ *Colpodes ovatulus* (Bates) det. D. R. Whitehead/ (Anchomenus). Of *languidum* Horn, lectotype ♂ designated by Liebherr (1991c) (MCZ): Ari// Lectotype 2888 [red label]// *P. languidus*/ Horn// **LECTOTYPE**/ Platynus/ *languidus*/ Horn/ J. K. Liebherr 1990; the type locality was restricted to Cochise Stronghold, Dragoon Mtns., Cochise Co., AZ (Liebherr, 1991c).

DISTRIBUTIONAL RANGE: Found in the mountains of southeastern Arizona and in the northern Sierra Madre Occidental in the Mexican states of Sonora and Chihuahua (fig. 160).

MATERIAL EXAMINED: MÉXICO. – Chi-

huahua: (no other data) Hepburn (MNHP, 1); Ciudad Guerrero, 19 mi NW, Rte. 16, 7000 ft, oak-juniper forest, 28-VIII-1972, Heming & Ball (UASM, 2); Colonia Garcia, 5.1 km N, 2010 m, creek margin, 23-VII-1979, Ashe, Ball & Shpeley (UASM, 1); Ejido Zaragoza, 1.3 km N, 1850 m, oak-pine for., cañon c/w creek, 22-VII-1979, Ashe, Ball & Shpeley (UASM, 2), 5.1 km N, 2010 m, creek margin, 23-VII-1979, Ashe, Ball & Shpeley (UASM, 1); El Ojito, 12.4 km E, Rte. 24, 2200 m, pine-oak, arroyo, litter, 11-VII-1983, Frania, Jaagumagi & Shpeley (UASM, 1); Madera, 8.6 mi SW, 2160 m, 31-VIII-1974, Frania & Ball (UASM, 1); Pinos Altos, Buchan-Hepburn (BMNH, 1). **Sonora:** Mesa de Tres Rios, 4.5 km N, 1950 m, oak-pine forest, 6-VII-1983, Frania, Jaagumagi & Shpeley (UASM, 14); Moctezuma, 55 km SW, Rte. 21, 500 m, dry trop. scrub, 2-VIII-1982, Ball, Ball & McCleve (UASM, 1); Nacori Chico, 11.9 km SE, 1160 m, oak for. & stock pond, 9-VIII-1982, Ball, Ball & McCleve (UASM, 3), 23 km E, Rancho Pinos, 1600 m, oak-pine forest, 4-VII-1983, Frania, Jaagumagi & Shpeley (UASM, 3); Rio Tres Rios, 18 km N Mesa de Tres Rios, 1450 m, oak forest, litter, 5-VII-1983, Frania, Jaagumagi & Shpeley (UASM, 3); San Nicolas, E on rd. to La Angostura, 1400 m, grassland-oak forest, 11-VIII-1982, Ball, Ball & McCleve (UASM, 1); Sierra Huachinera, 22.1 km SE Huachinera, 2090 m, oak-pine forest, 3-4-VIII-1982, Ball, Ball & McCleve (UASM, 1); Sierra San Luis, Varela Rch., Cn. Chimineaz, 1460-1690 m, oak-juniper-sycamore, 19-VIII-1982, Ball, McCleve & Maddison (UASM, 8). **U.S.A. - Arizona:** (no other data) Horn (MCZ, 1), Liebeck (MCZ, 2), Morrison (NMNH, 3). **Cochise Co.:** Chiricahua Mts., III, Duncan (MCZ, 1), 8-VI-1908, Fall (MCZ, 1), E Turkey Creek, 6000 ft, in litter, 1-V-1966, Roth (AMNH, 1), Martyr Camp, 7000 ft, 21-VIII-1978, Kukul (CNC, 1), Portal, 1-VI-1952, Cazier, Gertsch & Schrammel (AMNH, 1), 5000 ft, 21-VII-1969, Smetana (CNC, 1), 24-VII-1969, Smetana (CNC, 2), 5 mi W, 5500 ft, 23-VII-1969, Smetana (CNC, 2), Rucker Cyn., 1730 m, 22-VII-1976, Campbell (CNC, 1), Rucker Lk. vic., 7000 ft, 23-24-VIII-1981, Liebherr (CUIC, 1), Rushtler Park, 8400 ft, 4-VIII-1965, Saario (UCR, 1), Southwest Research Station, 5 mi W Por-

tal, 5400 ft, 11-VII-1956, Cazier (AMNH, 1), 23-VII-1958, Cazier (AMNH, 1), 5-VIII-1959, Evans (CUIC, 1), 9-VIII-1967, Schlinger (UCR, 1), Sunny Flat Cpgd., 5200 ft, 29-VII-1979, Smetana (CNC, 2); Cochise Stronghold, 4800 ft, 18-19-VIII-1981, Liebherr (CUIC, 3), larva in leaf litter, adult reared, 18-20-VIII-1981, Liebherr (CUIC, 1); Huachuca Mts., Ash Cyn., 5000 ft, 2-VIII-1969, Smetana (CNC, 1), Carr Cyn., 1760 m, 20-VII-1976, Campbell (CNC, 1), Miller Cyn., 6500-7000 ft, 1-VIII-1969, Smetana (CNC, 1), Ramsey Cyn., 5200 ft, 2-VIII-1969, Smetana (CNC, 2), Sierra Vista, V-1965, Sternitzky (CNC, 1), VI-1965, Sternitzky (CNC, 1). **Graham Co.:** Fort Grant, 23-VII, Hubbard & Schwarz (NMNH, 1); Galiuro Mts., Ash Creek Cyn., N fork, 1530-1640 m, riparian forest, 16-17-VIII-1982, Ball, McCleve & Maddison (UASM, 2). **Pima Co.:** Molino Basin, Santa Catalina Mts., 27-XI-1976, Roth & Schroepfer (AMNH, 1); Tucson, Bear Cyn., Mt. Lemon, Horse Camp Spg., 6000 ft, 1978, Langworthy (CMNH, 1). **Pinal Co.:** Oracle, 12-VII, Hubbard & Schwarz (NMNH, 1). **Santa Cruz Co.:** Santa Rita Mts., 13-IV-1910, Fall (MCZ, 1), 21-V, Hubbard & Schwarz (NMNH, 1), 23-V, Hubbard & Schwarz (NMNH, 3), 10-VI, Hubbard & Schwarz (NMNH, 6), 15-VI, Hubbard & Schwarz (NMNH, 2), XI-1968, Lenczy (CMNH, 2).

Platynus rotundatulus, new species

(figs. 55, 143, 144, 156, 157, 160)

DIAGNOSIS: Pronotal hind angles obsolete, margin evenly rounded outside basal setae, laterobasal depressions smooth (fig. 55); eyes moderately convex; ventral setae of tarsomere 5 longer than tarsomere depth at setal insertion.

DESCRIPTION: Frontal grooves well defined, area outside angulate grooves depressed; eyes moderately convex, ocular ratio 1.54 to 1.62. Pronotum with rounded obsolete hind angles (fig. 55); laterobasal depressions smooth; median base with numerous faint longitudinal wrinkles; basal marginal bead continuous, strongest behind laterobasal depressions, basal margin recurved inside depressions; median longitudinal impression fine throughout length; anterior transverse de-

pression broad, shallow; anterior marginal bead well defined throughout width; front angles protruding, tightly rounded; lateral marginal depressions narrow before lateral setae, evenly widening from lateral setae to laterobasal depressions. Elytral striae deep, slightly wavering; elytral intervals moderately convex; basal groove strongly recurved from scutellar to 4th stria, humerus angulate; 16 lateral elytral setae in eighth stria. Metepisternum somewhat reduced, lateral margin length 1.25 anterior margin; flight wings variable, brachypterous with only slightly reduced apex, brachypterous with reduced apex, and vestigial. Basal metatarsomere with moderately deep outer dorsal sulcus, inner sulcus slightly shallower, median area flat. Tarsomere 5 with ventral setae longer than tarsomere depth at setal position.

Head with well-developed, coriaceous isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture, the sculpticells in regular rows; pronotal laterobasal depressions and median base with isodiametric microsculpture; elytra with well-developed transverse mesh microsculpture, the sculpticells in regular rows, each sculpticell 2–4 times as long as broad. Vertex dark brunneous; frons, clypeus, labrum, and mandibles ferruginous; palps and antennae testaceous; pronotal disc brunneous, margins broadly paler, flavobrunneous; elytra brunneous, base adjacent to scutellum paler; ventral body surface pale brunneous, pronotal and elytral epipleura and legs testaceous.

Standardized body length 6.7–7.5 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved with finely rounded apex (fig. 143). Aedeagal internal sac trispinose, with apical spine on ventral side, and medial spines on right and left side of sac (fig. 144); stouter microtrichia near gonopore.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 11 setae (fig. 156). Apical gonocoxite with 3–4 lateral and 1 dorsal ensiform setae. A ring of stout microtrichia, 8 wide around widest portion of bursa copulatrix; spines much broader basally than sparse microtrichia closer to vagina, ranging from 14–33 μm long, and 3–8 μm wide at base ($n = 6$). Spermathecal duct narrow, angularly meeting apical reservoir (fig. 157).

TYPE: Holotype δ (UASM, deposited in NMNH): MEXICO. Jalisco./ 8.3 mi. s. Au-

tlan./ 3800'. Rte. 80./ VIII. 5. 1966// George E. Ball/ D. R. Whitehead/ collectors. Allotype ♀ : same data and deposition.

PARATYPES: MEXICO. – **Jalisco:** Autlan, 8.3 mi S, Rte. 80, 3800 ft, 5-VIII-1966, Ball & Whitehead (UASM, 17 δ , 10 ♀); Talpa de Allende, 10.8 mi S, 4900 ft, 8-VIII-1967, Ball, Erwin & Leech (UASM, 1 ♀); Tecalitlan, 12.4 mi S, 5300 ft, 2-VIII-1967, Ball, Erwin & Leech (UASM, 5 δ), 3-VIII-1967, Ball, Erwin & Leech (UASM, 1 δ , 3 ♀); Tequila, 5.3 km S on microondas rd., 1560 m, oak forest, litter, 25-VII-1985, Frania & Shpeley (UASM, 1 δ); Volcan de Colima, S slope, 6400 ft, 2-VIII-1966, Ball & Whitehead (UASM, 1 ♀). **Michoacán:** Uruapan, 6.3 km S, Rte. 37, 1470 m, oak-pine, stream, arroyo, litter, 17-VIII-1983, Frania & Jaagumagi (UASM, 4 δ , 3 ♀). **Morelos:** Cuernavaca, 5.4 mi E, 4600 ft, pedregal, 29-30-VI-1966, Ball & Whitehead (UASM, 1 ♀). **Nayarit:** Santa Isabel, 8.3 mi N, Rte. 15, 3600 ft, 2-VIII-1965, Ball & Whitehead (UASM, 2 ♀); Tepic, 19.3 mi SE, Rte. 15, 4000 ft, oak forest, 1-VIII-1967, Ball, Erwin & Leech (UASM, 7 δ , 6 ♀).

ETYMOLOGY: The diminutive of the Latin *rotundus*, meaning circular or round. The name denotes both the rounded pronotal hind angles, and the external similarity of this species to *Platynus ovatulus*.

DISTRIBUTIONAL RANGE: Found on the western reaches of the Transvolcanic Sierra, from Nayarit and Jalisco to Morelos (fig. 160).

Platynus crypticulus, new species
(figs. 13, 56, 57, 145–150, 158, 159, 160)

DIAGNOSIS: Brunneous pronotum and elytra contrasting with the piceous head and testaceous legs; eyes moderately convex; pronotum with rounded hind angles and smooth laterobasal depressions (figs. 56, 57); metepisternum short, lateral margin length less than 1.5 anterior margin; ventral setae of tarsomere longer than tarsomere depth at setal insertion.

DESCRIPTION: Frons smooth medially, frontal grooves with wrinkles radiating from anterior ocular setae, eyes moderately convex, ocular ratio 1.61 to 1.74. Pronotum with rounded hind angles, basolateral margins straight to slightly convex (figs. 56, 57); laterobasal depressions smooth with only faint irregularities in deepest portions; basal mar-

ginal bead well defined behind laterobasal depressions, fainter medially; median base variable, smooth to faintly longitudinally wrinkled; median longitudinal impression obsolete on base, well defined with transverse wrinkles on disc; anterior transverse depression moderately well defined medially, obsolete laterally; anterior marginal bead faint near middle; front angles tightly rounded; lateral marginal depressions gradually widening from front angles to middle of length, where they meet laterobasal depressions. Elytral striae deep, well defined, slightly irregular but not punctate; elytral intervals slightly convex; basal groove recurved to the tightly rounded to slightly angulate humerus; 15–16 lateral elytral setae in eighth stria. Metepisternum somewhat reduced, lateral margin length 1.24–1.40 × anterior margin; flight wings variable, macropterous to stenopterous (as in figs. 11, 13). Basal metatarsomere with broad, shallow outer dorsal sulcus and shallower inner dorsal sulcus, the median area convex. Tarsomere 5 with ventral setae longer than depth of tarsomere at setal insertion.

Head with well-developed isodiametric microsculpture; pronotal disc with elongate transverse mesh microsculpture; pronotal laterobasal depressions and median base with irregular transversely stretched isodiametric microsculpture; elytra with transverse mesh microsculpture, the sculpticells bricklike. Head capsule dark brunneous, clypeus and mouthparts ferruginous, palps and antennae rufotestaceous with faint infuscation; pronotal disc as dark as head, lateral and basal margins broadly paler, a dusky flavous along the lateral edges; elytra rufopiceous with silvery metallic reflection; ventral body surface a smoky rufous, pronotal and elytral epipleura and legs testaceous.

Standardized body length 6.5–7.5 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved with bluntly rounded apex (fig. 145–147). Aedeagal internal sac elongate, sac length 1.25 × length of median lobe from parameral articulation to apex; sac bispinose or trispinose, always with an apical spine just ventrad of gonopore and a medial spine on the right of the sac, with or without a medial spine on the left side of the sac (figs. 148, 149, 150); apex of sac with stronger microtrichia.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9–12 setae (fig.

158). Apical gonocoxite with 3–4 lateral and 1 dorsal ensiform setae. Bursa copulatrix with median ring of stout microtrichia on left side, extending toward middle of ventral surface. Spermathecal duct nearly as broad as apical reservoir, angularly joining spermatheca (fig. 159).

TYPE: Holotype ♂ (UASM, deposited in NMNH): MEX. OAXACA-CHIAPAS/ border 18.7 km. w. Rizo/ de Oro, Chis. 1345 m./ oak-pine for. (dry)/in litter, 79-49/ June 24, 1979// MEXICAN EXP. 1979/ J. S. Ashe, G. E. Ball/ & D. Shpeley/ collectors. Allotype ♀: same data and deposition.

PARATYPES: GUATEMALA. – **Baja Verapaz:** Purulha, 22 km S, 1420 m, oak litter, 15-VIII-1974, Ball, Frania & Whitehead (NMNH, 1♂, 1♀). **Guatemala:** Guatemala City (MNHP, 2♂), 5000 ft, Champion (BMNH, 2♂; MNHP, 1♂, 1♀). **MEXICO.** – **Chiapas:** Frontera Comalapa, 7.7 mi N, 2600 ft, black light, 15-16-VI-1966, Ball & Whitehead (UASM, 1♀); Lagos de Montebello Nat. Pk., 4800 ft, 30-V-1972, Meyer & Ball (UASM, 2♀); Ocozocuatla, 3.1 mi N, 18-VI-1972, Meyer & Ball (UASM, 1♀); Rizo de Oro, 3 mi NE, 2800 ft, 20-26-VIII-1971 (UASM, 1♂); Toliman, 13.6 km SE, 1600 m, oak-pine forest litter, 11-VII-1979, Ashe, Ball & Shpeley (UASM, 2♂). **Chiapas-Oaxaca:** Rizo de Oro, 18.7 km W, 1345 m, oak-pine for. (dry), in litter, 24-VI-1979, Ashe, Ball & Shpeley (UASM, 14♂, 17♀). **Oaxaca:** Puerto Escondido, 22.4 mi N, 2100 ft, black light, 20-21-VII-1966, Ball & Whitehead (UASM, 7♂, 4♀).

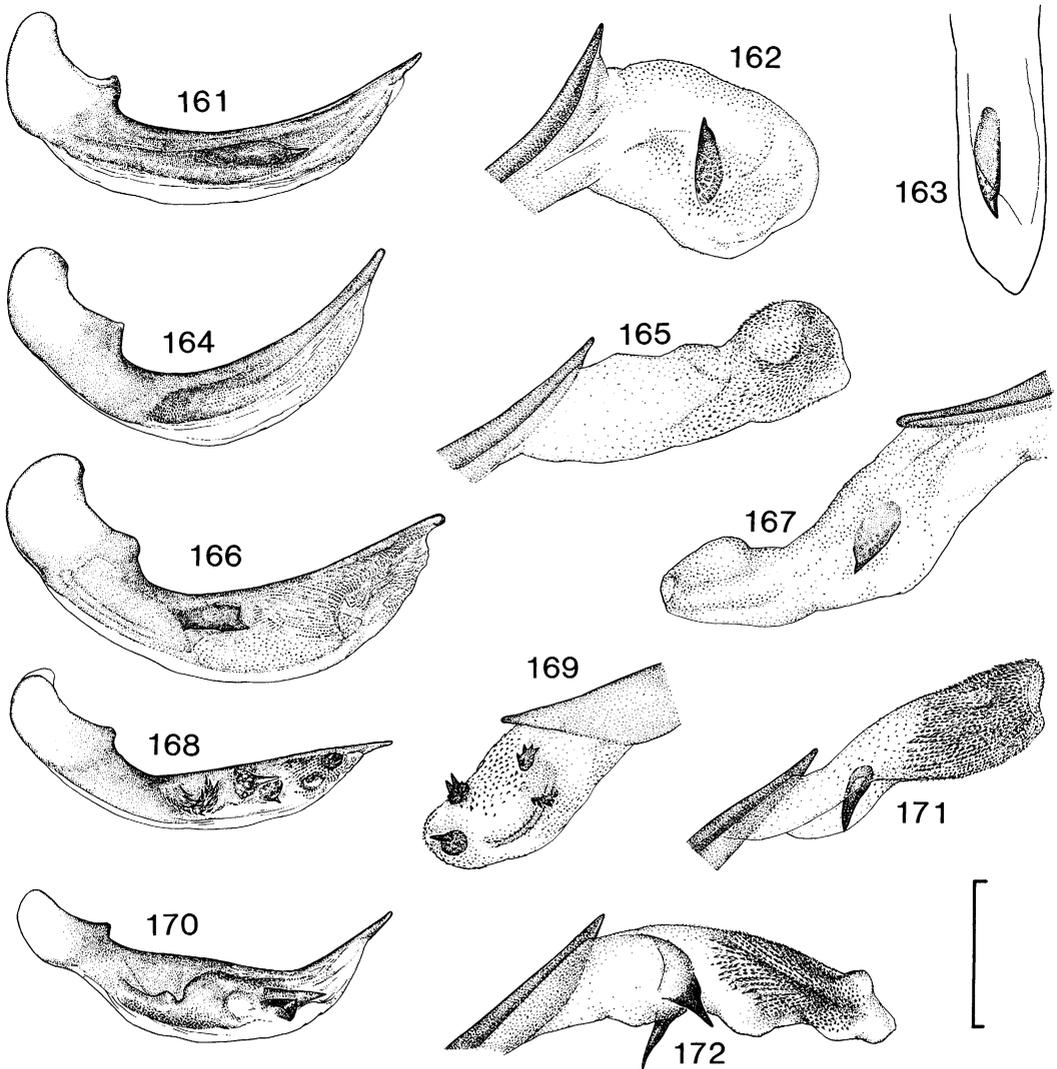
ETYMOLOGY: The latinized diminutive of the Greek *kryptos*, meaning hidden. This species proved the most difficult of all *degallieri* group species to diagnose due to variation in the pronotum and the male aedeagus.

DISTRIBUTIONAL RANGE: Known from montane forest in Guatemala and Chiapas, and west of the Isthmus of Tehuantepec above Puerto Escondido (fig. 160).

Platynus minusculus, new species

(figs. 71, 161–163, 173, 174, 182)

DIAGNOSIS: Small beetles, 5.5–6.3 mm standardized body length; eyes moderately convex; pronotum transverse, hind angles obtuse, lateral margins basally convex (fig. 71); antennae and legs testaceous, contrasting with piceous forebody and brunneous elytra.



Figs. 161–172. Male aedeagi. **161.** Median lobe, *P. minusculus*, dextroventral view. **162.** Everted internal sac, *P. minusculus*, dextroventral view. **163.** Median lobe apex, *P. minusculus*, detailing internal sac spination, euventral view. **164.** Median lobe, *P. nitidulus*, dextroventral view. **165.** Everted internal sac, *P. nitidulus*, dextroventral view. **166.** Median lobe, *P. margaritulus*, dextroventral view. **167.** Everted internal sac, *P. margaritulus*, levodorsal view. **168.** Median lobe, *P. degallieri*, dextroventral view. **169.** Everted internal sac, *P. degallieri*, levodorsal view. **170.** Median lobe, *P. aeneipennis*, dextroventral view. **171, 172.** Everted internal sac, *P. aeneipennis*, dextroventral view. **171.** Trinidad: Simla. **172.** Panamá: Pearl Islands. Scale bar = 0.5 mm.

DESCRIPTION: Frontal grooves moderately deep, areas laterad grooves depressed; eyes moderately convex, ocular ratio 1.56 to 1.62. Pronotum transverse, hind angles obtuse (fig. 71); laterobasal depressions deep on inner margins, gradually elevated to lateral margin, surface smooth; basal marginal bead well de-

finer medially, increasingly more indistinct from inner margin of laterobasal depressions to basal setae; median longitudinal impression fine throughout length; anterior transverse depression well developed, evident almost $\frac{1}{2}$ distance to front angles; anterior marginal bead faint medially; front angles

broadly rounded, little protruding; lateral marginal depressions narrow before lateral setae, widening behind to meet laterobasal depressions. Elytral striae well incised, very regular; elytral intervals slightly convex; basal groove slightly recurved, humerus rounded; 15–16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length more than $1.50 \times$ anterior margin; flight wings macropterous. Basal metatarsomere clearly incised, deep outer dorsal sulcus, and shallow inner sulcus, the median area convex. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with shallow isodiametric microsculpture; pronotal disc with transverse mesh microsculpture; pronotal laterobasal depressions and median base with slightly transversely stretched isodiametric microsculpture, the sculpticells parallel to outer margin; elytra with fine transverse mesh microsculpture, the sculpticells obscured in part by surface reflection. Head capsule rufopiceous, labrum and mandibles brunneous, palps and antennae testaceous; pronotum rufopiceous, explanate margins paler, rufopiceous; elytra brunneous with silvery metallic reflection, sutural interval may be paler, rufopiceous; ventral body surface rufopiceous, pronotal and elytral epipleura brunneous to flavous, legs testaceous.

Standardized body length 5.5–6.3 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved apically, with finely rounded apex (fig. 161). Aedeagal internal sac with a single medial spine on the right side (figs. 162, 163).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9 setae (fig. 173). Apical gonocoxite with 2 lateral and 1 dorsal ensiform setae. Spermathecal duct broad, apical reservoir angulate relative to duct (fig. 174).

TYPE: Holotype δ (UASM, deposited in NMNH): MEX. Veracruz/ 0.8 mi. w. Sontecoapan, 0'-100' IX.18-26.65// George E. Ball/ D. R. Whitehead/ collectors. Allotype φ : same data and deposition.

PARATYPES: MEXICO. – Veracruz: Catemaco, 33 km NE, Est. Biol. "Los Tuxtlas," ravine rainforest, flight intercept trap, VII-1983, Peck & Peck (CNC, 1 δ , 1 φ); Sontecoapan, 0.8 mi W, 0–100 ft, 18-26-IX-1965,

Ball & Whitehead (UASM, 4 δ), 2.5 mi W, 100 ft, 20,26-IX-1965, Ball & Whitehead (UASM, 4 δ), leaf litter, 1-5-VI-1966, Ball & Whitehead (UASM, 1 δ), swamps, 1-5-VI-1966, Ball & Whitehead (UASM, 1 φ), 6.7 mi NW, 200 ft, 3-VI-1966, Ball & Whitehead (UASM, 1 δ).

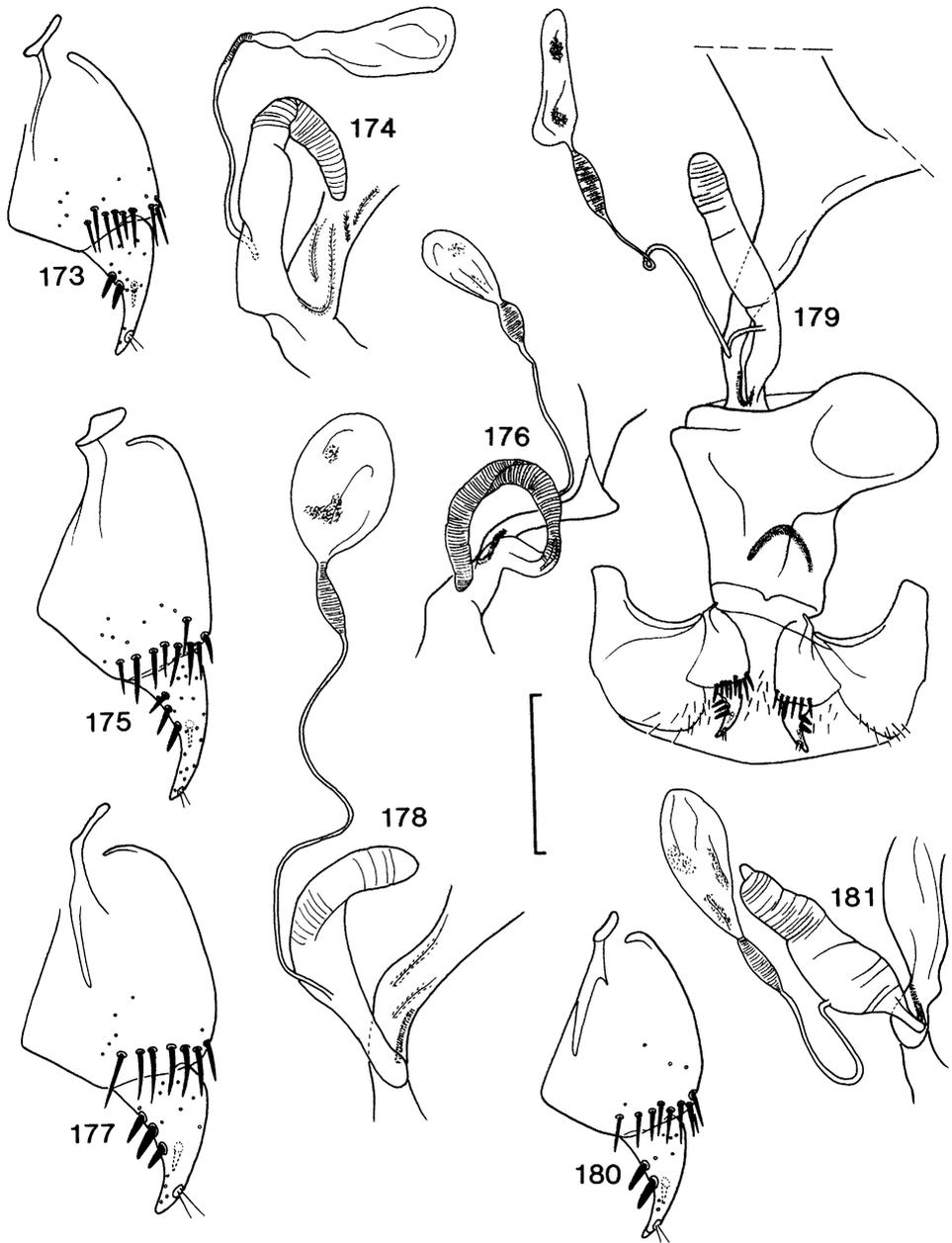
ETYMOLOGY: The diminutive form of the Latin *minus*, meaning little, referring to the small body size of these beetles.

DISTRIBUTIONAL RANGE: Known only from forests in the volcanic hills of the Sierra de los Tuxtlas along the Gulf Coast in southern Veracruz (fig. 182).

Platynus nitidulus, new species
(figs. 74, 164, 165, 175, 176, 182)

DIAGNOSIS: Elytra parallel-sided, shiny, with intense bluish to silvery metallic reflection; legs pale, testaceous, antennae infuscated brunneous; eyes moderately convex; pronotum with broadly testaceous margins contrasting with piceous disc, hind angles obtuse, side straight before basal setae, laterobasal depressions smooth (fig. 74); elytral striae slightly discontinuous near base of disc, irregularly punctate.

DESCRIPTION: Frontal groove broad and deep, defining triangular lateral tubercles; eyes moderately convex, ocular ratio 1.57 to 1.73. Pronotum transverse, explanate lateral margins convex medially, straight before obtuse hind angles (fig. 74); laterobasal depressions deep, circular, and smooth; median base smooth; basal marginal bead well defined medially, traceable on inner half of laterobasal depressions, absent closer to basal setae; the broad lateral margin smoothly contoured into laterobasal depression; median longitudinal impression fine, in depressed median area of disc; anterior transverse depression broad and shallow; anterior marginal bead little incised but traceable medially; front angles tightly rounded; lateral marginal depressions broad, gradually widening from front angles to laterobasal depressions. Elytral striae irregularly discontinuous in basal half of disc, irregularities defining minute punctulae; elytral intervals broadly convex; basal groove broadly recurved to rounded humerus; 16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length



Figs. 173–181. Female reproductive tract structures. 173. Right gonocoxa, *P. minusculus*, ventral view. 174. Common oviduct and spermatheca, *P. minusculus*, ventral view. 175. Right gonocoxa, *P. nitidulus*, ventral view. 176. Common oviduct and spermatheca, *P. nitidulus*, ventral view. 177. Right gonocoxa, *P. margaritulus*, ventral view. 178. Common oviduct and spermatheca, *P. margaritulus*, ventral view. 179. Female reproductive tract, *P. degallieri*, ventral view. 180. Right gonocoxa, *P. aeneipennis*, ventral view. 181. Common oviduct and spermatheca, *P. aeneipennis*, ventral view. Scale bar = 0.2 mm for figs. 173, 175, 177, 180; scale bar = 0.5 mm for figs. 174, 176, 178, 179, 181.

1.5× anterior margin; flight wings macrop-
terous. Basal metatarsomere with broad and
shallow outer and inner dorsal sulci, median

area convex. Tarsomere 5 with very short
ventral setae, visible only at high magnifi-
cation (×125).

Head with well-developed isodiametric microsculpture; pronotal disc with transverse mesh microsculpture, the sculpticells slightly obscured by surface reflection; pronotal laterobasal depressions with swirling transverse mesh microsculpture; median base with transversely stretched isodiametric microsculpture; elytra with transverse microsculpture of very dense lines, the sculpticells obscured by surface reflection. Head capsule rufopiceous, labrum and mandibles brunneous, palps and antennae rufotestaceous with smoky cast; pronotal disc rufopiceous, margins rufotestaceous; elytra rufopiceous with strong bluish to cupreous metallic reflection; ventral body surface rufopiceous to brunneous, pronotal and elytral epipleura brunneous, legs testaceous.

Standardized body length 6.5–7.5 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved with narrowly rounded apex (fig. 164). Aedeagal internal sac with longer bushy microtrichia near apex (fig. 165).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9 setae (fig. 175). Apical gonocoxite with 2–3 lateral and 1 dorsal ensiform setae. Spermathecal duct broad, angularly meeting apical reservoir (fig. 176).

TYPE: Holotype ♂ (NMNH): COSTA RICA: / Puntarenas Prov./ 8010 km above/ Monteverde/ 19-23-III-1973// wet leaf litter/ montane rain forest/ D. R. Whitehead// ADP/ 54384. Allotype ♀ (NMNH): same data except ADP/ 54380.

PARATYPES: COSTA RICA. – **San José:** San Isidro de Coronado, IX-1940, Bierig (MCZ, 1♂). **Cartago:** Turrialba, tropical rain forest floor, 8-VII-1965, Allen (NMNH, 1♀). **Puntarenas:** Monteverde, 9-XI-1981, Brailovsky & Barrera (UNAM, 1♀), 5000 ft, 27-29-V-1979, Campbell & Campbell (CNC, 1♂), 8–10 km above, montane rain forest, wet leaf litter, 19-23-III-1973, Whitehead (NMNH, 3♂), upper end, 1550 m, 12-VI-1973, Erwin & Erwin (NMNH, 1♂). **PANAM.** – **Chiriquí:** Las Lagunas, 4 km W Hato del Volcan, 1360 m, 4-V-1974, Stockwell (NMNH, 1♂).

ETYMOLOGY: The diminutive form of the Latin *nitidus*, meaning shining or elegant, denoting the shiny elytra.

DISTRIBUTIONAL RANGE: Found in montane rain forest of the Sierra de Talamanca from Costa Rica to Chiriquí Province, Panamá (fig. 182).

***Platynus margaritulus*, new species**

(figs. 61, 166, 167, 177, 178, 182)

DIAGNOSIS: Pronotum and elytra concolorous brunneous, with vivid pearly metallic reflection, head rufopiceous; eyes moderately convex; pronotal lateral margins straight to slightly convex before obtuse-rounded hind angles (fig. 61), laterobasal depressions and median base sparsely punctate to rugose; elytral striae with irregularities producing punctures on basal $\frac{1}{3}$ of disc.

DESCRIPTION: Frontal groove broad; eyes moderately convex, ocular ratio 1.64 to 1.71. Pronotum with moderately explanate margins, sides straight to slightly convex before obtuse-rounded hind angles (fig. 61); laterobasal depressions sparsely punctate; median base sparsely punctate on inner margins of laterobasal depressions; basal marginal bead continuous, well defined until just inside basal setae; median longitudinal impression fine, traversed by wrinkles caused by discal microsculpture; anterior transverse depression broad and shallow medially, traceable $\frac{1}{4}$ distance to front angles; anterior marginal bead continuous; front angles rounded; lateral marginal depressions moderately broad, gradually widening from front angles to laterobasal depressions. Elytral striae finely incised, continuous, with irregular constrictions forming punctures; elytral intervals slightly convex; basal groove broadly recurved to rounded humerus; 16–17 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length $1.9 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad, shallow outer dorsal sulcus, slightly shallower inner dorsal sulcus, median area flat. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with well-developed isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture; pronotal laterobasal depressions with mixture of transverse mesh and transversely stretched isodiametric microsculpture, the sculpticells parallel to outer margin; median base with transversely stretched isodiametric microsculpture; elytra with dense transverse mesh microsculpture, sculpticells sometimes fused transversely forming transverse lines. Head capsule rufopiceous, labrum, mandibles, palps, and antennae brunneous; pro-

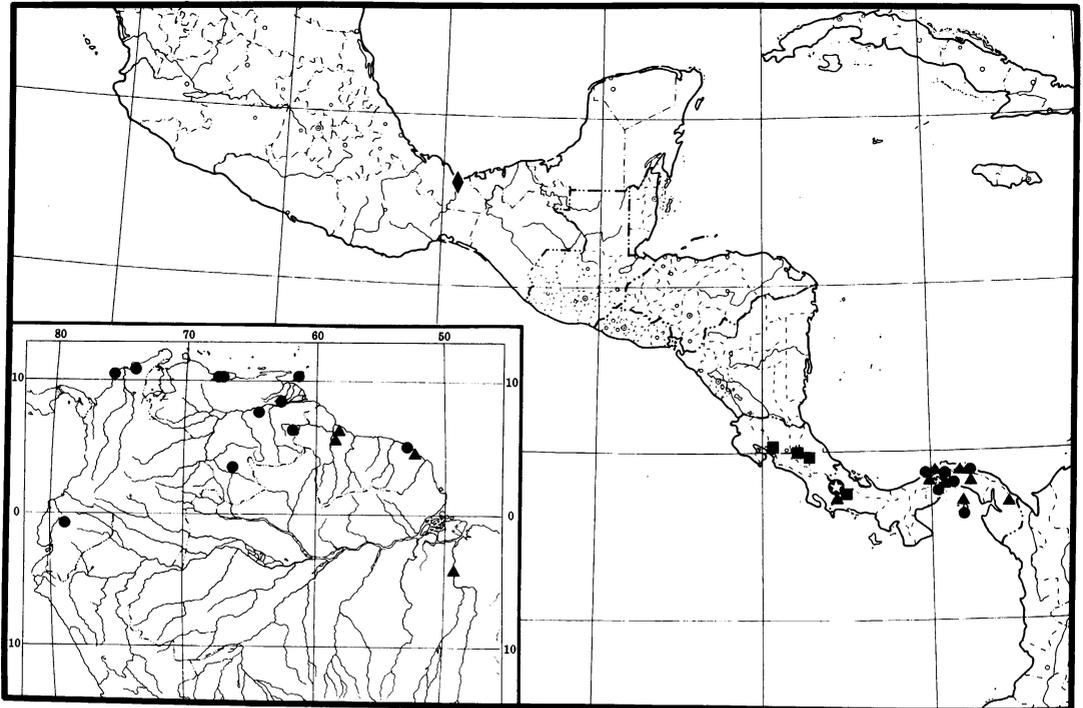


Fig. 182. Distributional records of *P. minusculus* (◆), *P. nitidulus* (■), *P. margaritulus* (●), *P. degallieri* (▲), and *P. aeneipennis* (●).

notal disc brunneous with bluish to silvery metallic reflection, margins hardly paler, with flavous tinge; elytra brunneous with vivid bluish to silvery metallic reflection; ventral body surface brunneous, pronotal and elytral epipleura flavobrunneous, legs rufotestaceous.

Standardized body length 6.5–7.9 mm.

MALE GENITALIA: Median aedeagal lobe with straight, bluntly rounded apex (fig. 166). Aedeagal internal sac unispinose, with short medial spine on left side of sac (fig. 167).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 7 setae (fig. 177). Apical gonocoxite with 3–4 lateral and 1 dorsal ensiform setae. Spermathecal duct broad, linearly joining arcuate apical reservoir (fig. 178).

TYPE: Holotype ♂ (NMNH): PANAMA-Chiriquí/ BOQUETE, 1250 m/ 8°47'N 82°26'W/ 15-IV-1977/ Coll. H. Wolda// ADP/ 54077// 393.

PARATYPES: PANAMÁ. – Chiriquí: Bo-

quete, 8° 47' N 82° 26' W, 16-17-II-1967, Flint (NMNH, 1♂), 1100 m, light trap, 3-9-VI-1976, Wolda (NMNH, 2♂, 1♀), 10-16-VI-1976, Wolda (NMNH, 2♀), 23-29-VI-1976, Wolda (NMNH, 1♂, 2♀), 28-VII-3-VIII-76, Wolda (NMNH, 1♀), 14-21-IX-1976, Wolda (NMNH, 1♂, 1♀), 12-II-1977, Wolda (NMNH, 1♀), 14-II-1977, Wolda (NMNH, 1♂), 16-II-1977, Wolda (NMNH, 1♂), 23-II-1-III-1977, Wolda (NMNH, 1♂, 1♀), 9-14-III-1977, Wolda (NMNH, 1♂), 31-III-1977, Wolda (NMNH, 1♀), 5-IV-1977, Wolda (NMNH, 1♂), 10-IV-1977, Wolda (NMNH, 1♀), 17-IV-1977, Wolda (NMNH, 1♀), 18-IV-1977, Wolda (NMNH, 1♂), 1250 m, 15-V-1976, Wolda (NMNH, 2♂, 1♀), 20-V-1976, Wolda (NMNH, 1♂).

ETYMOLOGY: The diminutive form of the Latin *margarita*, or pearl, denoting the pearly metallic reflection of the elytra.

DISTRIBUTIONAL RANGE: Known only from the type locality of Boquete in Chiriquí Province (fig. 182).

Platynus degallieri (Perrault),
new combination

(figs. 2, 5–10, 14–18, 21–26, 33,
49, 168, 169, 179, 182)

Glyptolenopsis degallieri Perrault, 1991: 49.

DIAGNOSIS: Forebody piceous, pronotum with broad rufotestaceous margins, elytra piceous with strong bluish-green metallic reflection; eyes convex, strongly protruding from head (fig. 2); pronotum with obtuse hind angles, sides straight to faintly sinuate before basal setae, laterobasal depressions with sparse punctures (fig. 49); elytral striae basally punctate.

DESCRIPTION: Frontal grooves broad, triangular areas laterad grooves slightly raised; eyes very convex, strongly protruding from head (fig. 2), ocular ratio 1.76 to 1.84. Pronotum transverse; hind angles obtuse, margins straight to faintly sinuate before basal setae (fig. 49), sinuation if present due to small jag where basal seta is situated; laterobasal depressions sparsely but distinctly punctate, especially on inner margin, deepest parts of depressions with irregular wrinkles; median base sparsely punctate; basal marginal bead continuous, forming distinct margin to inner half of laterobasal depression, less distinct near basal seta; median longitudinal impression distinct, set in shallowly depressed medial discal area; anterior transverse depression shallow and broad medially, obsolete before $\frac{1}{2}$ distance to front angles; anterior marginal bead well defined medially, strongly reflexed on rounded front angles; lateral marginal depressions broad, steeply reflexed at front angles, broadly explanate near lateral setae. Elytral striae clearly although irregularly punctate in basal $\frac{3}{4}$; elytral intervals moderately convex; basal groove broadly and evenly recurved to rounded humerus; 16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length $1.75 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad shallow outer and inner dorsal sulci. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with extremely shallow transversely stretched isodiametric microsculpture, most

sculpticells obscured by surface reflection; pronotal disc with regular, well-developed transverse mesh microsculpture; pronotal laterobasal depressions with transverse mesh microsculpture, the sculpticells parallel to outer margin; elytral microsculpture of very fine transverse lines loosely joined into a mesh (fig. 33). Head capsule piceous, mandibles, palps, and antennae rufotestaceous, antennomeres each with apical ring of infuscation; pronotal disc piceous, lateral margins broadly rufotestaceous; elytra piceous with strong bluish-green metallic reflection; ventral body surface rufobrunneous, pronotal epipleura rufotestaceous, femora a smoky rufous, femoral apices and tibiae rufotestaceous.

Standardized body length 6.1–7.0 mm.

MALE GENITALIA: Median aedeagal lobe with ventral side straight apically, apex finely acuminate (fig. 168). Aedeagal internal sac with apical spine on ventral side of gonopore, medial spine on left side, medial rasp on the right side, and basal rasp on ventral side of sac (fig. 169).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 6–8 setae (fig. 179). Apical gonocoxite with 2–3 lateral and 1 dorsal ensiform setae. Bursa copulatrix with c-shaped dorsal lobe with lightly sclerotized apex. Spermathecal duct broad, linearly joining apical reservoir.

TYPE: Holotype δ (G. G. Perrault collection): **COLLECTION/** G. G. PERRAULT// TUCURUI, Para/ Brésil. 23.11-7.12.1986/ Pieve d'interception// **HOLOTYPE// HOLOTYPE/** *Glyptolenopsis/ degallieri/* G. G. PERRAULT det. 1990.

DISTRIBUTIONAL RANGE: Found abundantly in Panamá, from Chiriquí to Darién, and in lesser numbers at disjunctly distributed coastal localities in Guyana, French Guiana, and Brazil (fig. 182). The single Brazilian record is from an interception trap, suggesting that the species has adventive tendencies.

MATERIAL EXAMINED: BRAZIL. – **Pará:** TUCURUI, piege d'interception [interception trap], VI-1985 (GGPC, 1), 23-XI-7-XII-1986 (GGPC, 5). FRENCH GUIANA. – Roches de Kourou, VI-1905, LeMoult (MNHP, 1). GUYANA. – Kartabo Point, 2-VII-1925,

White (MCZ, 1), 5-VII-1925, White (MCZ, 2), 8-VII-1925, White (MCZ, 1); Rio Essequibo (source), Ogilvie (MCZ, 1). PANAMÁ. — **Canal Zone:** Barro Colorado Is., 6-VII-1961, Campbell (CNC, 1), 18-28-IV-1964, Duckworth & Duckworth (NMNH, 1), 28-30-IV-1964, Duckworth & Duckworth (NMNH, 1), 1-9-V-1964, Duckworth & Duckworth (NMNH, 3), 10-17-V-1964, Duckworth & Duckworth (NMNH, 2), 20-VII-1974, Hespeneheide (HAHC, 1), 4-V-1981, Kimsey (UCD, 1), 9-V-1976, Levings (NMNH, 1), 19-VII-1938, Williams (CMNH, 1), 23-24-V-1940, Zetek (NMNH, 1), IV-1941, Zetek (NMNH, 1), IX-X-1946, Zetek (NMNH, 1), 1947, Zetek (NMNH, 1), III-IV-1949, Zetek (NMNH, 1), at light, 4-V-1977, Silberglied & Aiello (NMNH, 1), at lights, IV-1941, Zetek (NMNH, 7), berlese leaf litter, 21-XII-1975, Toft & Levings (NMNH, 1), 27-II-1976, Levings (NMNH, 1), 28-III-1976, Toft & Levings (NMNH, 1), canopy light trap, 27-VI-1972 (NMNH, 5), 6-VII-1973 (NMNH, 3), fermt. *Brosimum* fruits on litter, 9-VII-1974, Erwin & Whitehead (NMNH, 2), in litter, 9-VII-1974, Erwin & Whitehead (NMNH, 10), leaf debris at night, 19-V-1972, Allen (NMNH, 4), light traps, 7-V-1977, Nivel (NMNH, 1), 12-V-1977, Nivel (NMNH, 1), 18-V-1977, Nivel (NMNH, 3), 20-V-1977, Nivel (NMNH, 3), 23-V-1977, Nivel (NMNH, 2), 29-VI-1977, Nivel (NMNH, 2), 3-VII-1977, Nivel (NMNH, 1), 7-VII-1977, Nivel (NMNH, 2), 10-VII-1977, Nivel (NMNH, 5), 11-VII-1977, Nivel (NMNH, 3), 12-VII-1977, Nivel (NMNH, 2), 15-VII-1977, Nivel (NMNH, 1), 17-VII-1977, Nivel (NMNH, 16), 18-VII-1977, Nivel (NMNH, 1), 31-VII-1977, Nivel (NMNH, 5), 7-VIII-1977, Nivel (NMNH, 3), 15-I-1978, Nivel (NMNH, 1), 16-IV-1978, Nivel (NMNH, 3), 17-IV-1978, Nivel (NMNH, 3), 19-IV-1978, Nivel (NMNH, 23), 20-IV-1978, Nivel (NMNH, 1), 21-IV-1978, Nivel (NMNH, 2), 30-IV-1978, Nivel (NMNH, 1), 1-VI-1978, Nivel (NMNH, 1), 3-VI-1978, Nivel (NMNH, 1), 6-VI-1978, Nivel (NMNH, 1), 7-VI-1978, Nivel (NMNH, 1), 9-VI-1978, Nivel (NMNH, 2), 13-VI-1978, Nivel (NMNH, 1), 14-VI-1978, Nivel (NMNH, 2), 18-VI-1978, Nivel (NMNH, 1), 19-VI-1978, Nivel (NMNH, 5), 20-VI-1978, Nivel (NMNH, 1), 21-VI-1978, Nivel (NMNH, 1),

25-VI-1978, Nivel (NMNH, 2), 26-VI-1978, Nivel (NMNH, 1), 29-VI-1978, Nivel (NMNH, 1), 8-VII-1978, Nivel (NMNH, 1), 11-VII-1978, Nivel (NMNH, 4), 15-VII-1978, Nivel (NMNH, 1), 27-VII-1978, Nivel (NMNH, 1), 9-XI-1978, Nivel (NMNH, 1), raking dry litter along trail, 1-VII-1974, Whitehead (NMNH, 1), raking litter, 15-27-V-1972, Erwin (NMNH, 1), 28-VI-1973, Erwin & Erwin (NMNH, 5), 5-VII-1973, Erwin & Erwin (NMNH, 3), 10-VII-1973, Erwin & Erwin (NMNH, 6), running on litter at night, 29-VI-1973, Erwin & Erwin (NMNH, 3), stream bed, 20-VII-1969, Lawrence, Hlavac & Hlavac (MCZ, 1), under forest debris, 17-V-1972, Allen (NMNH, 2), 18-V-1972, Allen (NMNH, 1), under leaf debris, 22-V-1972, Allen (NMNH, 5), 25-V-1972, Allen (NMNH, 4), under leaf debris at night, 21-V-1972, Allen (NMNH, 2), under leaf litter, 27-V-1972, Allen (NMNH, 5), Armour to Zetek shortcut trail, raking litter, 15-27-V-1972, Erwin & Erwin (NMNH, 3), Armour Trail, in litter along trail at night, 27-VI-1974, Erwin & Whitehead (NMNH, 1), Armour Trail, raking dry litter along trail, 27-VI-1974, Erwin & Whitehead (NMNH, 5), Armour Trail, raking litter, 15-27-V-1972, Erwin & Erwin (NMNH, 3), Barbour Trail, raking litter, 15-27-V-1972, Erwin & Erwin (NMNH, 12), Barbour-Lathrop Trail, raking litter, 15-27-V-1972, Erwin & Erwin (NMNH, 13), Barbour-Lathrop Trail, raking wet litter along trail, 28-VI-1974, Erwin & Whitehead (NMNH, 1), Donato Trail, in litter along trail, 8-VII-1974, Erwin & Whitehead (NMNH, 1), field station, at white & black lights, 15-27-V-1972, Erwin & Erwin (NMNH, 1), field station, at white lights, 6-VI-1972, Pine (NMNH, 4), 14-VI-1972, Pine (NMNH, 1), Shannon Trail, along small stream in litter, 3-VII-1974, Erwin & Whitehead (NMNH, 1), Shannon Trail, raking litter, 15-27-V-1972, Erwin & Erwin (NMNH, 3), Wheeler Trail, raking litter, night, 15-27-V-1972, Erwin (NMNH, 3), Wheeler Trail, running on litter, 15-27-V-1972, Erwin & Erwin (NMNH, 1), Zetek Trail, raking litter, 15-27-V-1972, Erwin & Erwin (NMNH, 2); Gatun Is., Cano Saddle, Close's, 3-V-1923, Shannon (NMNH, 5), 4-V-1923, Shannon (NMNH, 1); Coco Solo Hospital, light trap, 13-VI-1972, Stockwell (NMNH, 1); Coruzal,

26-IV-1911, Busck (NMNH, 2), 27-IV-1911, Busck (NMNH, 1); Gamboa, 5 mi NW, 100 m, canopy fogging (pyrethrin) in *Luehea seemanni*, 12-VII-1976, Montgomery & Lubin (NMNH, 4), 23-X-1975, Montgomery & Lubin (NMNH, 1); Tabernilla, 10-V-1907, Busck (NMNH, 5), 14-V-1907, Busck (NMNH, 1), 29-V-1907, Busck (NMNH, 3). **Chiriquí:** Concepcion at Rio Escarrea, 5 km S, UV light, 30-V-1972, Erwin & Erwin (NMNH, 1). **Darién:** Rio Tuquesa, 500 ft, 4-6-VII-1975, Engleman (NMNH, 1). **Panamá:** Chepo, Altos de Maje, at lights, 17-V-1975, Stockwell & Engleman (NMNH, 10); Pearl Islands, Isla San Jose, collected at night, 7-VII-1944, Morrison (NMNH, 2).

Platynus aeneipennis (Dejean),
new combination
(figs. 31, 51, 170–172,
180, 181, 182)

Anchomenus aeneipennis Dejean, 1831: 732.

Acupalpus striatulus Reiche, 1843: 178 (NEW SYNONYMY).

Glyptolenopsis striatulus: Perrault, 1991: 50.

DIAGNOSIS: Forebody rufous, explanate pronotal margins rufotestaceous, in contrast to smoky brunneous elytra with silvery metallic reflection; eyes convex, strongly protruding from head; pronotum with obtuse hind angles, lateral margins straight before basal setae, laterobasal depressions punctate (fig. 51); elytral striae with weak punctures in basal half.

DESCRIPTION: Frontal grooves broadly depressed; eyes convex, strongly protruding from head, ocular ratio 1.80 to 1.84. Pronotum transverse with broadly explanate margins (fig. 51); hind angles obtuse, sides straight before basal setae; laterobasal depressions punctate, most strongly so on inner margins; median base smooth medially, more punctate near laterobasal depressions; basal marginal bead fine medially, strongest on inside of laterobasal depression, becoming obsolete near basal setae; median longitudinal impression fine, set in shallowly depressed median discal area; anterior transverse depression evident medially, traceable $\frac{1}{4}$ to $\frac{1}{3}$ distance to front angles; anterior marginal bead broad medially; front angles rounded; lateral marginal depressions broad, expand-

ing greatly from front angles to lateral seta, slightly wider in basal $\frac{1}{2}$ of length. Elytral striae continuous, with irregularities in basal $\frac{1}{2}$ that form faint punctulae; elytral intervals convex; basal groove broadly recurved to rounded humerus; 16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length $1.75 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad shallow outer and inner dorsal sulci, median area broadly convex. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with extremely faint isodiametric microsculpture, the cuticular surface glossy; pronotal disc with well-developed transverse mesh microsculpture; pronotal laterobasal depressions and median base with transversely stretched isodiametric microsculpture, the sculpticells parallel to outer margin; elytra with dense transverse mesh microsculpture (fig. 31). Head capsule rufous, mandible and palps with brunneous infuscation, antennae rufotestaceous with apical infuscation on outer antennomeres; pronotal disc rufous to rufobrunneous, explanate lateral margins broadly rufotestaceous; elytra smoky brunneous, with well-developed silvery metallic reflection; ventral body surface rufous to rufotestaceous, the epipleura and legs palest.

Standardized body length 6.4–7.2 mm.

MALE GENITALIA: Median aedeagal lobe with abrupt curve before straight, finely acuminate apex (fig. 170). Aedeagal internal sac with one or two spines, medial spine on the right side of sac always present (figs. 171, 172), medial spine on left side of sac present (fig. 172) or absent (fig. 171); a broad microtrichial field evident ventrad gonopore.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9 setae (fig. 180). Apical gonocoxite with 2–3 lateral and 1 dorsal ensiform setae. Bursa copulatrix without dorsal lobe. Spermathecal duct broad, linearly joining apical reservoir (fig. 181).

TYPE: Of *aeneipennis* Dejean, holotype δ (MNHP): δ [green label]// Lebas [green label]// *aeneipennis* m/ Cartagena [green label]// **HOLOTYPE/** *Anchomenus/ aeneipennis/* Dejean/ J. K. Liebherr 1984; described from Cartagena, Colombia. Of *striatulus* Reiche, holotype δ (MNHP): Ex Musæo/ Chaudoir/

/ *Acupalpus striatulus*/ Reiche Rev./ Cuvier 1843// HOLOTYPE// Holotype/ *Acupalpus striatulus* Reiche/ G. G. Perrault det. 1990; described from Nouvelle Grenade, or Colombia.

DISTRIBUTIONAL RANGE: Found from the Canal Zone, Panamá, eastward throughout northern South America (fig. 182).

MATERIAL EXAMINED: COLOMBIA. – **Bolívar:** Cartagena, Lebas (MNHP, 1). **Magdalena:** Cacagualito, V (CMNH, 3). **COSTA RICA.** – **San José:** Santa Ana, 30-III-1939, Bierig (MCZ, 1). **ECUADOR.** – **Pichincha:** Rio Palenque, 22-27-II-1976, Campbell (UASM, 1); Rio Palenque Res. Sta. 47 km S Santo Domingo, 250 m, 15-25-II-1979, Marshall (UASM, 1), 280 m, fruitfall #4, 11-VI-1979, Frania (UASM, 1). **FRENCH GUIANA.** – Gourdonville, VI-1905, Le Moul (MNHP, 1). **PANAMÁ.** – **Canal Zone:** Albrook Forest Site, Fort Clayton, black light trap, 9-10-V-1968, Hutton & Llaurodo (UARK, 1); Ancon, arc-light globe, IV-1911, Kraft (NMNH, 2); Barro Colorado Is., Cooper (MCZ, 1), 18-28-IV-1964, Duckworth & Duckworth (NMNH, 1), 1-9-V-1964, Duckworth & Duckworth (NMNH, 7), 10-17-V-1964, Duckworth & Duckworth (NMNH, 2), I-1968, MacFadyen (MCZ, 1), 23-24-V-1940, Zetek (NMNH, 1), I-III-1944, Zetek (NMNH, 2), I-II-1945, Zetek (NMNH, 1), IX-X-1946, Zetek (NMNH, 3), X-XI-1946, Zetek (NMNH, 1), 1947, Zetek (NMNH, 1), III-IV-1949, Zetek (NMNH, 2), at lights, IV-1941, Zetek (NMNH, 4), berlese funnel, III-X-1947, Zetek (NMNH, 1), canopy light trap, 27-VI-1972, Erwin (NMNH, 1), collected at light, V-1941, Zetek (NMNH, 2), in litter, 9-VII-1974, Erwin & Whitehead (NMNH, 1), light traps, 18-V-1977, Nivel (NMNH, 1), 7-VII-1977, Nivel (NMNH, 1), 15-VII-1977, Nivel (NMNH, 1), 15-I-1978, Nivel (NMNH, 1), 15-IV-1978, Nivel (NMNH, 2), 16-IV-1978, Nivel (NMNH, 1), 17-IV-1978, Nivel (NMNH, 3), 19-IV-1978, Nivel (NMNH, 3), 20-IV-1978, Nivel (NMNH, 1), 30-IV-1978, Nivel (NMNH, 2), 20-V-1978, Nivel (NMNH, 1), 24-V-1978, Nivel (NMNH, 1), 2-VI-1978, Nivel (NMNH, 2), 3-VI-1978, Nivel (NMNH, 5), 5-VI-1978, Nivel (NMNH, 2), 7-VI-1978, Nivel (NMNH, 2), 10-VI-1978, Nivel (NMNH, 1), 13-VI-1978,

Nivel (NMNH, 1), 14-VI-1978, Nivel (NMNH, 1), 15-VI-1978, Nivel (NMNH, 1), 17-VI-1978, Nivel (NMNH, 1), 19-VI-1978, Nivel (NMNH, 2), 20-VI-1978, Nivel (NMNH, 2), 25-VI-1978, Nivel (NMNH, 1), raking litter, 28-VI-1973, Erwin & Erwin (NMNH, 2), 5-VII-1973, Erwin & Erwin (NMNH, 1), taken at light, 19-IV-1963, Rettenmeyer & Rettenmeyer (UCD, 1), under forest debris, 17-V-1972, Allen (NMNH, 1), under leaf debris, 25-V-1972, Allen (NMNH, 1), Armour Trail, raking litter, 15-27-V-1972, Erwin & Erwin (NMNH, 1), field station, at white & black lights, 28-VI-1973, Erwin & Erwin (NMNH, 2), field station, at white lights, 6-VI-1972, Pine (NMNH, 1); Gamboa, 5 mi NW, 100 m, canopy fogging (pyrethrin) in *Luehea seemanni*, 12-VII-1976, Montgomery & Lubin (NMNH, 1); Paraiso, 24-IV-1911, Busck (NMNH, 1), Jennings (NMNH, 2); Tabernilla, 29-IV-1907, Busck (NMNH, 4), 8-V-1907, Busck (NMNH, 1), 14-V-1907, Busck (NMNH, 2). **Panamá:** Chepo, Altos de Maje, at lights, 17-V-1975, Stockwell & Engleman, (NMNH, 1); Isla San Jose, 5-V-1944, Morrison (NMNH, 2), 7-VII-1944, Morrison (NMNH, 1); La Chorrera, 13-V-1912, Busck (NMNH, 1). **TRINIDAD.** – Simla, 22-IV-20-V-1963, Emsley (MCZ, 2). **VENEZUELA.** – **Amazonas:** Mt. Duida, 14-XI-1928, Tate (AMNH, 1). **Aragua:** El Limon, 450 m, 4-V-1965, J. & B. Bechyne (UCVM, 2); Rancho Grande, 1100 m, 5-VII-1954, Kern (UCVM, 1), 10-VIII-1965, Salcedo (UCVM, 1). **Bolívar:** Ciudad Bolívar, 6-VII-1898, Klages (CUIC, 1♂), 24-VII-1898, Klages (CUIC, 1♂); El Dorado-Santa Elena, km 78, 160 m, 14-XI-1966, J. & B. Bechyne & Osuna (UCVM, 1). **Monagas:** Uverito, 50 m, at black light, 19-VI-1978, Rosales & Gonzalez (UCVM, 1), at light, 6-VIII-1980, Rosales & Gonzalez (UCVM, 4).

Platynus rugulellus, new species
(figs. 54, 184–186, 195, 196, 205)

DIAGNOSIS: A larger species, standardized body length 7.0–7.9 mm; eyes moderately convex; pronotal margins broadly convex to obtuse hind angles, not basally sinuate, laterobasal depressions with fine punctation mixed with faint wrinkles, median base finely

punctate (fig. 54); elytral striae faintly irregular on basal disc, but no punctures depressing deepest portions of striae.

DESCRIPTION: Frontal grooves broad and moderately deep; eyes moderately convex, ocular ratio 1.61 to 1.76. Pronotum transverse, sides evenly convex to obtuse hind angles (fig. 54); laterobasal depressions shallow and broad, bottom with faint wrinkles interspersed with fine punctulae; median base finely punctate inside laterobasal depressions, with irregular wrinkles medially; basal marginal bead continuous and well defined across base, indistinct just inside basal setae; median longitudinal impression fine, traversed by minute wrinkles on disc; anterior transverse depression deep, depressed median apex of disc making depression appear ovoid; anterior marginal bead continuous medially; front angles tightly rounded; lateral marginal depressions of equal width before lateral setae, slightly wider behind lateral setae. Elytral striae continuous, with minute irregular crenulations in basal half of disc, but irregularities not defining punctulae that depress deepest part of stria; elytral intervals moderately convex; basal groove broadly recurved to rounded humerus; 16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length $2.0 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad and deep outer dorsal sulcus, shallower inner dorsal sulcus, median area somewhat flattened. Tarsomere 5 with short ventral setae, less than $\frac{1}{6}$ tarsomere depth at setal insertion.

Head with well-developed isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture; pronotal laterobasal depressions and median base with transversely stretched isodiametric microsculpture, the sculpticells parallel to outer margin; elytra with microsculpture of transverse lines with limited cross lines joining them into a loose mesh. Head capsule rufopiceous to rufobrunneous, clypeus, labrum and mandibles rufous, palps and antennae rufotestaceous with a brunneous cast; pronotum rufopiceous to rufobrunneous, margins hardly paler; elytra rufobrunneous with bluish to silvery metallic reflection; ventral body surface rufopiceous, pronotal and

elytral epipleura flavobrunneous, abdominal segments apically flavous, legs testaceous.

Standardized body length 7.0–7.9 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved to finely rounded apex (fig. 184). Aedeagal internal elongate, sac length $1.6 \times$ length of median lobe from parameral articulation to apex (fig. 186); sac with apical rasp on right side (figs. 185, 186).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9 setae (fig. 195). Apical gonocoxite with 3 lateral and 1 dorsal ensiform setae. Spermathecal duct narrower than apical reservoir, linearly joining reservoir (fig. 196).

TYPE: Holotype δ (UASM, deposited in NMNH): COSTA RICA. San Jose./ San Isidro de Coronado/ Finca Joseph Smids, uv/light, VI.11-12.1967/ 5000' E. B. Fagen.// Borrowed ex/ G. E. Ball// ADP/ 23695. Allotype δ (UASM, deposited in NMNH): same data except ADP/ 23687.

PARATYPES: COSTA RICA. – **Heredia:** Vara Blanca, 8-VIII-1940, Bierig (MCZ, 1 δ). **Puntarenas:** Monteverde, along Rio Guacimal, 1380 m, washing litter along river, 8-VI-1973, Erwin & Erwin (NMNH, 1 δ). **San José:** San Isidro de Coronado, finca Joseph Smids, 5000 ft, UV light, 11-12-VI-1967, Fagen (UASM, 3 δ , 11 η).

ETYMOLOGY: The double diminutive form of the Latin *rugosus*, meaning wrinkled, denoting the wrinkled laterobasal depressions of the pronotum.

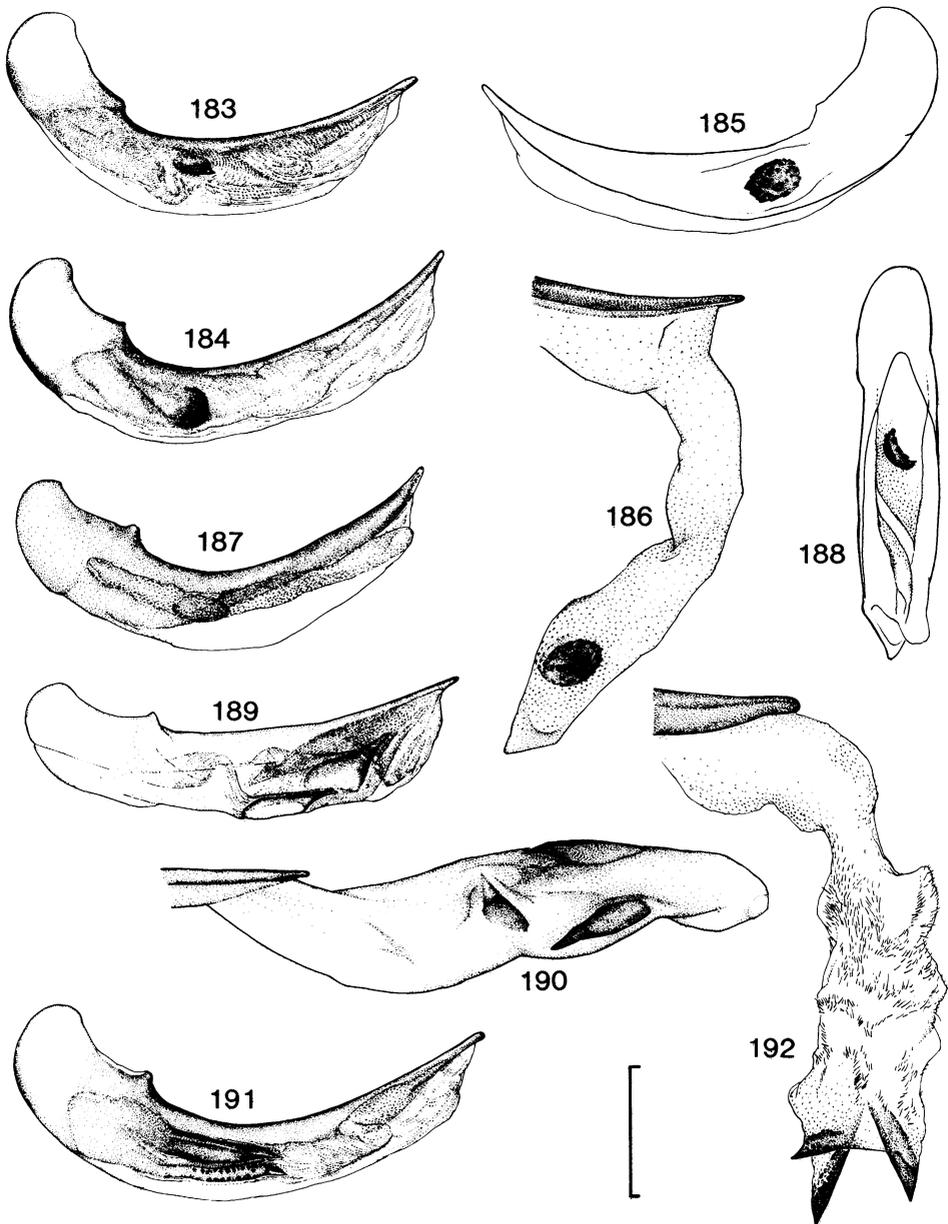
DISTRIBUTIONAL RANGE: Found in central and western Costa Rica (fig. 205).

***Platynus barbarellus*, new species**

(figs. 73, 183, 193, 194, 205)

DIAGNOSIS: A gracile species with moderately convex eyes; pronotum with straight margins before rounded hind angles, laterobasal depressions smooth (fig. 73); elytral striae with minute irregular punctulae; forebody rufopiceous, elytra brunneous with strong metallic reflection, antennae and legs rufotestaceous with smoky cast; flight wings macropterous; tarsomere 5 with very short ventral setae.

DESCRIPTION: Frontal grooves deep, triangularly incised on frons, broadly continued



Figs. 183–192. Male aedeagi. **183.** Median lobe, *P. barbarellus*, dextroventral view. **184.** Median lobe, *P. rugulellus*, dextroventral view. **185.** Median lobe, *P. rugulellus*, detailing saccal rasp, levodorsal view. **186.** Everted internal sac, *P. rugulellus*, dextroventral view. **187.** Median lobe, *P. stenophthalmus*, dextroventral view. **188.** Median lobe, *P. stenophthalmus*, detailing saccal rasp, eudorsal view. **189.** Median lobe, *P. rufulus*, dextroventral view. **190.** Everted internal sac, *P. rufulus*, dextroventral view. **191.** Median lobe, *P. woldai*, dextroventral view. **192.** Everted internal sac, *P. woldai*, dextroventral view. Scale bar = 0.5 mm.

on clypeus; eyes moderately convex, ocular ratio 1.63 to 1.73. Pronotum transverse with evenly rounded sides; hind angles obtuse, margins straight before angles (fig. 73); later-

obasal depressions smooth, flat-bottomed; median base with broad, faint irregular pits; basal margin finely incised medially, gradually widening behind laterobasal depression

to basal seta; median longitudinal impression finely incised from median base to deep anterior transverse depression which extends laterally to near front angles; anterior marginal bead broad medially, finer laterally on little protruding tightly rounded front angles; lateral marginal depressions gradually widening from front angles to laterobasal depressions. Elytral striae continuous, but with minute, irregular punctulae; elytral intervals slightly convex; basal groove weakly recurved to rounded humerus; 15 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length more than $1.5 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad and moderately deep outer dorsal sulcus and shallower inner sulcus, the median area laterally angulate, flat medially. Tarsomere 5 with very short ventral setae visible only at high magnification ($\times 125$).

Head with well-developed isodiametric microsculpture; pronotal disc with regular transverse mesh microsculpture; pronotal laterobasal depressions and median base with transversely stretched isodiametric microsculpture; elytra with very fine transverse mesh, the surface reflection obscuring sculpticells. Head capsule rufopiceous, labrum and mandibles brunneous, palps and antennae rufotestaceous with a smoky cast; pronotum rufopiceous, margins slightly paler, rufobrunneous; elytra brunneous with vivid bluish to cupreous metallic reflection; ventral body surface rufopiceous to brunneous, elytral epipleura more flavous, legs a smoky testaceous.

Standardized body length 6.1–6.8 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved to bluntly rounded apex (fig. 183). Aedeagal internal sac with single sclerotized tooth, probably an apicoventral spine.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 10 setae (fig. 193). Apical gonocoxite with 2 lateral and 1 dorsal ensiform setae. Spermathecal duct broad, angularly meeting apical reservoir (fig. 194).

TYPE: Holotype δ (NMNH): Panama, Chiriqui Prv./ Cerro Punta Area/ V-13-1981/ J. E. Wappes// ADP/ 58520.

PARATYPES: PANAMÁ. – **Chiriqui:** Volcan de Chiriquí, 2500–4000 ft, Champion (BMNH, 1 δ), 4000–6000 ft, Champion (MNHP, 1 δ , 1 η).

ETYMOLOGY: The diminutive form of the

Latin *barbarus*, meaning foreign, therefore crude or rude. The name denotes the relatively plesiomorphic nature of this species.

DISTRIBUTIONAL RANGE: Known only from the mountains of Chiriquí, Panamá (fig. 205).

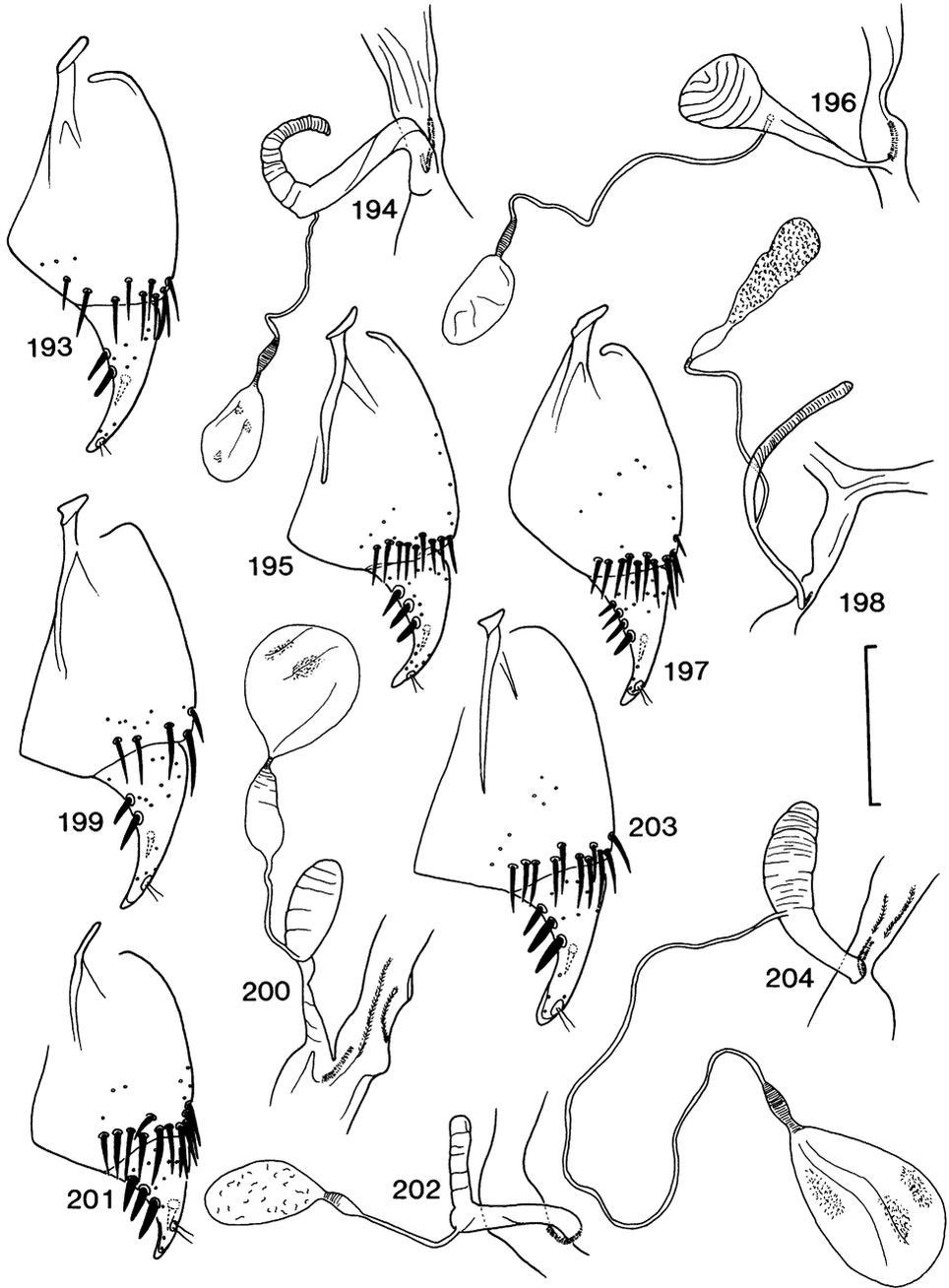
Platynus imitativus, new species

(figs. 47, 48, 197, 198, 205)

DIAGNOSIS: Body narrow, elytral sides subparallel; pronotal hind angles obtuse-rounded, margins slightly sinuate before basal setae (figs. 47, 48); eyes moderately convex; elytral striae basally with minute punctulae, interrupted; body brunneous, antennae infuscated testaceous, legs paler, testaceous.

DESCRIPTION: Frontal grooves deep and continuous to clypeal setae, areas laterad grooves depressed; eyes moderately convex, ocular ratio 1.64 to 1.73. Pronotum transverse; hind angles obtuse-rounded, lateral margins slightly sinuate before hind angles (figs. 47, 48); laterobasal depressions smooth, broadly elevated to lateral margins; median base smooth; basal marginal bead weak but traceable medially, very shallowly elevated behind laterobasal depressions; median longitudinal impression fine, disc broadly depressed; anterior transverse depression deep, traceable $\frac{1}{2}$ distance to front angles, median apex of pronotum depressed; anterior marginal bead medially absent; front angles rounded, little protruding; lateral marginal depressions slightly narrowed at front angles, slightly wider behind lateral setae to laterobasal depressions. Elytral striae occasionally interrupted on base of disc, minute irregularities forming small punctulae; elytral intervals slightly convex; basal groove little recurved to rounded humerus; 14–15 lateral elytral setae in eighth stria. Metepisternum moderately elongate, lateral margin length $1.4 \times$ anterior margin; flight wings variable, macropterous to stenopterous. Basal metatarsomere with shallow broad outer dorsal sulcus, slightly narrower inner sulcus, median area convex. Tarsomere 5 with very short ventral setae visible only at high magnification ($\times 125$).

Head with isodiametric mesh microsculpture; pronotal disc with shallow, regular transverse mesh microsculpture; pronotal laterobasal depressions and median base with transversely stretched isodiametric micro-



Figs. 193–204. Female reproductive tract structures. 193. Right gonocoxa, *P. barbarellus*, ventral view. 194. Common oviduct and spermatheca, *P. barbarellus*, ventral view. 195. Right gonocoxa, *P. rugulellus*, ventral view. 196. Common oviduct and spermatheca, *P. rugulellus*, ventral view. 197. Right gonocoxa, *P. imitativus*, ventral view. 198. Common oviduct and spermatheca, *P. imitativus*, ventral view. 199. Right gonocoxa, *P. stenophthalmus*, ventral view. 200. Common oviduct and spermatheca, *P. stenophthalmus*, ventral view. 201. Right gonocoxa, *P. rufulus*, ventral view. 202. Common oviduct and spermatheca, *P. rufulus*, ventral view. 203. Right gonocoxa, *P. woldai*, ventral view. 204. Common oviduct and spermatheca, *P. woldai*, ventral view. Scale bar = 0.2 mm for figs. 193, 195, 197, 199, 201, 203; scale bar = 0.5 mm for figs. 194, 196, 198, 200, 202, 204.

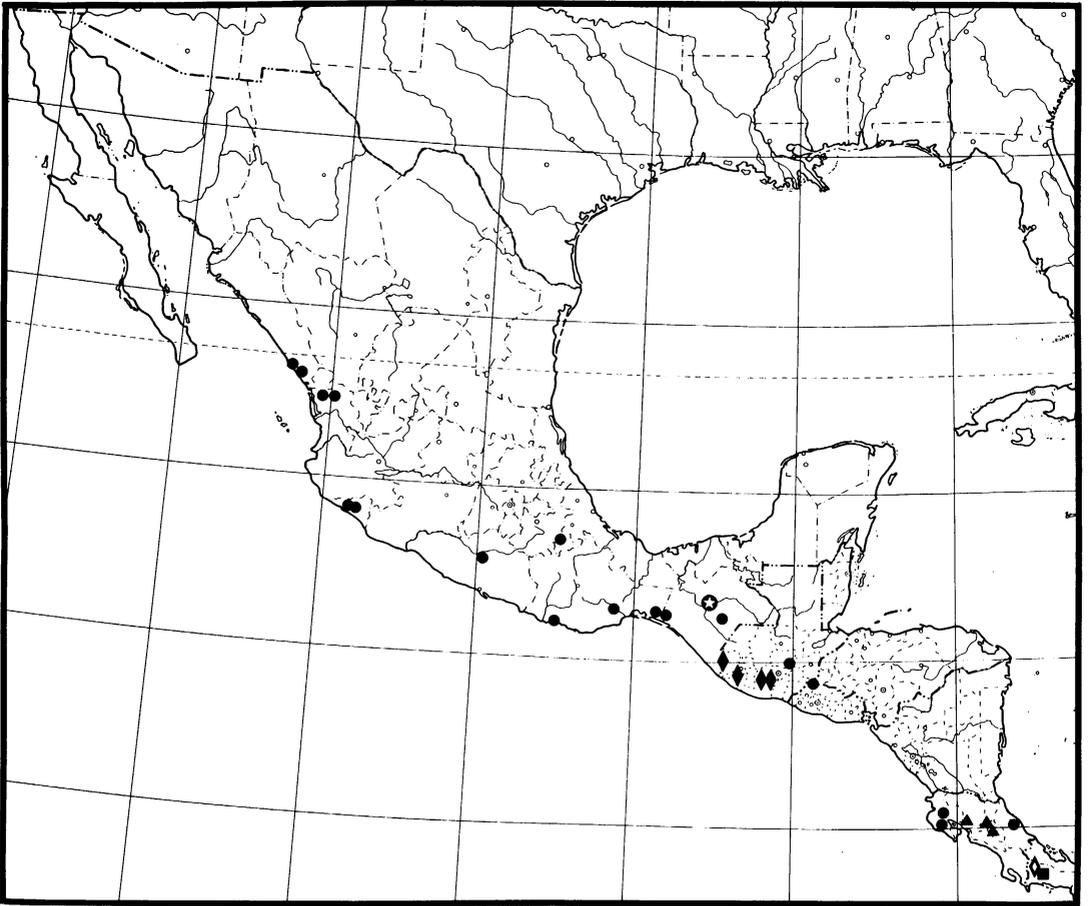


Fig. 205. Distributional records of *P. barbarelus* (◇), *P. rugulellus* (▲), *P. imitativus* (◆), *P. stenophthalmus* (●), *P. rufulus* (●), and *P. woldai* (■).

sculpture; elytra with fine transverse mesh microsculpture. Head capsule rufobrunneous to brunneous, labrum and mandibles rufous, palps and antennae testaceous, antennae with smoky infuscation on antennomere apices; pronotum rufobrunneous, margins slightly paler, rufous; elytra brunneous with cupreous metallic reflection; ventral body surface smoky brunneous, epipleura hardly paler, legs testaceous, sometimes with smoky cast.

Standardized body length 6.5–7.1 mm.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 10 setae (fig. 197). Apical gonocoxite with 2–4 lateral and 1 dorsal ensiform setae. Spermathecal duct narrow, apical reservoir and duct linearly joined (fig. 198).

TYPE: Holotype ♀ (UASM, deposited in NMNH); MEXICO, Chiapas/ Union Juarez, n. e. slope/ Volcan Tacana, leaf lit- ter under

coffee, finca/ in Guat., ele. 1630 m.,/ 15 DEC 1975, 117-75// 1975. MEX. EXP./ H. E. Frania/ J. Belicek/ COLLECTORS.

PARATYPES: MÉXICO. – **Chiapas:** Union Juarez, Volcan Tacaná, NE slope, 1650 m, ex small bromeliads, Pinus, 26-XII-1975, Frania & Belicek (UASM, 1♀). GUATEMALA. – **Chimaltenango:** S. P. Yepocapa, 4800 ft, 18-V-1948, Wenzel (CMNH, 1♀). **Quetzaltenango:** Cerro Zunil [14°43'N 91°29'W], 4000–5000 ft, Champion (MNHP, 1♀). **Zacatepéquez:** Capetillo [14°29'N, 90°48'W], Champion (BMNH, 1♀).

ETYMOLOGY: From the Latin *imitator*, meaning to imitate, denoting the external similarity of this species to its sister species, *Platynus stenophthalmus*.

DISTRIBUTIONAL RANGE: Found in the Sierra Madre in Chiapas and Guatemala (fig. 205).

Platynus stenophthalmus, new species

(figs. 4, 42, 187, 188, 199, 200, 205)

DIAGNOSIS: Eyes small, little convex, frons broad (fig. 4); pronotal lateral margins sinuate before obtuse-rounded hind angles (fig. 42), basal and apical marginal beads obsolete medially, anterior transverse depression deep.

DESCRIPTION: Frons broad, frontal grooves broad, rugose; eyes small, little protruding from head, ocular ratio 1.39 to 1.48 (fig. 4); antennae stout, antennomere 10 with length $1.25 \times$ width. Pronotum with broadly sinuate lateral margins before obtuse-rounded hind angles (fig. 42); laterobasal depressions broad, smooth; median base smooth; basal marginal bead absent on median base, indistinctly raised behind laterobasal depressions; median longitudinal impression fine; anterior transverse depression deep medially, median apex depressed; anterior marginal bead obsolete medially; front angles slightly angulate; lateral marginal depressions narrow at front angles, widening behind lateral setae to meet laterobasal depressions. Elytral striae continuous on disc, slightly wavering, obsolete just posterad basal groove; elytral intervals slightly convex; basal groove recurved to rounded humerus; 15–16 lateral elytral setae in eighth stria. Metepisternum subquadrate, lateral margin length $1.1\text{--}1.2 \times$ anterior margin; flight wings vestigial. Basal metatarsomere with broad, shallow outer and inner dorsal sulci, median area convex. Tarsomere 5 with short ventral setae, length less than $\frac{1}{6}$ tarsomere depth at setal insertion.

Head with coriaceous isodiametric microsculpture, some sculpticells longitudinally stretched; pronotal disc with dense transverse mesh microsculpture; pronotal laterobasal depressions and median base with transversely stretched isodiametric microsculpture; elytra with well-developed transverse mesh microsculpture, sculpticells $4\text{--}8 \times$ wide as long. Head capsule piceous, labrum and mandibles dusky rufotestaceous, palps paler, antennal scape brunneous, antennomeres 2–4 piceous, antennomeres 5–11 rufotestaceous; pronotum rufopiceous, margins hardly paler, extreme margin anteriorly brunneous; elytra rufopiceous with bluish to silvery metallic reflection; ventral body surface ru-

fopiceous, pronotal and elytral epipleura hardly paler, femora brunneous, tibiae rufopiceous.

Standardized body length 6.3–7.0 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved, with bluntly rounded apex (fig. 187). Aedeagal internal sac with apical sclerotized rasp on right side of sac (figs. 187, 188).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 5 setae (fig. 199). Apical gonocoxite with 2 lateral and 1 dorsal ensiform setae. Spermathecal duct narrow, linearly joining apical reservoir (fig. 200).

TYPE: Holotype δ (UASM, deposited in NMNH): MEXICO Chiapas/ Mt. Tzontehuitz/ n.e. San Cristobal/ oak cloud forest/ microondas/ ca. 2860 m. 3.V.1977// MEXICAN EXP. 1977/ J. S. Ashe, / H. E. Frania, / D. Shpeley coll.

PARATYPES: MÉXICO. – Chiapas: Mt. Tzontehuitz NE San Cristobal, microondas, 2840 m, oak cloud forest, 3-V-1977, Ashe, Frania & Shpeley (UASM, 1 δ), 4-V-1977, Ashe, Frania & Shpeley (UASM, 2 η).

ETYMOLOGY: A latinized combination of the Greek words *stenos*, meaning narrow, and *ophthalmos*, or eye. This species has the most reduced eyes of the entire species group.

DISTRIBUTIONAL RANGE: Known only from the type locality in Chiapas (fig. 205).

Platynus rufulus (Bates)

(figs. 59, 189, 190, 201, 202, 205)

Colpodes rufulus Bates, 1884: 286.

Platynus rufulus: Whitehead, 1973: 209.

DIAGNOSIS: Eyes convex; body pallid, head rufous, antennae, legs, and pronotum rufotestaceous, elytra rufotestaceous with silvery metallic reflection; pronotal hind angles obtuse, laterobasal depressions faintly rugose (fig. 59).

DESCRIPTION: Frons smooth with very faint frontal grooves; eyes convex, ocular ratio 1.72 to 1.84. Pronotum transverse, lateral margins broadly rounded (fig. 59); laterobasal depressions faintly rugose; hind angles well marked, obtuse with minute jag at basal seta; basal marginal bead continuous, strongly elevated behind laterobasal depressions; median base with very faint longitudinal strigae; median longitudinal impression very finely

indicated, traversed by faint wrinkles; anterior transverse depression demarking a slightly depressed area behind anterior margin; anterior marginal bead well developed, stronger at tightly rounded front angles; lateral depressions very narrow before lateral setae, wider only in basal $\frac{1}{3}$ of length near laterobasal depressions. Elytral striae continuous, smooth, only slight irregularities; elytral intervals slightly convex; basal groove tightly rounded on humerus; 16–17 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length $1.5 \times$ anterior margin, flight wings fully developed. Basal metatarsomere with well-developed outer dorsal sulcus and only slightly shallower inner dorsal sulcus. Tarsomere 5 with visible ventral setae, the setal length slightly shorter than tarsomere depth at setal insertion point.

Head with moderately developed isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture; pronotal laterobasal depressions with well-developed, swirling mixture of isodiametric and transverse mesh microsculpture; elytra with well-developed isodiametric to transverse microsculpture, the sculpticells forming irregular transverse rows. Head capsule, mandibles, and palps rufous; antennae basally rufotestaceous, the apical half of antennomere 4 to apex rufous; pronotal disc rufotestaceous, lateral margins slightly paler; elytra rufotestaceous with silvery metallic reflection, a slight smoky cast on disc; ventral body surface rufotestaceous with slight smoky cast, contrasting with pale rufotestaceous elytral epipleura, femora, and tibiae.

Standardized body length 6.4–7.4 mm.

MALE GENITALIA: Median aedeagal lobe relatively straight with finely rounded apex (fig. 189). Aedeagal internal sac elongate and trispinose; sac length $1.3 \times$ length of median lobe from parameral articulation to apex; 3 spines in apical half of sac, 1 each on ventral, right and left sides (fig. 190).

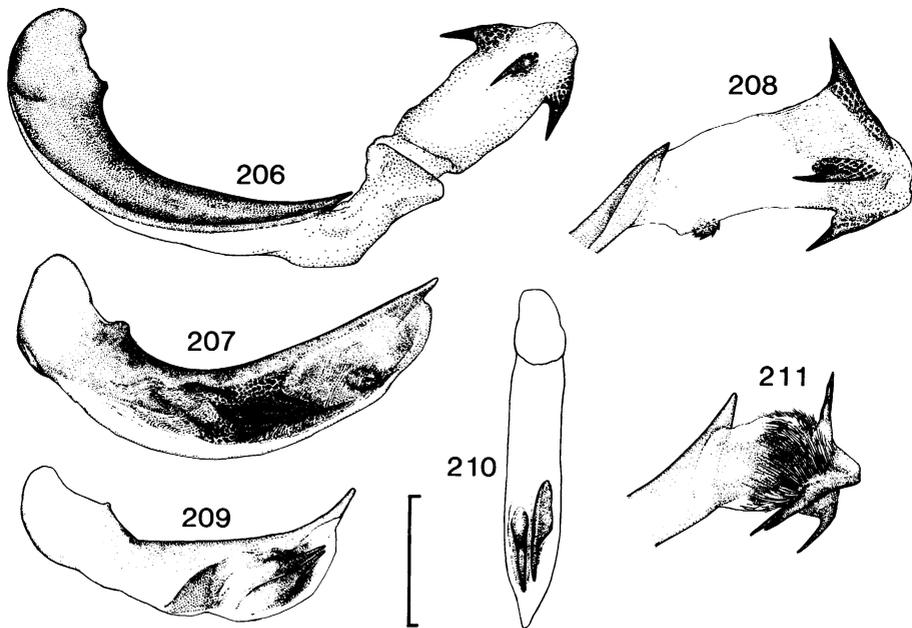
FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of approximately 12 setae (fig. 201). Apical gonocoxite with 3–4 lateral and 1 dorsal ensiform setae. Spermathecal duct broad, apical reservoir at angle to duct of similar diameter (fig. 202).

TYPE: Holotype δ (BMNH); **TYPE/** H.T.

[red-bordered circle]// Sp. figured.// Tocoay/ Vera Paz./ Champion.// B.C.A. Col. I. 1./ Colpodes/ rufulus/ Bates.// Colpodes/ rufulus/ Bates// Holo-/ type [red-bordered circle]// HOLOTYPE/ Colpodes/ rufulus/ Bates/ ind. G. E. Ball '72.

DISTRIBUTIONAL RANGE: Found on the Pacific Coast of México as far north as southern Sinaloa, east to Puebla State along the Rio Balsas and its tributaries, and south to Coast Rica where it is also found on the Atlantic Coast (fig. 205).

MATERIAL EXAMINED: COSTA RICA. – **Guanacaste:** Canas, 5 km N, 20-VII-1965, Noonan (NMNH, 3). **Puntarenas:** Monteverde, 4500 ft, 21-26-V-1979, Campbell & Campbell (CNC, 1); Santa Elena, 6 km S, 1100 m, 30-V-1979, Campbell & Campbell (CNC, 1). EL SALVADOR. – Monte Cristo, 2300 m, 9-V-1971, Howden & Peck (UASM, 3). GUATEMALA. **Baja Verapaz:** Tocoay, Champion (BMNH, 1). MEXICO. – Laredo, on plants: *Odontoglossum*, 28-X-1940 (NMNH, 1). **Chiapas:** Arriaga, 6.1 mi E, Rte. 200, 100 ft, riparian forest & clear creek, 5-VIII-1972, Heming & Ball (UASM, 1); Comitán, 32.5 mi E, Rte. 190, 2200 ft, 3-IX-1965, Ball & Whitehead (UASM, 1). **Colima:** Manzanilla, 12.8 mi E, Rte. 110, 100 ft, 4-VIII-1966, Ball & Whitehead (UASM, 1), sea level, UV light, 5-VIII-1967, Ball, Erwin & Leech (UASM, 2). **Guerrero:** Acapulco, Höge (BMNH, 3; MNHP, 2), 30-VII, Knab (NMNH, 1). **Nayarit:** San Blas, 13.8 mi E, Rte. 46, 200 ft, 30-VII-1967, Ball, Erwin & Leech (UASM, 1); Tepic, 56 km N, Rte. 15, 65 m, tropical deciduous litter, 25-VII-1985, Frania & Shpeley (UASM, 1). **Oaxaca:** Benito Juárez Dam, Lk. Tehuantepec, 400 ft, 21-VIII-1965, Ball & Whitehead (UASM, 1); Rio Grande, 3.6 mi W, Rte. 200, palm forest, UV light, VII-VIII-1972, Meyer & Ball (UASM, 1); Tapanatepec, 5.0 mi E, Rte. 190, 800 ft, 7-IX-1965, Ball & Whitehead (UASM, 1), 10-VI-1966, Ball & Whitehead (UASM, 18); Tehuantepec, 16 mi W, 700 ft, 8-VII-1953 (UKSM, 1). **Puebla:** Tehuacan, Höge (NMNH, 1). **Sinaloa:** Mazatlan, 5 mi N, 24-VII-1964, Howden (CNC, 1), 24-29-VII-1964, Howden (CNC, 2), 5-7-VIII-1964, Howden (CNC, 1), N nr. El Camaron, nr. sea beach, 20-VIII-1962, Ball (UASM, 2), Sands



Figs. 206–211. Male aedeagi. 206. Median lobe with internal sac everted, *P. angustulus*, dextroventral view. 207. Median lobe, *P. marginissimus*, dextroventral view. 208. Everted internal sac, *P. marginissimus*, dextroventral view. 209. Median lobe, *P. decorellus*, dextroventral view. 210. Median lobe, *P. decorellus*, detailing internal sac spination, euventral view. 211. Everted internal sac, *P. decorellus*, dextroventral view. Scale bar = 0.5 mm.

Motel, at light, 15-20-VIII-1962, Ball (UASM, 2); Villa Union, 33 mi E, 7-VIII-1964, Howden (CNC, 2).

Platynus marginissimus, new species

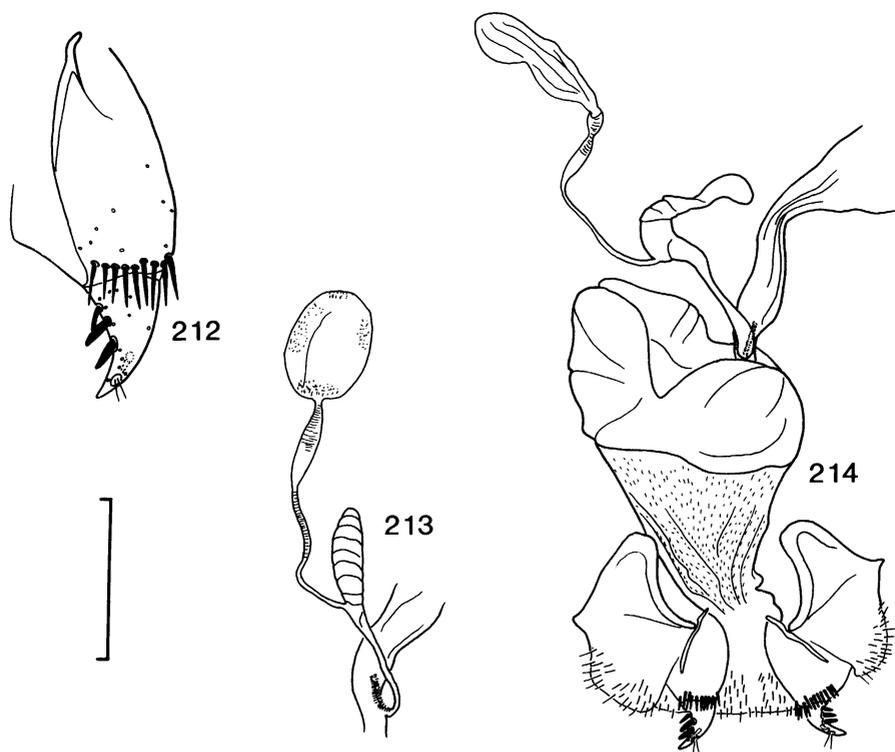
(figs. 1, 27, 50, 207, 208,
212, 213, 215)

DIAGNOSIS: Eyes convex (fig. 1); body shiny, piceous elytra with bluish metallic reflection, forebody rufopiceous, pronotal lateral margins broadly flavous, legs testaceous with slight smoky cast; pronotal hind angles obtuse-rounded, laterobasal depressions finely punctate (fig. 50).

DESCRIPTION: Frons smooth with broad frontal depressions; eyes convex, ocular ratio 1.74 to 1.85. Pronotum with finely punctate laterobasal depressions, broad wrinkles in the deepest portions; hind angles obtuse, evident but tightly rounded (fig. 50); basal marginal bead fine but continuous across base; median longitudinal impression fine; anterior transverse depression weakly developed; anterior marginal bead continuous; front angles

rounded, not strongly protruding; marginal depression narrowest at front angles, gradually widening to the laterobasal depressions. Elytral striae continuous, deep, slightly crenulate but not punctate; elytral intervals moderately convex; basal groove broadly rounded on humerus; 16–17 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length more than 1.5× anterior margin; flight wings fully developed. Basal metatarsomere with well-developed outer dorsal sulcus and very shallow inner sulcus. Tarsomere 5 with very short ventral setae (fig. 27), visible only at high magnification (× 125).

Head with isodiametric microsculpture with flat, shiny sculpticells; pronotal disc with transverse mesh microsculpture, the sculpticells producing an alutaceous sheen; pronotal laterobasal depressions and median base with smooth isodiametric microsculpture interrupted by wrinkles and punctures; elytral microsculpture of transverse lines joined in a loose mesh. Head capsule rufopiceous; mandibles and palps rufous; antennae rufotestaceous with faintly darker rings on the



Figs. 212–214. Female reproductive tract structures. 212. Right gonocoxa, *P. marginissimus*, ventral view. 213. Common oviduct and spermatheca, *P. marginissimus*, ventral view. 214. Female reproductive tract, *P. decorellus*, ventral view. Scale bar = 0.2 mm for fig. 212; scale bar = 0.5 mm for figs. 213, 214.

apex of antennomeres 1–4; pronotal disc rufopiceous, lateral margins broadly flavous; elytra piceous with bluish metallic reflection; ventral body surface including elytral epipleura rufopiceous; legs contrastingly paler, pro- and mesocoxae rufous, femora and tibiae rufotestaceous with a faint smoky cast.

Standardized body length 6.7–7.3 mm.

MALE GENITALIA: Median aedeagal lobe straight apically, apex relatively short (fig. 207). Aedeagal internal sac not elongate, tripinose, with an apical spines on ventral, right and left surfaces, plus a basodorsal sclerotized rasp (fig. 208).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical row of 9 setae (fig. 212). Apical gonocoxite with 2–3 lateral and 1 dorsal ensiform setae. Spermatheca narrowly ovoid, with a narrow spermathecal duct (fig. 213).

TYPE: Holotype ♂ (UASM, deposited in NMNH): MEXICO. Chiapas./ 9.2–12.5 mi.

n./ Ocozocuaula, ca./ 3200'. III.3–4.66/ in bromeliads// George E. Ball/ D. R. Whitehead/ collectors. Allotype ♀: same data and deposition.

PARATYPES: EL SALVADOR. – Boqueron, near Santa Tecla, 2-V-1971, Howden (UASM, 1♀); Cerro Verde summit, 20-VIII-1972, Hevel & Hevel (NMNH, 1♂); La Paz, San Juan Tepezoates, mosquito trap, 22-VI-1966, Blanton (UASM, 1♂); San Salvador, lights, 1-V-1957, Berry (NMNH, 1♂); Santa Anna, 6.0 km W Hwy. CA1, above Lago de Coatepeque, 853 m, UV light, 1-VI-1973, Erwin & Erwin (NMNH, 1♂). **GUATEMALA.** – (no other data) with orchid plants, 20-III-1940 (NMNH, 1♂, 1♀). **Chimaltenango:** Santa Emilia Pochuta, 1000 m, II-III-1931, Bequaert (MCZ, 1♀). **Escuintla:** Zapote [El Zapote], Champion (BMNH, 3♂, 2♀; MNHP, 1♂, 2♀; UARK, 1♀). **Petén:** Tikal, 17-IX-1963, Campbell (CNC, 1♂). **Quetzaltenango:** Cerro Zunil (MNHP, 1♂), 4000 ft, Champion

(BMNH, 1♂, 1♀), 4000–5000 ft, Champion (MCZ, 1♂, 1♀; MNHP, 1♂). **Sololá**: Volcan de Atitlan, 25–2500 ft, Champion (BMNH, 1♂, 2♀; MNHP, 1♂, 1♀). **Suchitepéquez**: Moca, 3000 ft, 21-VI-1947, Vaurie & Vaurie (AMNH, 1♂); Zapotitlan, Finca las Nubos, 16-VI-1973, Ekis, (NMNH, 1♂). **MÉXICO**. – (no other data) determined as *Anchomenus dominicensis* Bates (handwritten label) (BMNH, 1♂). **Campeche**: Chicana ruins, 6 mi E Xpujil, 700 ft, trop. seas. for., 13-14-VII-1983, Anderson & Maddison (UASM, 3♂, 2♀). **Chiapas**: Frontera Comalapa, 0.9 mi N, 2100 ft, 15-VI-1966, Ball & Whitehead (UASM, 1♂, 5♀), black light, 15-16-VI-1966, Ball & Whitehead (UASM, 3♂, 2♀), 2.9 mi N, 2200 ft, 17-VI-1966, Ball & Whitehead (UASM, 1♂), 4.9 mi N, 2400 ft, 18-VI-1966, Ball & Whitehead (UASM, 1♂); Huixtla, 33.7 mi N, 6000 ft, in bromeliads, 26-27-II-1966, Ball & Whitehead (UASM, 1♀); Jaltenango, El Triunfo, 12-V-1985, Arias, Vertiz & Velasco, (UNAM, 1♂); Ocozocauatla, 3.1 mi N, 18-VI-1972, Ball (UASM, 1♂), 9.2–12.5 mi N, 3200 ft, in bromeliads, 3-4-III-1966, Ball & Whitehead (UASM, 32♂, 36♀), 11.6 mi N, 3200 ft, black light, 10-13-VI-1966, Ball & Whitehead (UASM, 9♂, 4♀), 29-VIII-1967, Ball, Erwin & Leech (UASM, 2♂, 1♀), 25-V&20-VI-1972, Meyer, Ball & Ball (UASM, 1♀); Palenque ruins, 400 ft, 8-VI-1966, Ball & Whitehead (UASM, 1♂, 1♀), black light, 8-VI-1966, Ball & Whitehead (UASM, 2♀), 300 ft, UV light, 20-V-1972, Meyer, Ball & Ball (UASM, 1♂); Palenque, 64.2 mi SW, on Bonampak Rd., 500 ft, trop. lowl. for. litter, 24-VII-1983, Anderson & Peck (UASM, 2♂, 2♀); Santa Isabel at Rio Zoyalténcó, 19.3 km E, 650 m, ex fig-fall and litter, 9-VI-1991, Ashe (UKSM, 1♀); Sierra de Colmena, E slope, near La Caverna, Arroyo Santa Maria, 700 ft, on ground, 1-10-VI-1972, Meyer, Ball & Ball (UASM, 18♂, 9♀), UV light, 4-13-VI-1972, Meyer, Ball & Ball (UASM, 2♂, 1♀). **Guerrero**: Atoyac de Alvarez, 66.4 km NE, 1400 m, mont. trop. for. arroyo, litter, 13-VIII-1983, Frania & Jaagumagi (UASM, 1♂, 1♀); El Paraiso, 26 km NE, 1800 m, 8-VIII-1986, Davidson & Rawlins (UASM, 1♀). **Jalisco**: Autlan, 8.3 mi S, Rte. 80, 3800 ft, 5-VIII-1966, Ball & Whitehead (UASM, 1♂, 1♀); La Huerta, 10.2 mi NE, Rte. 80, 1200 ft, marsh, 6-VIII-1967, Ball, Erwin & Leech (UASM,

1♀); Talpa de Allende, 6.5 mi S, 4340 ft, 9-VIII-1967, Ball, Erwin & Leech (UASM, 1♀), 10.8 mi S, 4900 ft, 9-VIII-1967, Ball, Erwin & Leech (UASM, 1♀); Tecalitlan, 12.4 mi S, 5300 ft, 3-VIII-1967, Ball, Erwin & Leech (UASM, 1♂). **México**: Mexico City vic. (BMNH, 1♂, 1♀; MNHP, 1♂). **Oaxaca**: Juchatengo, 22.2 mi S, 5800 ft, 21-22-VII-1966, Ball & Whitehead (UASM, 2♀); Oaxaca, Höge (BMNH, 1♀); Pochutla, 34.5 mi N, Rte. 175, 4700 ft, in bromeliads, 19-20-III-1966, Ball & Whitehead (UASM, 14♂, 31♀); Suchixtepec [=Suchiltepec], 19.1 mi S, Rte. 175, 4500 ft, in bromeliads, 17-III-1966, Ball & Whitehead (UASM, 9♂, 4♀), 25.2 mi S, Rte. 175, 8-9-VII-1972, Meyer & Ball (UASM, 2♂, 1♀); Tapanatepec, 5.0 mi E, Rte. 190, 800 ft, 10-VI-1966, Ball & Whitehead (UASM, 2♂); Valle Nacional, 6.5 mi S, 2040 ft, 13-14-VIII-1965, Ball & Whitehead (UASM, 1♂, 1♀), 10.8 mi S, Rte. 175, 1200 m, 23-VII-1975, Ball & Frania (UASM, 1♂). **Quintana Roo**: Kohunlich, 68 km W Chetumal, 160 m, trop. seasonal for., flight intercept trap, 14-17-VII-1982, Peck & Peck (CNC, 1♀). **San Luis Potosí**: Ciudad del Maiz, 4.3-17.9 mi E, Rte. 80, 3700–4300 ft, 9-10-VII-1966, Ball & Whitehead (UASM, 1♀); El Naranjo, 3.6 mi W, Rte. 80, 1200 ft, 10-VII-1966, Ball & Whitehead (UASM, 5♂, 1♀). **Tamaulipas**: Aguacates, 5 mi NW Gomez Farias, 2400 ft, 26-VII-1971, Ball & Ball (UASM, 2♂); Gomez Farias, Rancho del Cielo, 1000 m, flight intercept trap, 6-VI-7-VIII-1983, Peck & Peck (CNC, 2♂, 1♀); Sierra de Guatemala, Rancho del Cielo, 8 mi W Gomez Farias, 3800 ft, 6-10-X-1965, Ball & Whitehead (UASM, 1♂), 24-29-VII-1971, Ball & Ball (UASM, 4♂, 4♀). **Veracruz**: Fortin de las Flores, Rancho Clacotengo, ca. 2–5 km N, 1120 m, banejo trees, in bromeliads, 21-XII-1978, Ball & Ball (UASM, 1♀); Huatusco, 1 km N, Hwy. 125, 1200 m, ex bromeliads, 12-VIII-1987, Liebherr & Millman (CUIC, 2♂), JKL lot 87H14.5, 14-VIII-1987, Liebherr & Millman (CUIC, 16♂, 3♀), 10.4 mi SW, 4700 ft, in bromeliads, 8-III-1966, Ball & Whitehead (UASM, 1♂), 18.8 km NE, Rte. 143, El Mirador, ravine, coffee finca, in bromeliads, 22-XII-1978, Ball & Ball (UASM, 1♂, 3♀); Jalapa, (MNHP, 1♂, 1♀), Höge (BMNH, 3♂, 2♀; MCZ, 1♂; MNHP, 1♂), Schaus (AMNH, 2♂), Trujillo (BMNH, 2♀; MNHP, 1♂), 2.4 mi E,

Rte. 140, 4200 ft, in bromeliads, 8-IV-1966, Ball & Whitehead (UASM, 1♂, 1♀); Sontecomapan, 2.5 mi W, 100 ft, blacklight, 1-5 & 20-VI-1966, Ball & Whitehead (UASM, 1♂). **Yucatán:** Chichen Itza, 2.1 mi E, 100 ft, dry trop. seas. for. litter, 20-VII-1983, Anderson & Peck (UASM, 5♂, 3♀).

ETYMOLOGY: The combination of the Latin *marginis*, or margin, and the adjectival superlative *-issimus*, denoting the characteristic pronotal lateral margins of this species.

DISTRIBUTIONAL RANGE: Among the more widely distributed and abundantly collected species, known from the Atlantic to Pacific Coasts in México south of the Tropic of Cancer, south to El Salvador (fig. 215).

Platynus decorellus, new species
(figs. 60, 209–211, 214, 215)

DIAGNOSIS: Tricolored body, head ferruginous, pronotum rufotestaceous, elytra piceous with bluish metallic reflection; eyes moderately convex; pronotum with obtuse-rounded hind angles, laterobasal depressions smooth (fig. 60).

DESCRIPTION: Frontal grooves broad, moderately deep, eyes moderately convex, ocular ratio 1.64 to 1.78. Pronotum transverse, lateral margins broadly rounded (fig. 60); laterobasal depressions smooth; median base with faint longitudinal wrinkles; basal marginal bead well defined medially, more indistinctly elevated behind laterobasal depressions; median longitudinal impression sharply incised basally, well defined though shallower on disc; anterior transverse depression nearly obsolete; anterior marginal bead well defined medially, stronger on tightly rounded front angles; lateral marginal depressions narrowest at front angles, continuously widening toward laterobasal depressions. Elytral striae moderately shallow, wavering; elytral intervals slightly convex, nearly flat; basal groove broadly recurved before tightly rounded humeral angle; 15 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length more than $1.5 \times$ anterior margin; flight wings fully developed. Basal metatarsomere with fine outer and inner dorsal sulci. Tarsomere 5 with ventral setal length subequal to tarsomere depth at setal insertion point.

Head with strong, coriaceous isodiametric

microsculpture; pronotal disc with well-developed, slightly transverse mesh microsculpture; pronotal laterobasal depressions and median base with mixture of transverse mesh and isodiametric microsculpture; elytra with strong slightly stretched transverse mesh microsculpture, the sculpticells irregularly isodiametric, more consistently isodiametric around dorsal elytral setae. Head capsule and mandibles ferruginous to brunneous, labrum infuscated, palps and antennae rufotestaceous; pronotum rufotestaceous, sometimes with smoky cast, margins only slightly paler than disc; elytra ranging from rufotestaceous with a smoky cast, to piceous with well-developed blue metallic reflection; ventral body surface smoky rufotestaceous, with prothorax and elytral epipleura rufotestaceous, femora and tibiae testaceous.

Standardized body length 6.0–6.8 mm.

MALE GENITALIA: Median aedeagal lobe with upturned, elongate, and tightly rounded apex (fig. 209). Aedeagal internal sac trispinose, with apical spines on ventral, right, and left surfaces (figs. 210, 211), long bushy microtrichia basad spines.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 11–13 setae (fig. 214). Apical gonocoxite with 3–4 lateral and 1 dorsal ensiform setae. Spermathecal duct narrow, at angle with apical reservoir.

TYPE: Holotype ♂ (UASM, deposited in NMNH): MEXICO. Oaxaca/ 21.8 mi. n./ Juchatengo. 7100'/ III.23.1966/in bromeliads/ / George E. Ball/D. R. Whitehead/ collectors. Allotype ♀: same data and deposition.

PARATYPES: MÉXICO. – (no other data) Staudinger & Bang-Haas (MCZ, 3♀). **Chiapas:** Comitán, 32.5 mi E, Rte. 190, 2200 ft, black light, 3-IX-1965, Ball & Whitehead (UASM, 1♂), 14-VI-1966, Ball & Whitehead (UASM, 1♂); Frontera Comalapa, 4.9 mi N, 2400 ft, black light, 17-VI-1966, Ball & Whitehead (UASM, 1♂, 5♀); Chiapas, Huixtla, 33.7 mi N, 6000 ft, in bromeliads, 26-27-II-1966, Ball & Whitehead (UASM, 1♀); La Trinitaria, 20 mi S, 5-VI-1969, Campbell (UASM, 1♀); Navenchuac, microondas ca. 1 km E, 2440 m, oak-pine forest, in bromeliads, 13-I-1979, Ball & Ball (UASM, 1♀); Ocozocuatla, 9.2–12.5 mi N, 3200 ft, in bromeliads, 3-4-III-1966, Ball & Whitehead (UASM, 1♂, 1♀); Pueblo Nuevo, 3.1 mi S,

Rte. 195, 5400 ft, in bromeliads, 27-IV-1966, Ball & Whitehead (UASM, 1♂). **Chiapas-Oaxaca:** Ejido Rudolfo Figueroa, W, Mont. Manantial, 1515 m, mont. trop. for., bromeliads, 25-VI-1979, Ashe, Ball & Shpeley (UASM, 6♂, 3♀). **Guerrero:** Chilpancingo, 5 mi N, 25-VIII-1958, Howden (UASM, 1♀); Iguala, Cerro Tuxpan, 2-VI-1989, Perez (UNAM, 4♀). **Jalisco:** Guadalajara (CMNH, 1♂); Puerto Vallarta, 15-16-VI-1961, Grant (CNC, 1♂, 1♀), 17-VI-1961, Grant (CNC, 1♀). **Michoacán:** Uruapan, 14.1 mi W, 7040 ft, wet pine-oak forest, 15-VIII-1967, Ball, Erwin & Leech (UASM, 1♂, 1♀). **Morelos:** Cuernavaca, 5.4 mi E, 4600 ft, pedregal, black light, 29-30-VI-1966, Ball & Whitehead (UASM, 2♀). **Oaxaca:** El Camaron, 9 mi E, 27-VI-1971, Ward & Brothers (UASM, 1♀), microondas San Cristobal, km 1.4, 10.2 km SE, 1120 m, riparian, oak-pine, 21-22-VI-1979, Ashe, Ball & Shpeley (UASM, 2♂, 2♀); Juchatengo, 21.8 mi N, 7100 ft, in bromeliads, 23-III-1966, Ball & Whitehead (UASM, 15♂, 13♀), 18-19-VII-1966, Ball & Whitehead (UASM, 2♂, 1♀); Pochutla, 34.5 mi N, Rte. 175, 4700 ft, in bromeliads, 19-20-III-1966, Ball & Whitehead (UASM, 3♂); Puerto Escondido, 22.4 mi N, 2100 ft, black light, 20-21-VII-1966, Ball & Whitehead (UASM, 1♂); Sola de Vega, 18.8 km S, Rte. 131, 2070 m, cloud forest, in bromeliads, 18-I-1979, Ball & Ball (UASM, 2♂). U.S.A. – **California:** San Francisco, intercepted on *Laelia anceps* (NMNH, 1♀).

ETYMOLOGY: The diminutive of the Latin *decorus*, meaning beautiful or becoming. The color pattern of this species is similar to that of the red-thoraxed forms of *Agonum decorum*.

DISTRIBUTIONAL RANGE: Found in the western half of México from Jalisco to Chiapas (fig. 215).

Platynus woldai, new species
(figs. 34, 53, 191, 192,
203, 204, 205)

DIAGNOSIS: Pronotum with broadly convex lateral margins, obtuse-rounded hind angles, sparsely punctate laterobasal depressions and median base (fig. 53); eyes moderately convex; elytral striae with minute punctures basally on disc; upper surface con-

colorous, elytra with vivid bluish to silvery metallic reflection.

DESCRIPTION: Frontal grooves deep, laterally delimiting triangular tubercles; eyes convex, protruding from sides of head, frons narrowest at anterior supraorbital seta, ocular ratio 1.66 to 1.77. Pronotum with evenly convex lateral margins, sides straight to slightly convex before basal setae (fig. 53); hind angles obtuse-rounded; laterobasal depressions broad, sparsely punctate to rugose on bottom; median base sparsely punctate laterally near laterobasal depressions, smooth with irregular depressions medially; basal marginal bead well developed, continuous to basal setae behind laterobasal depressions; median longitudinal impression fine; anterior transverse depression moderately deep medially, traceable $\frac{1}{3}$ distance to front angles; anterior marginal bead continuous; front angles tightly rounded; lateral marginal depressions moderately broad, gradually widening from front angles to laterobasal depressions. Elytral striae deep, continuous, with minute punctulae basal on disc; elytral intervals moderately convex; basal groove broadly recurved to rounded humerus; 15–16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length $1.7 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad, deep outer dorsal sulcus, shallow inner dorsal sulcus, median area convex. Tarsomere 5 with short ventral setae, setal length less than $\frac{1}{6}$ tarsomere depth at setal insertion.

Head with well-developed isodiametric microsculpture; pronotal disc with well-developed transverse mesh microsculpture; pronotal laterobasal depressions with swirling transverse mesh microsculpture; median base with transversely stretched isodiametric microsculpture; elytra with microsculpture of dense transverse lines (fig. 34), sculpticells obscured by surface reflection. Head capsule, pronotal disc and elytra concolorous rufobrunneous, mandibles rufous, palps and antennae rufotestaceous with brunneous infuscation; pronotal lateral margins slightly paler, rufotestaceous; elytra with vivid bluish to silvery metallic reflection; ventral body surface brunneous to rufous, pronotal and elytral epipleura, and legs rufotestaceous.

Standardized body length 6.8–8.1 mm.

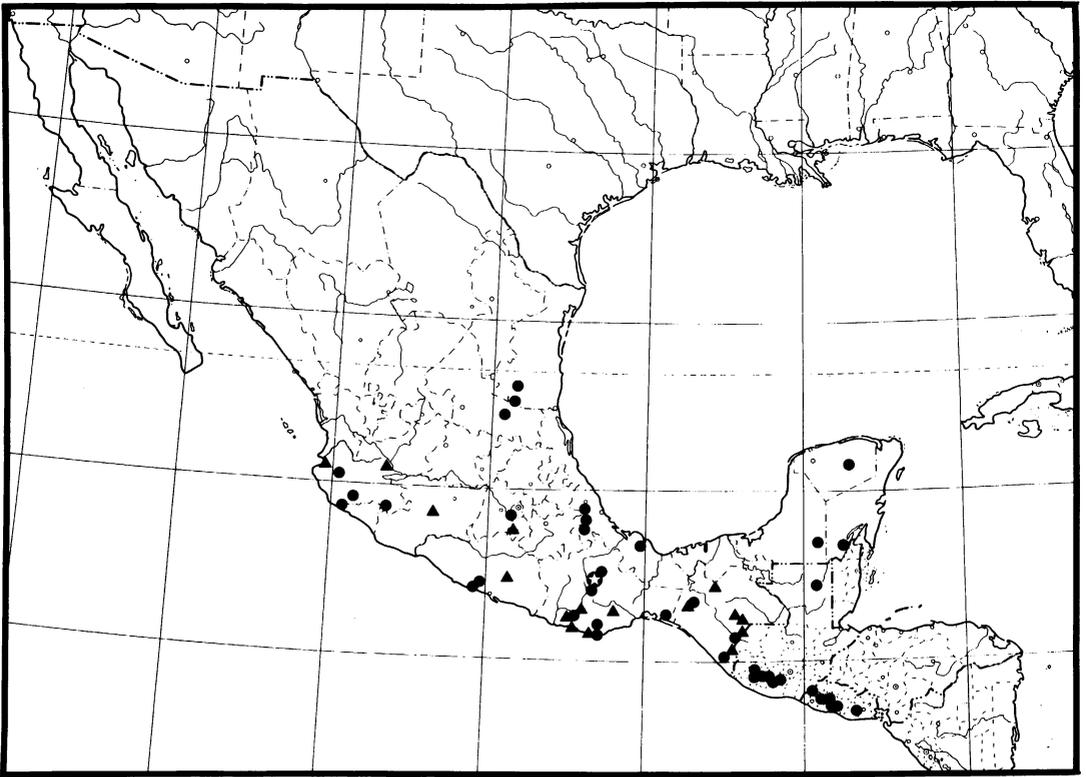


Fig. 215. Distributional records of *P. angustulus* (○), *P. marginissimus* (●), and *P. decorellus* (▲).

MALE GENITALIA: Median aedeagal lobe straight apically before blunt rounded apex (fig. 191). Aedeagal internal sac elongate and trispinose, sac length $1.3\times$ length of median lobe from parameral articulation to apex; sac with apical spines on ventral, right and left sides (fig. 192).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 11 setae (fig. 203). Apical gonocoxite with 3–4 lateral and 1 dorsal ensiform setae. Spermathecal duct broad, joining apical reservoir at slight angle (fig. 204).

TYPE: Holotype ♀ (NMNH): PANAMA Chiriqui/ Fortuna 1050 M/ $8^{\circ}4'N$ $082^{\circ}15'W$ / H. Wolda Lt. trap/ 24 May 1979.

PARATYPES: PANAMÁ. – Chiriquí: Fortuna, 1050 m, $8^{\circ}44'N$ $082^{\circ}15'W$, light trap (all Wolda, NMNH), 15-V-1977 (1♂), 15-VIII-1977 (3♂), 24-II-1978 (1♂), 3-IV-1978 (1♀), 5-IV-1978 (1♀), 11-IV-1978, (1♂), 2-V-1978 (1♀), 4-V-1978 (1♂), 9-V-1978 (1♀), 11-V-1978, (1♂), 12-V-1978 (1♂), 18-V-1978 (1♀),

19-V-1978 (2♀), 3-VI-1978 (1♂, 2♀), 4-VI-1978 (1♂), 8-VI-1978 (1♂), 10-VI-1978 (2♂), 13-VII-1978 (1♂), 26-III-1979 (1♂), 7-IV-1979 (1♂, 2♀), 20-IV-1979 (1♀), 23-IV-1979 (1♀), 24-IV-1979 (2♂, 2♀), 25-IV-1979 (1♂, 1♀), 30-IV-1979 (1♀), 15-VI-1979 (1♀).

ETYMOLOGY: Named to honor Henk Wolda, who has collected all the specimens during his light-trapping research in Panamá.

DISTRIBUTIONAL RANGE: Known only from the type locality in Panamá (fig. 205).

Platynus angustulus, new species
(figs. 72, 206, 215)

DIAGNOSIS: Small, narrow beetles, standardized body length 5.7–6.2 mm (males only); eyes moderately convex; pronotal hind angles obtuse, lateral margins convex before basal setae, laterobasal depressions smooth (fig. 72); elytral disc flat, intervals convex; forebody rufopiceous, elytral slightly paler, legs and antennae testaceous, antennomeres 4–7 with smoky cast.

DESCRIPTION: Frontal grooves broadly depressed, areas laterad to grooves raised in a tubercle; eyes moderately convex, ocular ratio 1.62 to 1.64. Pronotum relatively narrow, maximum width $1.35 \times$ median length, hind angles obtuse, lateral margin convex before basal setae (fig. 72); laterobasal depressions smooth, deepest in middle of width at inner margin of widely explanate basolateral margin; basal marginal bead narrow but well defined medially, narrower behind laterobasal depressions, obsolete at basal setae; median longitudinal impression fine throughout length; anterior transverse depression broad and shallow; anterior marginal bead broad medially; front angles tightly rounded, little protruding; lateral marginal depressions evident from front angle, gradually widening to linear laterobasal depressions. Elytra narrow, parallel-sided medially, humeri little narrower than maximum width; elytral striae finely and deeply incised; elytral intervals convex; basal groove moderately recurved, tightly rounded to slightly angulate at 6th stria; 14–15 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length more than $1.5 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with well-incised outer and inner dorsal sulci, the median area somewhat flattened. Tarsomere 5 with very short ventral setae, visible only at high magnification.

Head with very shallow, slightly transversely stretched isodiametric microsculpture, surface reflection obscuring the sculpticells; pronotum with shallow transverse mesh microsculpture, surface reflection obscuring the sculpticells; elytra with fine, transversely stretched transverse mesh microsculpture. Head capsule rufopiceous, labrum, mandibles, and palps rufobrunneous, antennae rufotestaceous with antennomeres 4–7 with a smoky cast; pronotal disc rufopiceous, lateral margins anteriorly paler, brunneous to flavous; elytra brunneous with well-developed silvery metallic reflection; ventral body surface rufopiceous, pronotal and elytral epipleura brunneous, legs testaceous.

Standardized body length 5.7–6.2 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved with finely acuminate apex (fig. 206). Aedeagal internal with elongate trispinose sac; sac length $1.7 \times$ median lobe length

from parameral articulation to apex; apical spines on the ventral, right, and left sides of sac.

TYPE: Holotype δ (UASM, deposited in NMNH): MEXICO Oaxaca/ 17.3 km. s. Valle/ Nacional, Rte. 175/ mountain tropical/ forest, ca. 1000 m./ April 26, 1977// MEXICAN EXP. 1977/ J. S. Ashe/ H. E. Frania/ D. Shpeley coll.

PARATYPE: Same data (UASM, 1 δ).

ETYMOLOGY: The diminutive form of the Latin *angustus*, meaning narrow, referring to the narrow, parallel-sided elytra.

DISTRIBUTIONAL RANGE: Known only from Valle Nacional in Oaxaca (fig. 215).

Platynus flavomarginatus, new species
(figs. 70, 216–218, 230, 231, 239)

DIAGNOSIS: Pronotum with extremely broad flavous margins, contrasting with rufopiceous disc, lateral margins straight before obtuse hind angles, laterobasal depressions smooth, anterior transverse depression deep medially (fig. 70); eyes moderately convex; elytra vividly metallic from dense transverse microsculpture; elytral striae slightly irregular basal, but no punctures depressing deepest part of striae.

DESCRIPTION: Frontal grooves broad, areas laterad grooves depressed; eyes moderately convex, ocular ratio 1.56 to 1.78. Pronotum transverse, lateral margins broadly explanate (fig. 70); lateral margins straight before obtuse hind angles; laterobasal depressions broad, smooth, gradually elevated to meet broad basolateral margin; median base smooth, with faint depressions and irregularities; basal marginal bead continuous medially, well defined behind laterobasal depressions almost to basal setae; median longitudinal impression well incised; anterior transverse depression deep, triangular, traceable almost to front margin inside tightly rounded front angles; anterior marginal bead well defined medially; lateral marginal depressions gradually widening from front angles to laterobasal depressions. Elytral striae deep, continuous, with minute irregularities which do not depress deepest portions of striae; elytral intervals broadly convex; basal groove broadly recurved to rounded humerus; 16 lateral elytral setae in eighth stria. Me-

tepisternum elongate, lateral margin length $1.8 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad, well-incised outer dorsal sulcus, shallower inner dorsal sulcus, median area convex. Tarsomere 5 with very short ventral setae visible only at high magnification ($\times 125$).

Head with shallow isodiametric microsculpture; pronotal disc with dense transverse mesh microsculpture; pronotal laterobasal depressions with swirling transverse mesh microsculpture; median base with transversely stretched isodiametric mesh microsculpture; elytra with microsculpture of dense transverse lines. Head capsule rufopiceous, labrum, mandibles and palps rufobrunneous; antennae rufotestaceous, antennomeres 2–4 entirely covered with smoky infuscation, outer antennomeres with apical infuscation; pronotal disc rufopiceous, lateral margins broadly flavous to rufotestaceous; elytra rufobrunneous with vivid bluish to cupreous metallic reflection; ventral body surface rufopiceous, pronotal and elytral epipleura rufobrunneous, legs rufotestaceous.

Standardized body length 6.6–8.3 mm.

MALE GENITALIA: Median aedeagal lobe straight to slightly recurved apically (fig. 216), apex bilaterally constricted (fig. 217). Aedeagal internal sac trispinose, with apical spines on ventral, right and left sides, bushy microtrichia best developed on basal portion of left side (fig. 218).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 9 setae (fig. 230). Apical gonocoxite with 3 lateral and 1 dorsal ensiform setae. Spermathecal duct broad, linearly joining apical reservoir (fig. 231).

TYPE: Holotype δ (NMNH): PANAMÁ: Coclé Prov./ La Mesa ab. El Valle/ $8^{\circ}37'N$, $80^{\circ}07'W$ 850 m/ 13 July '75 Stockwell// ADP/ 45278.

PARATYPES: PANAMÁ. – **Chiriquí:** Fortuna, light trap, (all Wolda, NMNH) 30-XII-1976 (1♀), 1050 m, 20-IX-1977 (1♀), 22-IX-1977 (1♂), 27-II-1978 (1♂), 13-IV-1978 (1♀), 4-IX-1978 (1♂), 12-X-1978 (1♂), 28-XI-1978 (1♂), 7-II-1979 (1♂), 25-III-1979 (1♂), 27-III-1979 (1♂), 21-V-1979 (1♀), 2-VII-1979 (1♀), 3-VII-1979 (1♀). **Panamá:** Cerro Campana, nr. Chica, 2-5-IV-1965, Duckworth & Duckworth (NMNH, 2♂); Cerro Jefe, 8 km NE, 700 m, 27-III-1976, Stockwell, (NMNH, 1♀).

ETYMOLOGY: A combination of the Latin *flavus*, or yellow, and *marginis*, meaning margin, denoting the pale pronotal margins.

DISTRIBUTIONAL RANGE: Found throughout Panamá (fig. 239).

Platynus dominicensis (Bates)
(figs. 3, 11, 43, 44, 219–225,
232–234, 239)

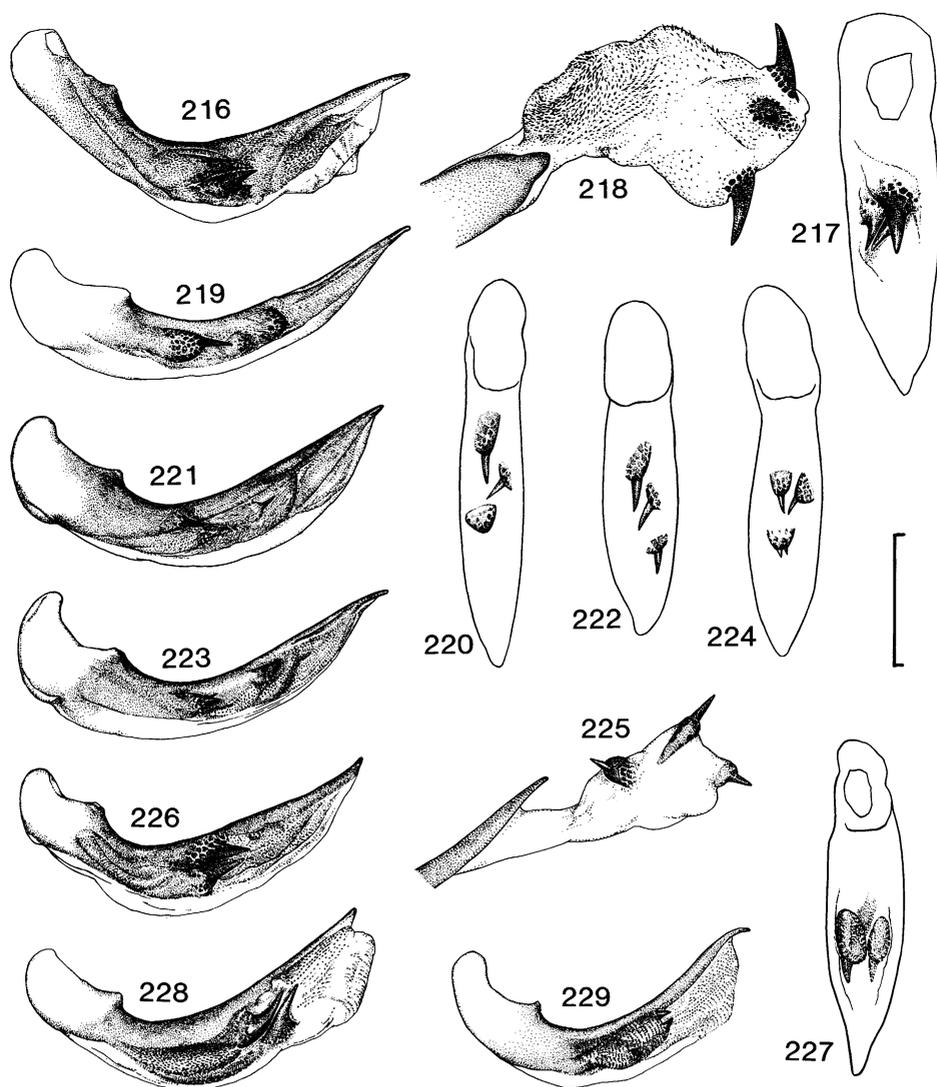
Anchomenus dominicensis Bates, 1882: 96.

Agonum dominicense: Csiki, 1931: 847.

Platynus dominicensis: Whitehead, 1973: 195.

DIAGNOSIS: Pronotum with well-developed hind angles and sinuate lateral margins, laterobasal depressions deep and smooth, anterior transverse depression deep medially, traceable almost to front angles (figs. 43, 44); eyes moderately convex to convex (fig. 3); elytra strongly iridescent due to fine transverse microsculpture; elytral intervals broadly rounded.

DESCRIPTION: Frontal grooves deep and broad, area laterad grooves depressed; eyes moderately convex to convex (fig. 3), ocular ratio 1.56 to 1.71. Pronotum subcordate, hind angles obtuse, lateral margin sinuate before angles (figs. 43, 44); laterobasal depressions deep and smooth, faint irregular wrinkles in deepest part, disc greatly elevated from depressions; basal marginal bead well defined medially, indistinct behind laterobasal depressions; median base with faint irregular wrinkles, otherwise smooth, greatly depressed relative to disc; median longitudinal impression fine throughout length, extending almost to anterior margin; anterior transverse depression broad and deep, extending almost to front angles; anterior marginal bead well defined medially, stronger at rounded front angles; lateral marginal depressions extending to front angles, widened in basal $\frac{1}{2}$ of length. Elytral striae deep and smooth; elytral intervals broadly rounded; basal groove little recurved before broadly rounded humerus; 16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length more than $1.5 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with deep outer dorsal sulcus and somewhat shallower and finer inner sulcus. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).



Figs. 216–229. Male aedeagi. **216.** Median lobe, *P. flavomarginatus*, dextroventral view. **217.** Median lobe, *P. flavomarginatus*, detailing internal sac spination, euventral view. **218.** Everted internal sac, *P. flavomarginatus*, euventral view. **219.** Median lobe, *P. dominicensis* (Veracruz: Huatusco), dextroventral view. **220.** Median lobe, *P. dominicensis* (Veracruz: Huatusco), detailing internal sac spination, euventral view. **221.** Median lobe, *P. dominicensis* (Chiapas: Jitotol), dextroventral view. **222.** Median lobe, *P. dominicensis* (Chiapas: Jitotol), detailing internal sac spination, euventral view. **223.** Median lobe, *P. dominicensis* (Chiapas: Volcán Tacaná), dextroventral view. **224.** Median lobe, *P. dominicensis* (Chiapas: Volcán Tacaná), detailing internal sac spination, euventral view. **225.** Everted internal sac, *P. dominicensis* (Veracruz: Coscomatepec), dextroventral view. **226.** Median lobe, *P. mimulus*, dextroventral view. **227.** Median lobe, *P. mimulus*, detailing internal sac spination, euventral view. **228.** Median lobe, *P. nevermanni*, dextroventral view. **229.** Median lobe, *P. purpurellus*, dextroventral view. Scale bar = 0.5 mm.

Head with shallow isodiametric microsculpture; pronotal disc with evident transverse mesh microsculpture, the sculpticells regular; pronotal laterobasal depressions with

transverse mesh microsculpture; median base and apex with transversely stretched isodiametric microsculpture; elytra with fine transverse line microsculpture, the lines joined in

a loose transverse mesh. Head capsule and pronotal disc piceous; labrum, mandibles, and palps brunneous, antennae rufotestaceous with a smoky cast; pronotal lateral margins rufopiceous to brunneous; elytra piceous with aeneous metallic reflection; ventral body surface smoky brunneous, legs paler, a smoky flavous.

Standardized body length 6.0–6.9 mm.

MALE GENITALIA: Median aedeagal lobe finely acuminate apically, the tip slightly recurved (figs. 219, 221, 223). Aedeagal internal sac trispinose with apical spines on the ventral, right and left side (fig. 225), the apical spine somewhat variable, with or without acuminate tips (figs. 220, 222, 224).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 7 setae (fig. 232). Apical gonocoxite with 2–3 lateral and 1 dorsal ensiform setae. Bursa copulatrix with V-shaped dorsal lobe, lightly pigmented, yellow (fig. 233). Spermathecal duct broad, linearly joining apical reservoir (fig. 234).

TYPE: Of *dominicensis* Bates, lectotype ♂ designated by Whitehead (1973), selected by Madge (BMNH): LECTO-/ TYPE [purple-bordered circle]// Cordova// Mexico/ Salle Coll.// 510 [green square]// B.C.A. col. I. 1./ *Anchomenus/ dominicensis/ Bates./ Platynus/ dominicensis/ Mann/ apud. Sallé// LECTOTYPE/ Anchomenus/ dominicensis/ Bates/ designated/ R. B. Madge '72.*

DISTRIBUTIONAL RANGE: Widely distributed along the Atlantic Versant of México in Hidalgo and Veracruz States south to Guatemala, as well in Costa Rica and Chiriquí Province, Panamá (fig. 239).

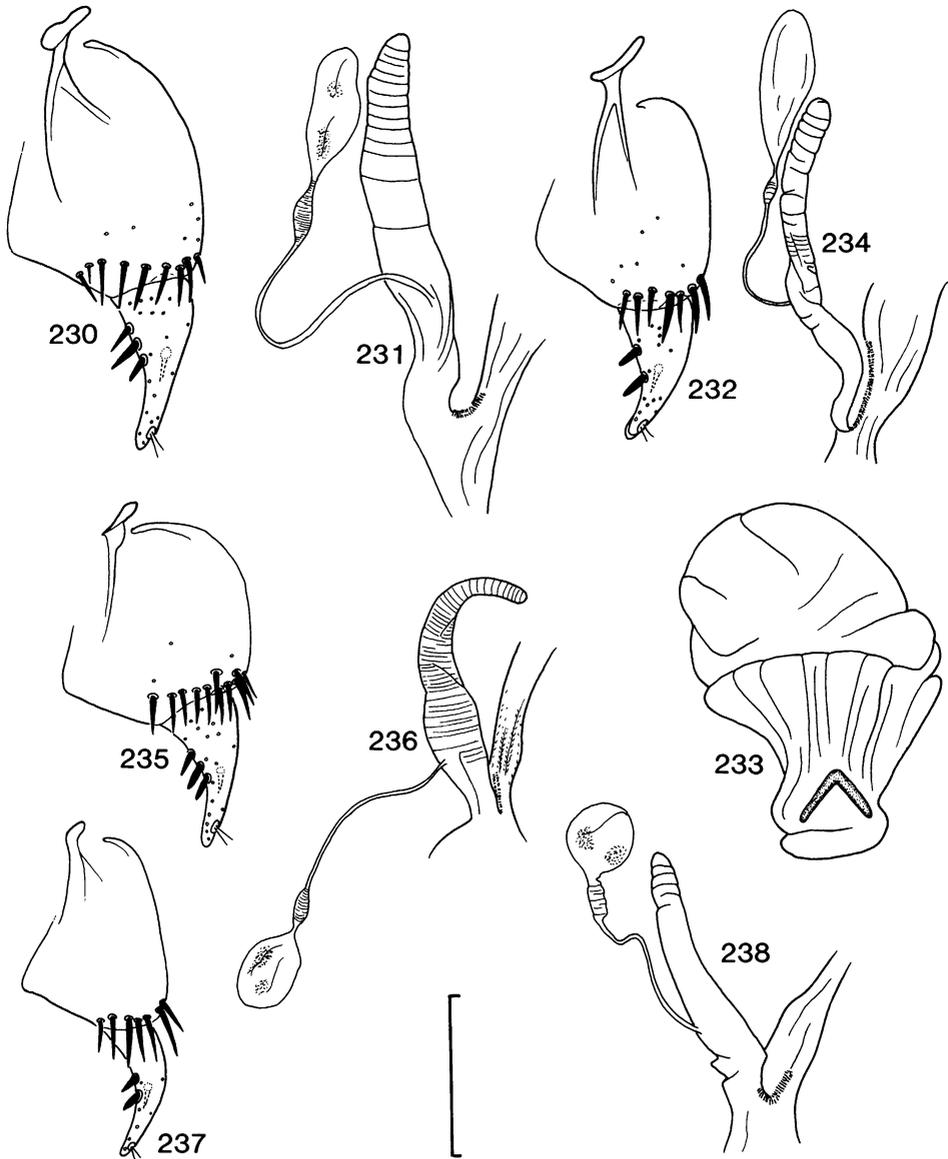
MATERIAL EXAMINED: (no data), det. *Anchomenus dominicensis* Bates (handwritten label) (BMNH, 2). **COSTA RICA.** – (no other data) (BMNH, 1). **GUATEMALA.** – **Guatemala:** Guatemala City, Champion (BMNH, 1). **Quetzaltenango:** Cerro Zunil (MNHP, 1); Cerro Zunil, 4000 ft, Champion (BMNH, 1). **MEXICO.** – **Chiapas:** Jitotol, 11 km S, Rte. 195, 1650 m, pine-sweetgum, 5-V-1977, Ashe, Frania & Shpeley (UASM, 2), ex bromeliads, 5-V-1977, Ashe, Frania & Shpeley (UASM, 1); Lagos de Montebello Nat. Pk., 4800 ft, 30-V-1972, Meyer, Ball & Ball (UASM, 1), Dos Lagunas, 3-VIII-1974, Whitehead, Frania & Ball (UASM, 1); Volcan Tacaná, 5000 ft, ex bromeliads, 21-XII-1976, Frania & Procter (UASM, 1). **Hidalgo:** Tlan-

chinol, 2.4 km N, Rte. 105, 1540 m, ground, cloud forest, 21-23-VI-1975, Ball & Frania (UASM, 6), 3.2 km N, Rte. 105, 1540 m, ground, cloud forest, 21-23-VI-1975, Ball & Frania (UASM, 5), 3.7 km N, Rte. 105, 1690 m, cloud forest, 10-V-1977, Ashe, Frania & Shpeley (UASM, 1). **Oaxaca:** Oaxaca, Höge (BMNH, 1); Valle Nacional, 6.5 mi S, 2040 ft, 13-14-VIII-1965, Ball & Whitehead (UASM, 2). **Puebla:** Xicotepec de Juarez, 1.2 mi N, 3500 ft, cloud-mixed oak forest, 17-VI-1983, Anderson (UASM, 2). **Veracruz:** Cordoba, Sallé (BMNH, 2); Coscomatepec, 3.9 km NE, Rte. 125, 1310 m, acacias, in bromeliads, 19-XII-1978, Ball & Ball (UASM, 3), stream gravel-rubble, 19-XII-1978, Ball & Ball (UASM, 1); El Bastanal, near Coyame, San Andres Mts., 2500 ft, 19-IX-1965, Ball & Whitehead (UASM, 2); Huatusco, 1 km N, Rte. 140, 1200 m, in bromeliads, 14-VIII-1987, Liebherr & Millman (CUIC, 1), 6 km S, Rte. 125, 1370 m, cloud forest, in bromeliads, 20-XII-1978, Ball & Ball (UASM, 3), 7 km N, 2164 m, cloud forest, 24-IV-1977, Ashe, Frania & Shpeley (UASM, 1), 25-IV-1977, Ashe, Frania & Shpeley (UASM, 2), 4.3 mi E, 3400 ft, cloud forest, 21-VI-1983, Anderson (UASM, 1), 18.8 km NE, El Mirador, Rte. 143, ravine, coffee finca, in bromeliads, 22-XII-1978, Ball & Ball (UASM, 1); Jalapa, Höge (MNHP, 3), Schaus (AMNH, 2); Las Vigas, Höge (BMNH, 1). **PANAMÁ.** – **Chiriquí:** Bugaba, 800-1500 ft, Champion (BMNH, 6).

Platynus mimulus, new species
(figs. 52, 226, 227, 235, 236, 239)

DIAGNOSIS: Eyes convex; pronotum transverse, explanate lateral margins straight before obtuse hind angles, laterobasal depressions and adjacent areas of median base sparsely punctate, anterior transverse depression deep (fig. 52); elytral striae sparsely and irregularly punctate on basal portion of disc; head rufopiceous, pronotum rufobrunneous with brunneous margins, elytra brunneous with bluish to silvery metallic reflection, legs testaceous.

DESCRIPTION: Frontal grooves broad, areas laterad grooves depressed; eyes convex, ocular ratio 1.71 to 1.84. Pronotum transverse, lateral margins broadly explanate, straight before obtuse hind angles (fig. 52); laterobasal



Figs. 230–238. Female reproductive tract structures. 230. Right gonocoxa, *P. flavomarginatus*, ventral view. 231. Common oviduct and spermatheca, *P. flavomarginatus*, ventral view. 232. Right gonocoxa, *P. dominicensis*, ventral view. 233. Bursa copulatrix with V-shaped sclerotized dorsal lobe, *P. dominicensis*, dorsal view. 234. Common oviduct and spermatheca, *P. dominicensis*, ventral view. 235. Right gonocoxa, *P. mimulus*, ventral view. 236. Common oviduct and spermatheca, *P. mimulus*, ventral view. 237. Right gonocoxa, *P. nevermanni*, ventral view. 238. Common oviduct and spermatheca, *P. nevermanni*, ventral view. Scale bar = 0.2 mm for figs. 230, 232, 235, 237; scale bar = 0.5 mm for figs. 231, 233, 234, 236, 238.

depressions deep, sparsely punctate and irregularly wrinkled; median base sparsely punctate near laterobasal depressions, smooth medially; basal marginal bead continuous,

well defined behind laterobasal depressions, obsolete just inside basal setae; median longitudinal impression well developed, median area of disc depressed; anterior transverse de-

pression deep, median apex depressed in front of depression; anterior marginal bead broad and well defined medially; front angles rounded; lateral marginal depressions broad, gradually widening from front angles to laterobasal depressions, faintly wrinkled behind lateral seta. Elytral striae continuous with fine punctulae in basal portion of disc; elytral intervals broadly convex; basal groove broadly recurved to rounded humerus; 16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length $1.7 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad, deep outer dorsal sulcus, shallower inner dorsal sulcus, median area convex. Tarsomere 5 with very short ventral setae visible only at high magnification ($\times 125$).

Head with shallow isodiametric microsculpture, the sculpticells obscured by surface reflection; pronotal disc with transverse microsculpture, transverse sculpticells mixed with transverse lines; pronotal laterobasal depressions with swirling transverse mesh microsculpture; median base with transversely stretched isodiametric mesh microsculpture; elytra with transverse microsculpture, transverse lines joined in a loose mesh. Head capsule rufopiceous, labrum, mandibles, palps and antennae rufotestaceous with brunneous infuscation; pronotal disc rufopiceous, lateral margins broadly paler, rufous; elytra brunneous with bluish to silvery metallic reflection; ventral body surface rufous to brunneous, pronotal and elytral epipleura and legs rufotestaceous.

Standardized body length 6.5–6.9 mm.

MALE GENITALIA: Median aedeagal lobe with straight apical portion, finely rounded apex slightly downturned (fig. 226). Aedeagal internal sac trispinose, with apical spines on ventral, right and left sides (figs. 226, 227).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 11 setae (fig. 235). Apical gonocoxite with 3 lateral and 1 dorsal ensiform setae. Spermathecal duct broad, linearly meeting the arcuate apical reservoir (fig. 236).

TYPE: Holotype δ (UASM, deposited in NMNH): Cerro Campana, 3000', Panama./ Aug. 1, 1970./ H. & A. Howden// Borrowed ex/ G. E. Ball// ADP/ 54684.

PARATYPES: PANAMÁ. – **Panamá:** Cerro

Campana, 850 m, night, running on logs or branches, 3-4-VI-1972, Erwin & Erwin (NMNH, 2♀).

ETYMOLOGY: The diminutive form of the Latin *mimus*, meaning imitator, for the external similarity of this species to *Platynus flavomarginatus*, and *P. nitidulus*.

DISTRIBUTIONAL RANGE: Known only from the type locality in Panamá (fig. 239).

***Platynus nevermanni*, new species**

(figs. 46, 228, 237, 238, 239)

DIAGNOSIS: A small species, standardized body length 5.3–6.6 mm; eyes convex; pronotum with obtuse hind angles and sides broadly but shallowly sinuate before basal setae, laterobasal depressions smooth on bottom (fig. 46); elytral striae minutely punctate on basal half of disc.

DESCRIPTION: Frontal grooves deeply incised, mesally delimiting triangular tubercles; eyes convex, ocular ratio 1.74 to 1.82. Pronotum with broadly explanate lateral margins (fig. 46); hind angles obtuse, basal setae situated on minute marginal bump, sides slightly and broadly sinuate before basal setae; laterobasal depressions deep, smooth on bottom, gradually elevated to meet explanate basolateral margin; median base smooth; basal marginal bead well defined to obsolete medially; median longitudinal impression in broadly depressed median portion of disc; anterior transverse depression shallow medially, traceable for $\frac{1}{3}$ distance toward front angles; anterior marginal bead broad and well defined to obsolete medially; front angles rounded; lateral marginal depressions broad, gradually widening from front angles to laterobasal depressions. Elytral striae somewhat discontinuous basally, inner 5 striae irregularly punctate in basal half; elytral intervals slightly convex; basal groove slightly recurved to broadly rounded humerus; 16 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length $1.7 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad, well-incised outer dorsal sulcus, slightly shallower inner dorsal sulcus. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with shallow isodiametric micro-

sculpture, the sculpticells obscured by surface reflection; pronotal disc with regular, shallow transverse mesh microsculpture; pronotal laterobasal depressions and median base with transverse mesh microsculpture in irregular rows; elytra with transverse microsculpture of very shallow, very closely spaced lines irregularly joined by cross lines. Head capsule, labrum, and mandibles rufopiceous, palps and antennae rufotestaceous; pronotal disc rufopiceous, lateral margins rufotestaceous; elytra rufopiceous, shiny, with bluish to cupreous metallic reflection; ventral body surface rufopiceous to rufous, pronotal and elytral epipleura paler, more flavous, legs rufotestaceous.

Standardized body length 5.3–6.6 mm.

MALE GENITALIA: Median aedeagal lobe straight in apical half, with bluntly acuminate apex (fig. 228). Aedeagal internal sac trispinose, with apical spines on ventral, right and left sides of sac.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 7 setae (fig. 237). Apical gonocoxite with 2–3 lateral and 1 dorsal ensiform setae. Spermathecal duct broad, linearly joining apical reservoir (fig. 238).

TYPE: Holotype ♂ (NMNH): COSTA RICA/ F NEVERMANN/ 28 IX 30// HAMBURG FARM/ REVENTAZON/ EBENE LIMON/ / Gesiebe vom Waldboden// ♂ winged// ADP/ 03707.

PARATYPES: COSTA RICA. – **Limón:** Reventazon, Hamburg Farm, sifted forest litter, 12-II-1934, Nevermann (CNMH, 1♀), gekatschert an gras und gebusch, 27-VII-1930, Nevermann (NMNH, 1♂), sifted swamp litter, 7-VII-1933, Nevermann (CNMH, 1♀).

ETYMOLOGY: Named to memorialize Wilhelm Heinrich Ferdinand Nevermann, who collected all known specimens.

DISTRIBUTIONAL RANGE: Known only from the type locality in Limón Province, Costa Rica (fig. 239).

***Platynus purpurellus*, new species**
(figs. 45, 229, 239)

DIAGNOSIS: Eyes convex; pronotal lateral margins explanate, slightly sinuate before obtuse hind angles, laterobasal depressions sparsely punctate on inner side, anterior transverse depression deep (fig. 45); elytral striae basally punctate; elytral intervals con-

vexly rounded; body size small, standardized length 5.9 mm.

DESCRIPTION: Frontal grooves broad, areas laterad grooves depressed; eyes convex, protruding from head, ocular ratio 1.81. Pronotum with broadly explanate lateral margins, sides sinuate before obtuse hind angles (fig. 45); laterobasal depressions deep, rugose in deepest parts, sparsely punctate on inner sides; median base smooth; basal marginal bead continuous medially, fainter behind laterobasal depressions, obsolete at basal setae; median longitudinal impression well incised, set in depressed median area of disc; anterior transverse depression deep medially, traceable to anterior margin inside front angles; anterior marginal bead traceable medially, tall at tightly rounded front angles; lateral marginal depressions broadly explanate from front angles, as wide at lateral seta as at basal $\frac{1}{5}$ where they meet laterobasal depressions. Elytral striae deep, continuous, with evident punctures depressing bottom of striae on basal $\frac{1}{3}$ of disc; elytral intervals broadly and strongly convex; basal groove broadly recurved to rounded humerus; 15 lateral elytral setae in eighth stria. Metepisternum elongate, lateral margin length more than $1.5 \times$ anterior margin; flight wings macropterous. Basal metatarsomere with broad, moderately deep outer dorsal sulcus, shallower inner dorsal sulcus, median area convex. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with very shallow isodiametric microsculpture, surface reflection obscuring sculpticells; pronotal disc with shallow transverse mesh microsculpture, surface reflection partially obscuring sculpticells; pronotal laterobasal depressions and median base with shallow, swirling, transversely stretched isodiametric microsculpture; elytra with transverse microsculpture of shallow, dense lines. Head capsule rufopiceous, labrum and mandibles brunneous, palps and antennae rufotestaceous; pronotal disc piceous, base rufopiceous, explanate lateral margins anteriorly rufotestaceous; elytra shiny rufobrunneous, with vivid bluish to silvery reflection, giving them a purplish cast; ventral body surface piceous, pronotal and elytral epipleura brunneous, abdominal apex and legs rufotestaceous.

Standardized body length 5.9 mm.

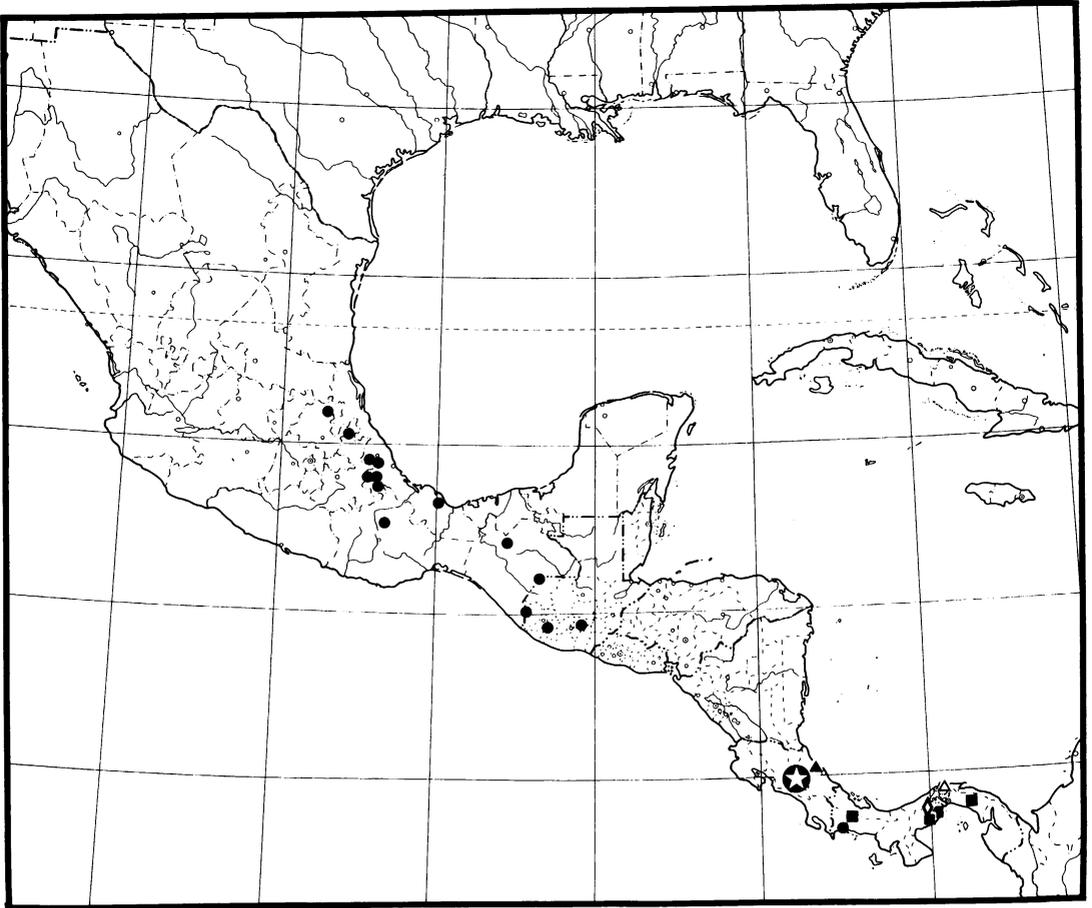


Fig. 239. Distributional records of *P. flavomarginatus* (■), *P. dominicensis* (●, ⊙ = country record only), *P. mimulus* (◊), *P. nevermanni* (▲), and *P. purpurellus* (△).

MALE GENITALIA: Median aedeagal lobe evenly curved before strongly recurved acuminate apex (fig. 229). Aedeagal internal sac apparently trispinose, with apical spines on ventral, right and left sides.

TYPE: Holotype ♂ (NMNH): Porto Bello [= Portobelo]/ 20-2-11 Pan [= Panamá]// E A Schwarz/ Collector// ♂ + wing// ADP/ 10359.

ETYMOLOGY: The diminutive form of the Latin *purpureus*, or purple, denoting the purple metallic reflection of the elytra.

DISTRIBUTIONAL RANGE: Known only from the type locality in Panamá (fig. 239).

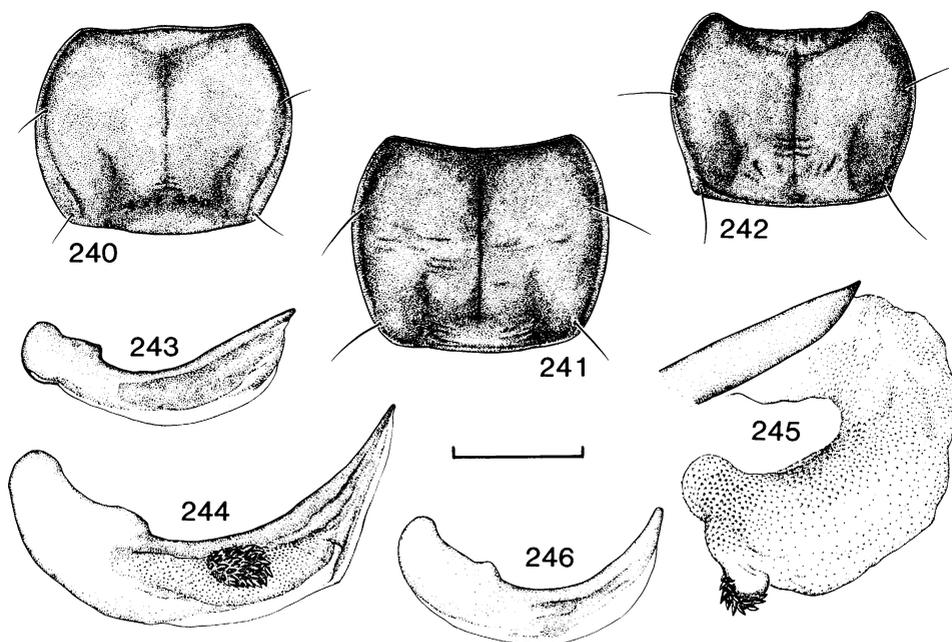
DESCRIPTION OF ADULTS OF OUTGROUP TAXA

In order to validate names for taxa used in the cladistic analysis as outgroups for the *degallieri* species group, the following descrip-

tions are provided. These species are not included in the key to species of the *degallieri* group, and so the diagnoses are more detailed than for the above species, hopefully allowing new material to be diagnosed. Tentative phylogenetic relationships for these species are presented in the *degallieri* group cladistic analysis, but these species should be considered *incertae sedis*.

Platynus pygmaeus, new species (figs. 240, 243, 247, 251)

DIAGNOSIS: Small beetles, standardized body length 4.5–5.2 mm; eyes moderately convex; pronotum with obtuse-rounded hind angles, smooth laterobasal depressions with basally explanate lateral margins, and obsolete basal marginal bead (fig. 240); elytral striae weakly punctate basally; metacoxa bise-



Figs. 240–242. Pronota. **240.** *P. pygmaeus*. **241.** *P. ballorum*. **242.** *P. franiai*. Figs. 243–246. Male aedeagi. **243.** Median lobe, *P. pygmaeus*, dextroventral view. **244.** Median lobe, *P. ballorum*, dextroventral view. **245.** Everted internal sac, *P. ballorum*, dextroventral view. **246.** Median lobe, *P. franiai*, dextroventral view. Scale bar = 0.5 mm for figs. 243–246.

tose, inner seta absent; fourth metatarsomere with elongate outer lobe, over $2\times$ length of inner lobe.

DESCRIPTION: Frontal grooves broad, shallow, laterally delimiting weakly raised triangular tubercles; eyes large, moderately convex, ocular ratio 1.73 to 1.77. Pronotum with lateral margins straight before obtuse-rounded hind angles (fig. 240); laterobasal depressions smooth, deepest part a linear extension of lateral marginal depressions; basal setae just laterad convex tubercle set in explanate basolateral margin; median base smooth; basal marginal bead absent, margin indistinctly raised behind laterobasal depressions; median longitudinal impression fine; anterior transverse depression broad, very shallow; anterior marginal bead broad, continuous; front angles tightly rounded, little protruding; lateral marginal depressions very narrow before lateral setae, expanded behind setae to explanate basolateral margins. Elytra broadly ovoid; elytral striae 1 to 5 and 8 shallow but continuous, finely punctate in basal half, stria 6 and 7 very shallow basally, intermittently

effaced; elytral intervals nearly flat except for upraised sutural intervals; basal groove evenly and moderately recurved to rounded humerus; 15 lateral elytral setae in eighth stria. Metepisternum moderately elongate, lateral margin length 1.35–1.45 anterior margin; flight wings macropterous. Profemur with several apicodorsal setae, 2 posteroventral setae, and 1 posteroapical seta. Mesofemur with 2 anteroventral setae, and about 7 dorsoapical setae. Metacoxa bisetose, inner seta absent; metafemur with 2 anteroventral setae. Fourth protarsomere and mesotarsomere lobate, anterior lobe length about $2\times$ posterior lobe. Basal metatarsomere with well-developed outer and inner dorsal sulci, the median area subcarinate; 4th metatarsomere with elongate outer or anterior lobe, more than $2\times$ length of inner lobe. Tarsomere 5 with very short ventral setae, barely visible at high magnification ($\times 125$).

Head with shallow isodiametric microsculpture; pronotal disc with fine, shallow transverse mesh microsculpture, sculpticells partially obscured by surface reflection; pro-

notal laterobasal depressions and median base with transverse mesh microsculpture, the sculpticells parallel with outer margin; elytra with fine transverse mesh microsculpture. Head capsule rufous, labrum and mandibles rufotestaceous, palps and antennae testaceous; pronotum rufous, margins hardly paler, slightly more flavous; elytra shiny, rufobrunneous, with well-developed bluish to purplish metallic reflection; ventral body surface rufobrunneous, pronotal and elytral epipleura paler, rufoflavous, legs testaceous.

Standardized body length 4.5–5.2 mm.

MALE GENITALIA: Median aedeagal lobe straight apically with bluntly rounded apex (fig. 243). Aedeagal internal sac with fine microtrichia, without spines.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 10–15 setae (fig. 247). Apical gonocoxite with 2 lateral and 1 dorsal ensiform setae. Bursa copulatrix without visible luminal microtrichia. Spermatheca broadly arcuate, with broad duct, isodiametric microsculpture at base of apical reservoir; spermathecal gland duct inserting onto apical reservoir.

TYPE: Holotype ♂ (UASM, deposited in NMNH): MEX. Oaxaca. 6.5/ mi. s. Valle Nacional 2040'/ VIII. 13-14. 65// George E. Ball/ D. R. Whitehead/ collectors.

PARATYPES: MÉXICO. – **Chiapas:** Ocozucua, 11.6 mi N, 3200 ft, black light, 10-13-VI-1966, Ball & Whitehead, (UASM, 1♂). **Oaxaca:** Valle Nacional, 6.5 km S, 2040 ft, 13-14-VIII-1965, Ball & Whitehead (UASM, 1♂); Suchixtepec [= Suchiltepec], 25.2 mi S, Rte. 175, 8-9-VII-1972, Meyer & Ball (UASM, 1♀).

ETYMOLOGY: Based on the Latin *pygmaeus*, meaning dwarf, referring to the small body size of this species.

DISTRIBUTIONAL RANGE: Spanning the lowlands of the Isthmus of Tehuantepec, found in montane habitats in Oaxaca and Chiapas (fig. 251).

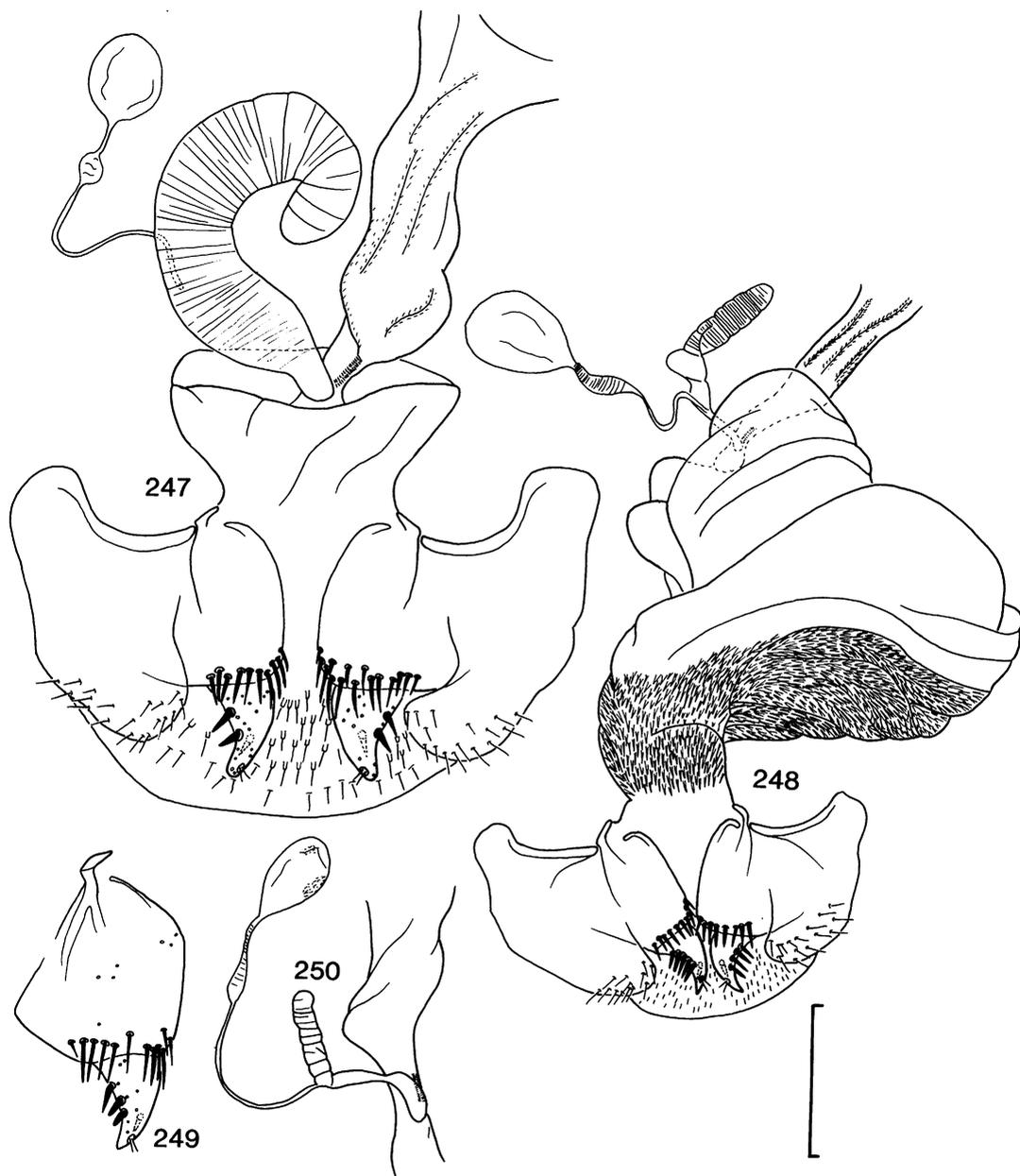
Platynus ballorum, new species
(figs. 241, 244, 245, 248, 251)

DIAGNOSIS: Elytral disc flat, humeri narrow and angulate; eyes small, little convex; pronotum with sides straight to slightly convex before rounded hind angles, laterobasal de-

pressions smooth, with convex tubercle (fig. 241); flight wings vestigial; metacoxa trisetose, inner seta present; metafemur with 2–3 apicodorsal setae.

DESCRIPTION: Frontal grooves broad and shallow; eyes little convex, ocular ratio 1.38 to 1.42. Pronotum quadrate, lateral margins straight to slightly convex before rounded hind angles (fig. 241); basal setae before hind angles; laterobasal depressions smooth, with broad tubercle; median base with faint transverse wrinkles; basal marginal bead continuous medially, well defined at inside of laterobasal depressions, obsolete at hind angles; median longitudinal impression fine, set in broad median depression of disc; anterior transverse depression obsolete; anterior marginal bead shallow, faintly traceable medially; front angles tightly rounded; lateral marginal depressions little reflexed marginally, narrow throughout length before laterobasal depressions. Elytra flat medially, ovoid, humeri narrow; elytral striae shallow but continuous, slightly wavering but not distinctly punctate; elytral intervals flat; basal groove recurved to angulate humerus; 16 lateral elytral setae in eighth stria. Metepisternum slightly elongate, lateral margin length 1.25–1.33 × anterior margin; flight wings vestigial. Profemur with 2 anterodorsal setae, 4–6 dorsal setae, 2 posteroventral setae, and 1 posteroapical seta. Mesofemur with 3 anteroventral setae and 12–18 dorsal setae, in 2 rows basally and 3 rows apically. Metacoxa trisetose, inner seta present; metafemur with 2 anteroventral setae, 2–4 apicodorsal setae. Basal metatarsomere with broad shallow outer dorsal sulcus and shallower inner dorsal sulcus, median area convex; fourth metatarsomere with outer and inner lobes of subequal length, outer lobe slightly broader ventrally. Tarsomere 5 with short ventral setae, setal length less than 1/6 tarsomere depth at setal insertion.

Head with shallow isodiametric microsculpture; pronotal disc with transverse mesh microsculpture; pronotal laterobasal depressions with transverse mesh microsculpture, sculpticells parallel to outer margin; median base and median apex with well-developed isodiametric to transversely stretched isodiametric microsculpture; elytra with fine transverse mesh microsculpture, sculpticells



Figs. 247–250. Female reproductive tract structures. 247. Female reproductive tract, *P. pygmaeus*, ventral view. 248. Female reproductive tract structures, *P. ballorum*, ventral view. 249. Right gonocoxa, *P. franiai*, ventral view. 250. Common oviduct and spermatheca, *P. franiai*, ventral view. Scale bar = 0.2 mm for figs. 247, 248; scale bar = 0.5 mm for figs. 249, 250.

partially obscured by shiny surface. Head capsule rufopiceous, labrum and mandibles rufobrunneous, palps rufotestaceous, antennae slightly darker, basally flavobrunneous,

antennomeres 4–11 brunneous; pronotal disc rufopiceous, margins broadly paler, rufobrunneous; elytral disc rufopiceous, base rufobrunneous; ventral body surface rufopi-

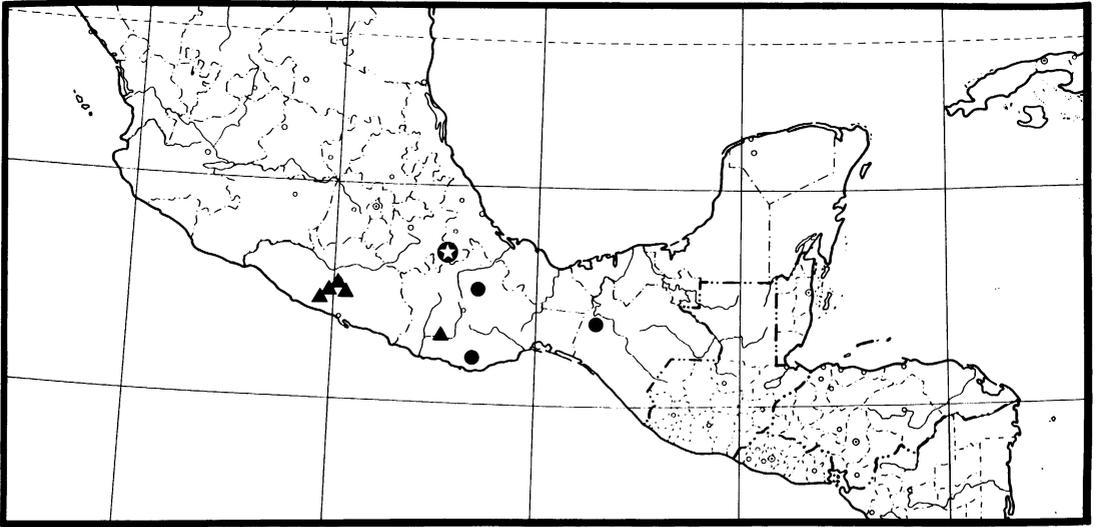


Fig. 251. Distributional records of *P. pygmaeus* (●), *P. ballorum* (◐), *P. franiai* (▲).

ceous, pronotal and elytral epipleura and legs slightly paler, rufobrunneous.

Standardized body length 6.9–7.5 mm.

MALE GENITALIA: Median aedeagal lobe evenly curved, with short, acuminate apex (fig. 244). Aedeagal internal sac with apical sclerotized rasp ventrad gonopore (figs. 244, 245).

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of 8–10 setae (fig. 248). Apical gonocoxite with 4–5 lateral and 1 dorsal ensiform setae. Bursa copulatrix with long silky lumenal microtrichia apically near vagina. Spermathecal duct narrow, joining apical reservoir at an angle.

TYPE: Holotype ♂ (UASM, deposited in NMNH): MEX. Puebla 37.5/ km. s.e. Azumbilla/ 2500 m., wet oak-/ pine for. 78B-37/ Dec. 25, 1978// MEXICAN EXP./ 1978-79/ G. E. & K. E. Ball/ collectors. Allotype ♀: same data and deposition.

PARATYPES: MEXICO. – **Puebla:** Azumbilla, 37.5 km SE, 2500 m, wet oak-pine forest, 25-XII-1978, G. & K. Ball (UASM, 3♂, 1♀), 50.8 km SE, 2480 m, oak-pine forest, logs, ground, 24-25-XII-1978, G. & K. Ball (UASM, 14♂, 8♀), in bromeliads, 24-XII-1978, G. & K. Ball (UASM, 5♂, 2♀).

ETYMOLOGY: This species is named to honor George and Kay Ball, for their splendid efforts in the support of coleopterology and coleopterists.

DISTRIBUTIONAL RANGE: Known from the Sierra de Zongolica to the southeast of Azumbilla, Puebla, along the top of the Atlantic Versant of the Transvolcanic Sierra (fig. 251).

Platynus franiai, new species
(figs. 242, 246, 249, 250, 251)

DIAGNOSIS: Eyes small but convexly protruding from sides of head, distinct linear depression between eye and vertex; pronotum with slightly sinuate lateral margins before obtuse hind angles, laterobasal depressions smooth, with broad tubercle (fig. 242); elytra ovoid, humeri broad and angulate; elytral intervals flat, brightly iridescent from dense transverse line microsculpture; metepisternum quadrate, flight wings vestigial; metacoxa trisetose; fourth metatarsomere with subequal outer and inner lobes.

DESCRIPTION: Frontal grooves broad, with longitudinal wrinkles; eyes small in diameter, but bulging, ocular ratio 1.42 to 1.53, linear depression running from inner anterior margin to eye inside eye to gena below posterior supraorbital seta. Pronotum with slightly sinuate lateral margins before obtuse hind angles (fig. 242); laterobasal depressions smooth with broad convex tubercle medially; median base with longitudinal wrinkles; basal marginal bead continuous though faint medially, well defined behind laterobasal depressions to

basal setae; median longitudinal impression fine throughout, traversed by fine wrinkles basally; anterior transverse depression shallow, traceable to front margin inside front angles; anterior marginal bead continuous medially; front angles tightly rounded to angulate; lateral marginal depressions narrow throughout length. Elytra broadly ovoid with broad angulate humeri; elytral striae shallow, broad, continuous, slightly wavering but not punctate; elytral intervals flat; basal groove weakly recurved to angulate humerus; 16 lateral elytral setae in eighth stria. Metepisternum quadrate, lateral and anterior margins subequal; flight wings vestigial. Profemur with 1 anterodorsal seta, a series of 3–4 dorsoapical setae, 2 posteroventral setae, and 1 posteroapical seta. Mesofemur with 2 anteroventral setae, a series of about 12 dorsoapical setae, in single row basally and 2 rows apically. Metacoxa trisetose, inner seta present; metafemur with 2 anteroventral setae. Basal metatarsomere with shallow, broad outer and inner dorsal sulci, the median area convex; fourth metatarsomere with subequal outer and inner lobes. Tarsomere 5 with very short ventral setae, visible only at high magnification ($\times 125$).

Head with well-developed, coriaceous isodiametric microsculpture; pronotal disc with well-developed, bricklike transverse mesh microsculpture; pronotal laterobasal depressions with swirling transverse mesh microsculpture; median base and median apex with transversely and longitudinally stretched isodiametric mesh microsculpture; elytra with dense microsculpture of transverse lines loosely joined in a mesh. Head capsule, pronotum, and elytra rufopiceous; labrum and mandibles rufobrunneous; palps and antennomeres 1–3 testaceous, antennomeres 4–11 with smoky cast; pronotal lateral and basal margins slightly paler, rufobrunneous; elytra shiny with vivid bluish to golden metallic reflection; ventral body surface rufopiceous, pronotal epipleura rufobrunneous, elytral epipleura and legs rufotestaceous.

Standardized body length 5.6–6.6 mm.

MALE GENITALIA: Median aedeagal lobe strongly curved to bluntly rounded apex (fig. 246). Aedeagal internal sac with fine microtrichia, without spines.

FEMALE REPRODUCTIVE TRACT: Basal gonocoxite with apical fringe of about 12 setae (fig. 249). Apical gonocoxite with 3 lateral and 1 dorsal ensiform setae. Bursa copulatrix with long silky luminal microtrichia. Spermatheca with narrow duct, duct meeting apical reservoir at an angle (fig. 250).

TYPE: Holotype δ (UASM, deposited in NMNH); MEX. Guer. 35.8 km nw/ jct. Rte 195, rd to/ Filo de Caballo/ cloud for.; oak-pine/ leaf litter; 2420 m./ Aug. 9, 1983 83-71// MEXICO EXPED. 1983/ H. E. Frania &/ R. J. Jaagumagi/ collectors. Allotype ♀ : same data and deposition.

PARATYPES: MEXICO. – **Guerrero:** Atoyac de Alvarez, 73.8 km NE, 2340 m, cloud forest, stream, arroyo, litter, 12-VIII-1983, Frania & Jaagumagi (UASM, 1 δ), 74.5 km NE, 2350 m, cloud forest, leaf litter, 11-12-VIII-1983, Frania & Jaagumagi (UASM, 8 δ , 7 ♀), burnt pine-oak-alder, under logs, 12-VIII-1983, Frania & Jaagumagi (UASM, 1 ♀); Filo de Caballo, 11.4 km SW, rd. to Puerto de Gallo, 2420 m, cloud forest, oak-pine leaf litter, 9-VIII-1983, Frania & Jaagumagi (UASM, 2 δ , 1 ♀); Filo de Caballo rd., 34.8 km NW jct. Rte. 195, 2390 m, cloud forest, litter, under logs, 8-VIII-1983, Frania & Jaagumagi (UASM, 2 δ , 4 ♀), 35.8 km NW jct. Rte. 195, 2420 m, cloud forest, oak-pine leaf litter, 9-VIII-1983, Frania & Jaagumagi (UASM, 2 δ , 7 ♀); Omiltemi, 7300 ft, 14-15-VII-1966, Ball & Whitehead (UASM, 1 δ , 3 ♀). **Oaxaca:** Juchatengo, 22.2 mi S, 5800 ft, 21-22-VII-1966, Ball & Whitehead (UASM, 1 ♀).

ETYMOLOGY: This species is named to honor Henry Frania, who collected so much of the material upon which this study is based.

DISTRIBUTIONAL RANGE: Known from the Sierra Madre del Sur, from Guerrero east to southern Oaxaca (fig. 251).

CLADISTIC ANALYSIS

The monophyly of the *degallieri* species group was previously assessed for the Antillean species of the group (Liebherr, 1987), based on the apomorphies of unconstricted

neck, relatively small body size compared to other *Platynus*, and a male aedeagal sac with elongated spines. Perrault (1991) diagnosed his genus *Glyptolenopsis*, comprising *P. de-*

gallieri and *P. aeneipennis*, by characters of the metatarsi, pronotum, eyes, and spermatheca, but did not assess whether the diagnostic character states were primitive or derived. In this study, cladistic analysis of the *degallieri* group and cladistically associated outgroups was used to: 1) more clearly establish the monophyly of the group, and 2) establish the closest outgroups. A subsidiary result of the cladistic analysis was a preliminary test of the utility of dividing the Neotropical *Platynus* in the broad sense of Whitehead (1973) into a larger number of genera, as proposed by Moret (1989, 1990) and Perrault (1991).

TAXA

There are 36 described species assignable to the *degallieri* species group. Eleven of these species were previously described, and 25 are described herein. Outgroups to be included in the analysis were chosen using several criteria. Firstly, several species were included that were extremely similar in external morphology to species of the ingroup—*P. pygmaeus*, n. sp.; *P. ballorum*, n. sp.; *P. franiai*, n. sp. These species, in fact, had been initially examined as if they were to be assigned ingroup status, but several character-state differences suggested that they were not cladistic members of the *degallieri* group. Secondly, *P. nugax* (Bates) and *P. concisus* (Bates) were included based on their small body size. As with the first three species, several character-state differences placed them cladistically outside the *degallieri* group. Several more distantly related species of Mexican *Platynus*—*P. lugens* (Dejean), *P. lyratus* (Chaudoir), and *P. moestus* (Dejean)—were also included. Three type species of generic-level names associated with *Platynus* were also included, allowing preliminary assessment of the cladistic relationships of taxonomic units derived by the recent dismemberment of the genus *Platynus* in the broad sense (Moret, 1989; 1990; 1991). These included *Platynus assimilis* (Paykull) of Europe, type species of *Platynus* Bonelli; *Platynus memnonius* (Dejean) of the Lesser Antilles, type species of *Dyscolus* Dejean; and *Platynus acuminatus* (Chevrolat) of México, type species of *Stenocnemion* Moret [= *Stenocnemus* Chaudoir]. *Dyscolus* and *Stenocnemion* are considered valid genera distinct from *Platynus* by Moret

(1989, 1991), and their inclusion was used to test their validity given cladistic diagnoses of genera in the Neotropical *Platyni*.

Two species were included as secondary outgroups of the *degallieri* group plus other species of *Platynus*. These included *Agonum marginatum* (L.) of Europe, type species of *Agonum* Bonelli, and *Anchomenus dorsalis* (Pontoppidan) of Europe, type species of *Anchomenus* Bonelli. These were assumed the most distantly related taxa in the analysis relative to the *degallieri* group.

CHARACTERS

Forty-four anatomical characters were discovered to vary within the *degallieri* ingroup; 23 external morphological characters, 17 from the male aedeagus, and 4 from the female reproductive tract (appendix 1). All characters were unit-coded. Characters 6 and 7, and 17 and 18 of the external character suite defined linear two-step transformation series. Characters 24–26 and 28–30 of the male aedeagal character suite defined a Y-shaped three-state transformation series, the three possible configurations being the primitive state (coded 0,0,0), one derived state (coded 1,1,0), and the alternate derived state (coded 1,0,1). The rationale for such coding is provided in the list of characters below. Characters 41–43 of the female reproductive tract character suite define a linear two-step transformation series describing presence or absence of a dorsal bursal lobe, and its possible specialization. All characters initially used to discriminate among ingroup taxa were also scored for the outgroup taxa.

An additional 15 unit characters (characters 45–59), several of which were joined into 2-step transformation series, were used to discriminate within the various outgroup taxa.

The 44 characters found to vary among the ingroup taxa are the following.

EXTERNAL CHARACTERS

Head:

1. Eyes moderately convex, large, maximum ocular ratio < 1.80 in all individuals (0; fig. 3); eyes very convex, larger in diameter, maximum ocular ratio > 1.80 in at least some individuals (1; fig. 2).
2. Eyes moderately convex, large, minimum ocular ratio > 1.55 in at least some

individuals (0); eyes reduced in size, relatively flat, ocular ratio < 1.55 in all individuals (1; fig. 4).

3. Frons moderately wide between eyes (0; figs. 2, 3); frons and head widened, head robust (1; fig. 4).

Prothorax:

4. Pronotal hind angle evident, basolateral margin convex or sinuate (0; figs. 37, 38); pronotal hind angle obsolete, margin rounded (1; fig. 36).
5. Pronotal hind angle evident, lateral margin convex (0; fig. 38); pronotal hind angle evident, lateral margin sinuate (1; fig. 37).

[Note: Characters 4 and 5 define a V-shaped transformation series with the primitive state an evident hind angle with convex basolateral margins. A very rounded basolateral margin and strong sinuation of the basolateral margin are considered derivations of the primitive state.]

6. Pronotal laterobasal depression smooth to weakly rugose, but without punctures surrounded by smooth cuticle (0; figs. 61, 65); laterobasal depression distinctly punctate (1; figs. 49–54).
7. Pronotal laterobasal depression faintly punctate (0; fig. 53); laterobasal depression strongly punctate (1; fig. 49).
8. Pronotal median base smooth to slightly rugose or wrinkled (0; figs. 42, 56, 64); median base strongly punctate (1; figs. 49, 52).
9. Pronotal basal bead continuous medially (0; figs. 64–66); basal bead discontinuous, absent medially (1; fig. 68).
10. Pronotal apical bead continuous medially (0; figs. 43, 44); apical bead reduced, absent medially (1; fig. 48).
11. Pronotal apical transverse impression moderately developed (0; fig. 42); transverse impression deep, disc anterad impression depressed (1; figs. 43, 44).
12. Lateral pronotal margin moderately explanate at lateral seta (0; fig. 73); broadly explanate to front angles (1; fig. 70).

Elytra:

13. Elytral intervals flat to slightly convex (0); intervals strongly convex, rounded (1).

14. Elytral striae impunctate, at most slightly wavering due to microsculpture (0); striae at least weakly punctate (1).
15. Elytral basal groove weakly to strongly angulate at humerus (0; figs. 75–79); basal groove smoothly rounded at humerus (1; figs. 80, 81).

Pterothorax:

16. Flight apparatus, including flight wings and metepisternum, fully developed (0); brachyptery variously developed, either polymorphic or fully (1).

Legs:

17. Metafemur glabrous apically (0; figs. 18, 19); metafemur with 1 or more setae on dorsoapical surface (1; fig. 20).
18. Ventral setae on fifth metatarsomere extremely short, barely visible, to short and visible (0; fig. 27); ventral setae longer, subequal to depth of tarsomere at setal insertion, or longer (1; fig. 28).
19. Ventral setae on fifth metatarsomere subequal to depth of tarsomere at setal insertion (0); setae longer than tarsomere depth (1).

Microsculpture:

20. Elytra with isodiametric to open transverse mesh microsculpture (0; figs. 29–32); microsculpture much more transverse, of fine parallel lines loosely joined into a mesh, elytra more iridescent (1; figs. 33, 34).

Coloration:

21. Elytra piceous, antennae and legs more or less concolorous (0); elytra piceous, antennae and legs much paler (1).
22. Forebody as melanized as elytra (0); forebody paler than elytra (1).

Size:

23. Standardized body length (fig. 35) moderate to larger, at least some individuals > 6.7 mm length (0); body size smaller, length < 6.7 mm in all individuals (1).

Male Terminalia: [Note: The positions of sclerotized structures on the aedeagal internal sac are standardized relative to the location of the gonopore, with the aedeagus assumed everted. In the everted state of this definition,

the aedeagus is rotated 90° counterclockwise (viewed from the posterior of the specimen) from the position when at rest within the abdominal apex, and the aedeagal tip is assumed to be directed caudally.]

24. Aedeagal internal sac membranous apically, ventrad the gonopore (0); internal sac with an apical sclerotized structure ventrad the gonopore (1).
25. Apicoventral sclerotization other than a rasp (0); apicoventral sclerotization a sclerotized rasp (1; fig. 142).
26. Apicoventral sclerotization other than a spine (0); apicoventral sclerotization a sclerotized spine (1; figs. 144, 192, 208).

[Note: The transformation series for characters 24–26 group taxa with two types of sclerotized structures at the apicoventral position of the aedeagal internal sac. It is felt that the tendency for sclerotization to occur at this position should be considered a synapomorphy (character 24). Beyond the general derivation of sclerotization, the specific type of sclerotized structure present at the position offers a second level of homology. In this case, taxa possessing apicoventral spines are grouped together based on character 26, and the taxon possessing an apicoventral rasp, i.e., *P. ovatulus*, may group with *P. barbarellus* based on character 25, although the position of the rasp in the latter taxon is currently unknown because no specimen has had the aedeagal sac everted. Coding the specific type of sclerotized structure as independent characters was consistent with incomplete knowledge of the developmental processes leading to these structures. One could hypothesize that a spine is the product of a rasp composed of a number of scales, in which a single scale developed at the expense of the adjacent scales. This scenario would suggest a linear transformation series from membrane to scale to spine. However, as such a scenario is as yet insupportable, the coding is unordered, recognizing mutually exclusive specializations of rasp versus spine.]

27. Aedeagal internal sac membranous on left side at apex (0); internal sac with sclerotized spine on left side at apex (1; figs. 136, 137, 211, 218).
28. Aedeagal internal sac membranous on right side at apex (0); internal sac with

sclerotized structure on right side at apex (1).

29. Apical structure on right side of sac other than a sclerotized rasp (0); apical structure on right side of sac a sclerotized rasp (figs. 90, 186).
30. Apical structure on right side of sac other than a sclerotized spine (0); apical structure on right side of sac a sclerotized spine (figs. 136, 137, 190, 211, 218).

[Note: As in characters 24–26, the triplet of characters 28–30 defines first a tendency for sclerotization to occur on the apical right sac of the aedeagal sac, and then more specifically whether the sclerotization is a spine or a rasp. As in the above case, the different developmental processes leading to rasp or spine formation remain unknown, leading to the unordered specializations of rasp versus spine.]

31. Aedeagal internal sac membranous medially on left side (0); internal sac with sclerotized spine medially on left side (1; figs. 144, 149, 167, 190).
32. Aedeagal internal sac membranous medially on right side (0); internal sac with sclerotized spine medially on right side (1; figs. 144, 149, 162).
33. Aedeagal internal sac membranous basally on ventral side (0); internal sac with sclerotized rasp basally on ventral side (1; figs. 137, 169).
34. Aedeagal internal sac with gonopore opening apical, sac straight when everted (0; figs. 169, 192, 208); aedeagal internal sac with gonopore opening situated ventrally, gonopore curved when everted (1; figs. 137, 140).
35. Aedeagal internal sac membrane with short microtrichia (0; figs. 87, 140, 190); internal sac membrane with long bushy microtrichia (figs. 192, 211).
36. Aedeagal internal sac of moderate length, less, when everted, than $1.25 \times$ length of median lobe from parameral articulation to apex (0; figs. 87, 104, 115); internal sac elongate, more than $1.25 \times$ length of median lobe measured as above (figs. 90, 91, 110, 190).
37. Aedeagal internal sac membranous or with short or long microtrichia ventrad gonopore (0); internal sac with a brush

of long spikelike macrotrichia ventrad gonopore (1; figs. 107, 110, 115).

38. Aedeagal internal sac membranous or with short or long microtrichia dorsad gonopore (0); internal sac with a brush of long spikelike macrotrichia dorsad gonopore (1; figs. 113, 115).
39. Aedeagal median lobe bluntly rounded to finely acuminate, evenly curved at tip (0); tip of median lobe sharply downcurved, hooklike (1; figs. 103, 104, 107).
40. Aedeagal median lobe bluntly rounded to finely acuminate, evenly curved at tip (0); median lobe apex blunt and slightly to strongly downcurved at apex (1; figs. 83, 87, 88, 90, 91).

Female Reproductive Tract:

41. Bursa copulatrix without a dorsal lobe at apex of vagina (0); dorsal lobe evident near apex of vagina (1; figs. 96, 98, 100, 118, 120, 123, 126, 129, 132).
42. Dorsal lobe of bursa unsclerotized (0; figs. 96, 98, 100); dorsal lobe more heavily sclerotized than surrounding membrane (1; figs. 118, 120, 121, 123, 126, 129, 132).
43. Sclerotized dorsal lobe of bursa broadly opening onto bursal lumen (0; figs. 129); dorsal lobe narrower, more constricted laterally, sometimes with sclerotized groove (1; figs. 118, 120, 123, 126, 132).
44. Lumen of bursa copulatrix appearing glabrous ($\times 125$), or with fine microtrichia in median ring (0); bursal lumen with heavy chitinated spines making part of median microtrichial ring (1).

The 15 characters used to define relationships among the outgroups but which did not vary within the *degallieri* group are the following.

45. Profemur without anteroventral setae (0); profemur with 1–3 anteroventral setae (1).
46. Profemur with 2 posteroventral setae (0); profemur with 3–7 ventral setae (1).
47. Mesofemur with only 2 anteroventral setae (0); mesofemur with more than 2, up to 7 anteroventral setae in at least some individuals (1).
48. Metafemur with only 2 anteroventral setae (0); metafemur with more than 2 an-

teroventral setae in some individuals, or 3 setae in all individuals (1).

49. Metacoxa bisetose, inner seta lacking (0); metacoxa trisetose, inner seta present (1).
50. Metatarsomere 4 with ventral setae in two linear series (0); metatarsomere 4 with ventral setae arranged in 2–3 rows or more on anterior lobe, and 1 or more rows on posterior lobe (1).
51. Metatarsomere 4 with ventral setae in 2–3 rows on anterior lobe and 1 row on posterior lobe (0); metatarsomere 4 with ventral setae on anterior and posterior lobes arranged in broad pads, setae not in rows (0).

[Note: Character 51 is a secondarily derived state of the derived state for character 50.]

52. Mesotarsomere 4 with anterior lobe short, ventral surface not strongly emarginate medially (0); mesotarsomere 4 with anterior lobe elongate, ventral surface emarginate medially (1).
53. Mesotarsomere 4 with posterior lobe short (0); mesotarsomere 4 with posterior lobe elongate, ventral surface medially emarginate (1).
54. Metatarsomere 4 not lobate, ventral surface at most weakly emarginate medially (0); metatarsomere lobate, anterior lobe longer than posterior lobe, ventral surface emarginate medially (1).
55. Metatarsomere 4 lobate, anterior lobe slightly longer than posterior lobe (0); metatarsomere 4 strongly lobate, anterior lobe $2\times$ as long as posterior lobe (1).

[Note: Character 55 is a secondarily derived state of the derived state for character 54.]

56. Head not at all constricted behind vertex, dorsum not depressed in lateral view (0); head constricted behind vertex forming a neck, the dorsum of head depressed in lateral view (1).
57. Body size larger, standardized body length of at least some individuals more than 8.6 mm (0); body size smaller, standardized body length less than 8.6 mm in all individuals (1).
58. Bursa copulatrix with reduced ring of microtrichia medially, microtrichia short and sparsely distributed (0); bursa with well-developed ring of microtrichia, the

microtrichia longer and densely distributed, often overlapping (1).

59. Microsculpture on elytral disc isodiametric (0); elytral microsculpture slightly transversely stretched to an elongate transverse mesh (1).

Two dummy characters were entered into the HENNIG86 input data matrix to constrain monophyly of the ingroup, and of the ingroup plus primary outgroups. These characters were each given a weight of 10, and their weights were subtracted from the calculated tree length to determine the consistency and retention indices of the constrained cladograms.

RESULTS

Cladistic Relationships: The cladistic data, with monophyly of the *degallieri* group and genus *Platynus* constrained, was analyzed using the five network building and bb* branch breaking options of HENNIG86 (Farris, 1988), resulting in eight equally parsimonious cladograms (length = 223 steps, consistency index = 0.26, retention index = 0.60). These eight cladograms were arrayed in two islands (Maddison, 1991), one of six cladograms and the other of two. The h, h*, and tread network building options resulted in finding the six cladogram island, whereas the m and m* options resulted in the other two cladograms. The strict consensus of the six cladograms in island 1 was determined using the nelsen option, and resulted in a cladogram one step longer than the six equally parsimonious cladograms (fig. 252; length = 224). The six cladograms result from alternative manners of resolving two trichotomies on the consensus cladogram. Within component 88, clades A, B, and C may be unresolved, clades A and B may be considered more closely related relative to C, or clades A and C may be more closely related relative to B. Secondly, within the outgroup taxa, either *P. memnonius* and *P. acuminatus* were placed as sister taxa, or *P. memnonius* and *P. lyratus* were placed as sisters (component 76 of fig. 252).

The second island of 2 trees contained two resolutions of the trichotomy within component 88; either clades A and C, or clades A and B were considered most closely related.

This island differed from the first island in representation of the relationships among the outgroups. In this island, the four taxa comprising component 82 (fig. 252) were resolved in the relationship (*lyratus* (*memnonius* (*acuminatus* - *pygmaeus*))).

Because the ambiguities within the *degallieri* ingroup involve only a basal trichotomy which is one of the most parsimonious representations of relationships in one island, use of the consensus does not result in loss of resolution or parsimony (Miyamoto, 1985). For subsequent zoogeographic analysis, the two resolutions of component 88 were used because of the limitation of the COMPONENT program whereby a fully dichotomous user cladogram must be entered.

Constraining the monophyly of the ingroup, as was done above, resulted in a somewhat less parsimonious hypothesis of relationships than a fully global parsimony analysis of all taxa. If taxa were analyzed globally without any constraints on monophyly, using the three network building starting points—h*, m, m*—54 equally parsimonious cladograms of length 221 steps were found. The starting points of the h and tread commands resulted in finding 171 cladograms of 222 step length. In the shortest cladograms, the *degallieri* group species were split into several clades, with other exemplar *Platynus* outgroup taxa considered sister groups to these clades. The very limited sampling of outgroup taxa, and the likely lack of homology among characters of the outgroup and ingroup taxa due to the use of these exemplars were judged sufficient reasons to dismiss this global analysis given the saving of only two steps in the analysis.

Character Evolution: The most striking aspect of character evolution in the *degallieri* group involves the ornamentation of the aedeagal internal sac. The external facies of the species varies comparatively little relative to the complex spination of the internal sac. Conversely, the female reproductive tract is relatively undifferentiated across the group, as indicated by 4 characters drawn from this character system versus 17 found in the male terminalia. If the number of character state changes in male characters (characters 24–40) and female character (characters 41–44) are compared (fig. 252), 52 character-state

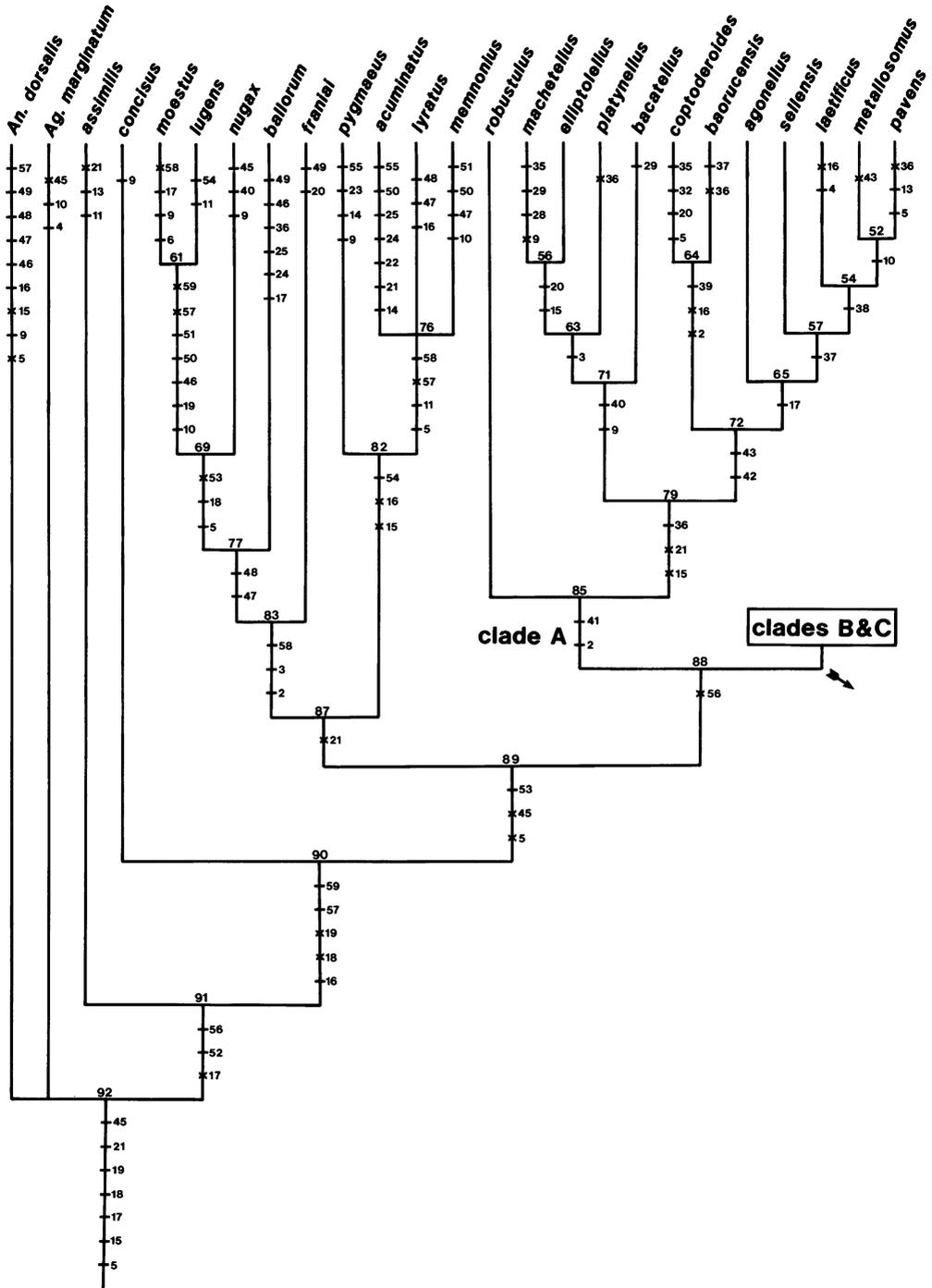


Fig. 252. Strict consensus cladogram of equally parsimonious cladograms in six cladogram island, for the 36 species of the *degallieri* group (length = 224 steps, c.i. = 0.26, r.i. = 0.60). The character state advances below node 92 do not count in total state changes, as these characters assumed to have state 1 in unincluded outgroup to these taxa. Hash marks indicate character state advances, x's indicate reversals.

stronger argument for the female choice hypothesis can be made. This argument establishes a cause and effect relationship between the derivation of a female dorsal bursal lobe and modifications of the male aedeagal median lobe apex. Clade A (fig. 252) is characterized by three synapomorphies, one being the occurrence of a dorsal bursal lobe (character 41). In its least specialized condition, this lobe is an unsclerotized pocketlike evagination of the dorsal bursal wall (figs. 96, 98). Its position implies that the apex of the male aedeagal median lobe would enter it during copulation, with the male's aedeagal internal sac everting to place the gonopore at the base of the spermathecal duct (figs. 107, 120). In the Antillean species of the *degallieri* group, this bursal lobe is sclerotized at its tip (character 42; figs. 118, 120, 123, 126, 129, 132). In addition, for five of the six Antillean species for which females are known, the dorsal bursal lobe is narrow basally, the sides subparallel (character 43). Based on the cladistic analysis, the bursal lobe specialization coded as characters 42 and 43 is basal to the evolution of the Antillean species, implying that the common ancestor of the Antillean clade possessed these apomorphies.

Four of the mainland species of Clade A—*P. bacatellus*, *P. platynellus*, *P. machetellus*, and *P. elliptolellus*—exhibit a synapomorphic aedeagal apex which is blunt and downcurved (figs. 83, 86, 87, 88, 90, 91). This synapomorphy (character 40) is nested within the synapomorphic possession of an unsclerotized bursal lobe (character 41, fig. 252).

Within the Antillean species, the male median lobe apex takes on configurations unique in the species group. Both *P. baorucensis* and *P. coptoderoides* have the apex of the median lobe very finely acuminate, and strongly downcurved in the shape of a small hook (character 39, figs. 104, 107). Moreover, *P. baorucensis* exhibits a median lobe apex that is strongly bilaterally constricted (fig. 108), an autapomorphy for the species not included in the ingroup cladistic analysis.

The more restricted specializations of the male aedeagal median lobe apex (characters 39 and 40) are preceded evolutionarily by specializations of the female bursa (characters 41, 42 and 43). If females possessing a bursal lobe could discriminate among males of variable median lobe apex, a strong selec-

tive pressure for modification of the median lobe would be present. Dorsal bursal lobes have evolved two other times in the *degallieri* group, represented as autapomorphies of *P. degallieri* and *P. dominicensis* (fig. 252). In neither case is the evolution of the dorsal lobe preceded by specialization of the aedeagal median lobe tip. In no case within the *degallieri* group has synapomorphic modification of the aedeagal median lobe apex occurred in the absence of the prior origin of a dorsal bursal lobe. An explanation utilizing more randomly acting pleiotropy as the responsible agent for evolution of these structures cannot account for this pattern of female specialization preceding male specialization, especially for the *degallieri* group wherein male terminalia exhibit substantially more variation.

The external characters exhibit more homoplasy than the male terminalic or female reproductive tract characters. The 23 external characters change state an average of 3.4 times per character within the *degallieri* group. Nonetheless, within the external character suite there are some characters that uniquely define a single clade. The three species *P. degallieri*, *P. aeneipennis*, and *P. margaritulus* can all be characterized by having strongly punctate pronotal laterobasal depressions (character 7). But, having a pronotum with moderately punctate depressions is not cladistically informative, based on that degree of punctuation (character 6) evolving or reversing six times on the cladogram.

Leg setation is cladistically informative within two of the four clades in the group. Five of the seven Antillean species possess metafemora with apical setae (character 17). This character state occurs in other species groups of Neotropical *Platynus*, and may prove useful for defining monophyletic groups. The state of longer ventral setae on tarsomere 5 defines clade B (character 18, fig. 252) and is also an autapomorphy of *P. decorellus*. The further development of these setae so that they are longer than the depth of tarsomere 5 (character 19) uniquely defines the triplet of *P. ovatulus*, *P. rotundatulus*, and *P. crypticulus*. In general, leg setation has been an underutilized character suite in Platynini, and these results suggest it should be examined more thoroughly.

HENNIG86 allows for the occurrence of

missing data in the analysis. In this data set, missing data are due to lack of both sexes in four species; males are unknown for *P. imitativus*, and females are unknown for *P. angustulus*, *P. purpurellus*, and *P. laetificus*. In addition, the very limited number of specimens for several species precluded eversion of the male aedeagal internal sac, requiring several characters relative to that structure to be coded as missing. The cladogram provides hypotheses regarding such missing data, allowing prediction of what character states will be found when the missing sex, or larger numbers of specimens are obtained.

For *P. imitativus*, the cladogram predicts that the male will possess an apical sclerotized rasp to the right of the gonopore (characters 28, 29). The internal sac may be elongate (character 36). But, that character has not been examined for *P. stenophthalmus*—the sister species of *P. imitativus*—due to limited specimens, so that prediction is less supportable.

The position of the saccal sclerotization of *P. barbarellus* was not coded due to limited specimens. There are two positions for such saccal rasps, apically on the sac ventrad the gonopore (characters 24, 25), and on the right side of the gonopore (characters 28, 29). The unevverted specimen did not allow choosing between these alternatives, so both possibilities were coded as missing data. Based on the cladistic hypothesis, I predict that the rasp on the sac of *P. barbarellus* is located to the right side of the gonopore, as characters 28 and 29 change state basal to the species on the cladogram.

The internal sac length (character 36) predicted by the cladistic hypothesis can be determined for the other five species for which this character is missing (appendix 1). *P. barbarellus*, *P. agonellus*, and *P. laetificus* are predicted to possess an elongate internal sac, whereas *P. flavomarginatus* and *P. purpurellus* are predicted to possess a shorter sac (fig. 252).

The position of a saccal rasp was also not determined prior to the analysis for *P. robustulus*. As with *P. barbarellus*, characters 24 and 25, and 28 and 29 were coded as missing, with the other characters determining placement of this species. In this case, the cladistic relationships determined by other characters do not permit a definitive predic-

tion regarding whether the saccal rasp is ventrad (character 24) or to the right (character 28) of the gonopore, as *P. robustulus* is placed cladistically basal to any other taxa possessing the derived state of either of these characters. A slight preference for predicting that the saccal rasp is to the right of the gonopore may be made, based on parallel occurrences of this derivation in *P. bacatellus* and *P. machetellus*, but this preference cannot be based on synapomorphic homology (Patterson, 1982).

Explicit predictions of the female reproductive tract configuration may be made for the four species lacking females. *Platynus bacatellus* and *P. laetificus* females should have a dorsal bursal lobe (character 41). The lobe in *P. laetificus* should be sclerotized (character 42), and based on the topology of the consensus cladogram, it should also be narrowed basally (character 43). If it is broad basally, as in *P. metallosomus*, the topology of the consensus cladogram would be changed, leaving the triplet of *P. laetificus*, *P. metallosomus*, and *P. pavens* unresolved.

CLASSIFICATORY CONSEQUENCES

The *degallieri* group is placed cladistically within what Whitehead (1973) considered the genus *Platynus*. The type species of *Platynus*, *P. assimilis*, is cladistically basal to all other potential congeners. The dismemberment of *Platynus* into a number of smaller genera, as pursued by Moret (1989, 1990, 1991) and Perrault (1991) reduces the concept of *Platynus* to the close relatives of *P. assimilis*. Species in this analysis removed to other genera include: 1) *degallieri* removed to *Glyptolenopsis*, 2) *acuminatus* removed to *Stenocnemion*, and 3) *memnonius* removed to *Dyscolus*.

Specific results of this analysis point to serious problems with such a classificatory strategy. For example, Moret (1989) diagnosed *Dyscolus* based on a variety of variable traits, and the following four more constant traits:

1. Abdomen with 2 apical setae in the male, 4 in the female.
2. Fourth metatarsomere with numerous ventral setae in a confused arrangement, the setae forming setal pads (Moret, 1989: fig. 8).
3. Fourth metatarsomere with apical dor-

solateral seta present, apicolateral and apicoventrolateral setae lost in the confused mass of ventral setae.

4. Bursa copulatrix with a medial ring of dense luminal microtrichia (Moret, 1989: fig. 15).

The first of these is a symplesiomorphy of the subtribe Platyni. The second and third criteria involve the development of broader, more setose tarsi, possibly providing better traction on arboreal surfaces. The fourth character was considered an apomorphy for *Dyscolus* by Moret, who considered such a ring absent from *Platynus assimilis*. However, luminal microtrichia appear to be present throughout platynine taxa; only their development varies. In *Platynus assimilis*, bursal microtrichia are present, but they are short. In *Agonum marginatum* they are longer, but are restricted to the region surrounding the entrance of the common oviduct into the bursa copulatrix. This analysis agrees with Moret's in considering a more setose bursal lumen as the derived state.

In this data set, three taxa possess the tarsal configuration that diagnoses *Dyscolus*: *Platynus lugens*, *P. moestus*, and *P. memnonius*. *P. memnonius*, the type species of *Dyscolus*, is widely separated from the other two in this analysis. Moreover, *P. moestus* lacks the dense ring of luminal microtrichia Moret also uses to diagnose *Dyscolus*, having the bursal walls almost glabrous internally. Clearly, his diagnosis breaks down in this exemplar data set. A more comprehensive set of taxa is required to analyze the pattern of evolution of these characters.

Whereas character state reversal or parallel derivation is to be expected, especially in a radiation of as many species as the Neotropical Platyni, when such reversals effect taxonomic diagnoses, taxonomic instability will follow. This example supports the argument that broad generic concepts should be used

in the Neotropical Platyni until a comprehensive analysis of the fauna can be done. Until then, informal names can be used to group species for revision, without generating future additional generic synonyms.

Beyond the problem of homoplasy destroying the utility of taxonomic diagnoses that are drawn too tightly, recognizing taxa such as *Stenocnemion*, *Dyscolus*, and *Glyptolenopsis* as generic entities distinct from *Platynus*, will necessitate the proposing of many other generic entities to accommodate the Neotropical Platyni. Based on the strict consensus summary of this analysis, new and different generic names for *Platynus* not currently associated with a more restrictive generic name would be required, that is if genera are to be cladistically defined. The alternative is the paraphyletic definition of genera, with a cladistically basal *Platynus* giving rise to any number of more "highly derived" genera.

Based on these objections to the dismemberment of *Platynus*, the *degallieri* group is considered a species group of *Platynus* in the broad sense. *Glyptolenopsis* may be considered the generic-level name associated with the species group, and could be used at the subgeneric level once a comprehensive analysis of *Platynus* is completed. However, such usage is unnecessary, and only the means to preserve unnecessary nomenclatural dross.

Compared to its closest outgroups, *degallieri* group monophyly is based on lack of a constricted neck (fig. 252, character 56, node 88). This state was coded primitive by outgroup analysis, but given widespread distribution of a constricted neck across *Platynus*, must be considered a secondary reduction here. Based on tarsal derivations (characters 52 and 53), the *degallieri* group is not closely related to *Agonum*, a group to which it bears superficial resemblance due to the neck configuration and, in some cases, metallic cuticle.

HABITAT AND DISPERSAL

The species of the *degallieri* group are found in a variety of situations within montane forests in México and Central America. This section summarizes the physical and biological attributes of habitats occupied by these

species, and examines the historical correlation of these attributes with flight wing configuration and dispersal ability of the adult beetles.

Habitat: Adults of the *degallieri* group have

most commonly been collected by searching in leaf litter in montane forests. Mexican species may be found in pine-oak forests, in damp or dry litter. Daytime searching by raking or sifting litter is the most common means of finding the adults, but where possible, nighttime searching is likely to be more effective in their discovery as they are more active out of the litter layer after dark. Often, beetles are found in moister microhabitats within the forest, where they live in alder (*Alnus*) litter along streams. In México, *Platynus bacatellus*, *P. caerulipennis*, *P. ovatulus*, and *P. rotundatulus* have been found in such situations. The widespread *P. rufulus* has been found in a variety of habitats, including palm forest, riparian forest, in litter near a sea beach, and in litter of tropical deciduous forest.

Several species appear to be restricted to higher elevation cloud forest formations. The Oaxacan species *P. platynellus* and *P. elliptolellus* have only been found in leaf litter in cloud forests above 2000 m elevation (table 1), as has the Chiapan *P. stenophthalmus*, which is known only from Mt. Tzontehuitz at 2800 m elevation.

Restriction to low elevation forest and swampy habitats is uncommon, but these are the only known habitats for *P. minusculus*, which is restricted to lowland wet forest habitats in the Los Tuxtlas volcanic range along the Gulf Coast of southern Veracruz.

Several species have been found in arboreal situations, most commonly bromeliaceous epiphytes. Bromeliad habitation has been recorded in collections from the Mexican states of Veracruz, Puebla, Oaxaca, and Chiapas. Relatively few collectors search this habitat, so the possibility of its more widespread utilization is considerable. Bromeliaphilic species include *P. marginissimus*, *P. decorellus*, *P. dominicensis*, and *P. imitativus* of the *degallieri* group, and *P. ballorum* of the outgroup taxa. For the first three species, 10, 9, and 6 series have been collected from bromeliads, accounting respectively for 14.5, 36, and 20% of the collections made.

Limited records of other arboreal activity are present in the study material; *Platynus mimulus* has been recorded running on logs at night. However, based on the records from bromeliads, and the propensity for attraction to nighttime light sources (to be discussed

TABLE 1
Habitat Characteristics and Flight Apparatus
Configuration of *degallieri* Group Species

Species name	Elev. range (m)	Elev. index ^a	Flight config. index ^b
<i>robustus</i>	1150	3	4
<i>bacatellus</i>	2390–2560	5	4
<i>platynellus</i>	2090–2540	5	4
<i>machetellus</i>	1798–2400	4	4
<i>elliptolellus</i>	2570–2880	5	4
<i>coptoderoides</i>	0–910	1	1
<i>baorucensis</i>	1250	3	1
<i>agonellus</i>	1500–2100	4	2
<i>sellensis</i>	1500–2100	4	3
<i>laetificus</i>	1425	3	1
<i>metallosomus</i>	910–2425	2	2
<i>pavens</i>	1500–2100	4	3
<i>brunnellus</i>	1100–1870	3	2
<i>caerulipennis</i>	1000–2540	3	2
<i>ovatulus</i>	500–2550	2	2
<i>rotundatulus</i>	1100–1950	3	3
<i>crypticulus</i>	850–1525	2	3
<i>minusculus</i>	0–60	1	1
<i>nitidulus</i>	1360–1550	3	1
<i>margaritulus</i>	1100–1250	3	1
<i>degallieri</i>	0–150	1	1
<i>aeneipennis</i>	0–1100	1	1
<i>rugulellus</i>	1380–1525	3	1
<i>barbarellus</i>	750–1825	2	1
<i>imitativus</i>	1200–1650	3	3
<i>stenophthalmus</i>	2840	5	3
<i>rufulus</i>	0–1350	1	1
<i>marginissimus</i>	30–1825	1	1
<i>decorellus</i>	640–2150	2	1
<i>woldai</i>	1050	3	1
<i>angustulus</i>	1000	3	1
<i>flavomarginatus</i>	700–1050	2	1
<i>dominicensis</i>	750–2164	2	1
<i>mimulus</i>	850–910	2	1
<i>nevermanni</i>	<500	1	1
<i>purpurellus</i>	<500	1	1

^a Elevation coded as minimum elevation of habitat (x): state 1, $x < 500$ m; state 2, $500 \leq x < 1000$ m; state 3, $1000 \leq x < 1500$ m; state 4, $1500 \leq x < 2000$ m; state 5, $x \geq 2000$ m.

^b Flight apparatus configuration coded as four states: state 1, metepisternum elongate and wings fully developed; state 2, metepisternum moderately reduced, lateral margin length 1.1–1.5 \times anterior margin, flight wings brachypterous; state 3, metepisternum moderately reduced, flight wings variable, brachypterous to stenopterous or vestigial; state 4, metepisternum quadrate and flight wings stenopterous or vestigial.

TABLE 2
Flight Apparatus Configuration and Collection Records in Flight for *degallieri* Group Species

Species name	Flight config. code ^a	No. coll. rec.	No. records at light	No. records flight trap	% records in flight
<i>robustus</i>	4	1	0	0	0
<i>bacatellus</i>	4	2	0	0	0
<i>platynellus</i>	4	3	0	0	0
<i>machetellus</i>	4	3	0	0	0
<i>elliptolellus</i>	4	2	0	0	0
<i>coptoderoides</i>	1	21	1	0	4.8
<i>baorucensis</i>	1	3	0	2	66.6
<i>agonellus</i>	2	2	0	0	0
<i>sellensis</i>	3	2	0	0	0
<i>laetificus</i>	1	1	0	0	0
<i>metallosumus</i>	2	8	0	0	0
<i>pavens</i>	3	1	0	0	0
<i>brunnellus</i>	2	5	0	0	0
<i>caerulipennis</i>	2	72	0	0	0
<i>ovatulus</i>	2	52	0	0	0
<i>rotundatulus</i>	3	10	0	0	0
<i>crypticulus</i>	3	10	2	0	20.0
<i>minusculus</i>	1	9	0	1	16.7
<i>nitidulus</i>	1	7	0	0	0
<i>margaritulus</i>	1	19	15	0	78.9
<i>degallieri</i>	1	115	52	1	46.1
<i>aeneipennis</i>	1	75	34	0	45.3
<i>rugulellus</i>	1	3	1	0	33.3
<i>barbarellus</i>	1	3	0	0	0
<i>imitativus</i>	3	5	0	0	0
<i>stenophthalmus</i>	3	2	0	0	0
<i>rufulus</i>	1	25	3	0	12.0
<i>marginissimus</i>	1	72	9	2	15.3
<i>decorellus</i>	1	25	4	0	16.0
<i>woldai</i>	1	27	27	0	100.0
<i>angustulus</i>	1	1	0	0	0
<i>flavomarginatus</i>	1	17	14	0	82.4
<i>dominicensis</i>	1	30	0	0	0
<i>mimulus</i>	1	2	0	0	0
<i>nevermanni</i>	1	4	0	0	0
<i>purpurellus</i>	1	1	0	0	0

^a Flight apparatus configuration coded as in table 1.

below), many more species are likely to be observed actively foraging and mating in arboreal situations at night.

Flight Activity: The *degallieri* group species exhibit a range of development of the metathoracic sclerites and wings. Flight wings may be fully developed (fig. 11), and variously reduced to brachypterous (fig. 12), stenopterous (fig. 13), or vestigial conditions. The metepisternum may be elongate, indicating the metathorax is fully developed with a full complement of internal apodemes for con-

nection of flight muscles, or it may be fore-shortened or quadrate, a condition associated with reduced internal apodemes and brachypterous to vestigial flight wings. The flight apparatus development was quantified using a four-step index (tables 1, 2).

The development of the flight apparatus is mirrored in the manner by which these beetles have been collected (table 2). Eleven species have been taken at light sources at night, with 10 of these comprising completely fully winged individuals. The single exception, *P.*

crypticulus, is a flight-wing polymorphic species. In this case, the specimens collected at black light are macropterous. Two other totally macropterous species, *P. baorucensis* and *P. minusculus*, have been collected in flight-intercept traps but not at light sources. Eight other macropterous species have been collected only by hand.

The manner of collection varies across the range of the *degallieri* group. Seven of the 12 species occurring in lower Central America—Costa Rica and Panamá—have been collected at light or in flight intercept traps, versus only 5 of 18 species collected at light or in flight traps in México and Guatemala. I believe this represents a collecting bias, due to the extensive light trap surveys of Henk Wolda in Panamá, and the extensive effort expended by George Ball, Don Whitehead, and colleagues to collect carabids in bromeliads and leaf litter in México and Guatemala. Equally extensive ground and litter sampling is needed in Costa Rica and Panamá to determine whether the *degallieri* group fauna is relatively rarer in such situations there. If it is not, such a sampling program will lead to discovery of undescribed species.

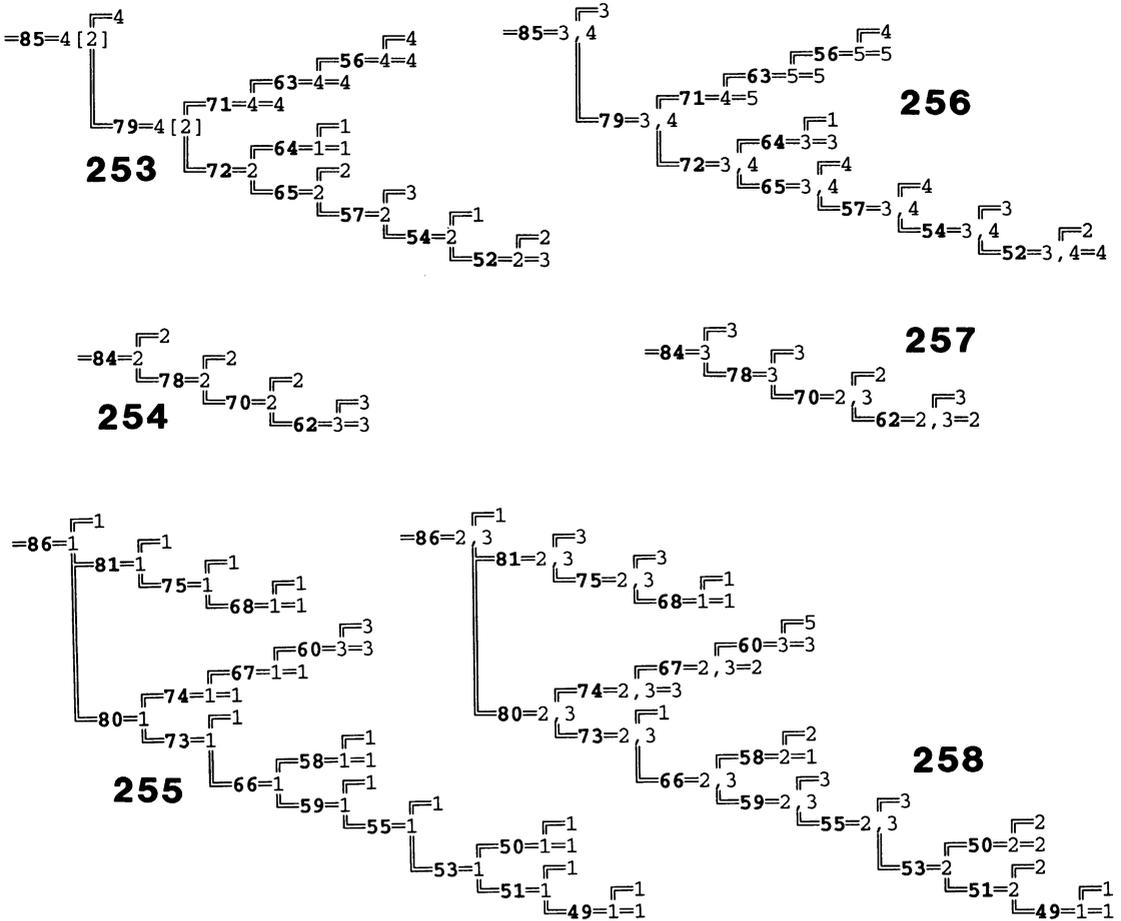
Elevational Range: Species in the *degallieri* group have been found from sea level up to 2900 m elevation. In general, however, species are found in intermediate elevation montane forests, from 1000–2500 m. The known span of elevations from which species have been collected varies widely among the species. Widespread species such as *P. caeruleipennis* and *P. aeneipennis* may have 1000 m to 1500 m elevational ranges (table 1). Other widespread species have more limited elevational spans, especially if the species occupies lowland habitats; e.g., *P. degallieri* in habitats below 150 m elevation. Geographically restricted species may have similarly restricted elevational limits; e.g., *P. rugulellus* found from 1380–1525 m elevation in Costa Rica. Conversely, geographically restricted species may be found at a variety of elevations; e.g., *P. metallosomus* from 910–2425 m elevation on Hispaniola, and *P. barbarellus* recorded from 750–1825 m elevation in Chiriquí Province, Panamá (table 1).

Among the Mexican species, there are a number of high altitude specialists. The species constituting the sister group of the An-

tillian species—*P. bacatellus*, *P. platynellus*, *P. machetellus*, and *P. elliptolellus*—are all restricted to habitats occurring above 1800 m (table 1). The only other high elevation endemic is *P. stenophthalmus*, whose sister species, *P. imitativus*, is restricted to lower elevations.

The elevational attributes of the species' habitats were quantified using the simplified coding of Liebherr and Hajek (1990), whereby the lowest elevation at which the species occurs determines its elevational class. Five elevational classes were used for the elevational ranges of the *degallieri* group species (table 1). This approach was used because *Platynus* species, in general, tend to be more diverse in mid-elevation montane situations. Relatively few species occur below 1000 m elevation, where platynines are ecologically replaced by members of the tribe Lebiini. Quantifying habitat stability for such cool-adapted organisms, so that lower elevations are more associated with extreme climatic conditions, assumes that organisms in topographically diverse habitats will be buffered from climatic changes through their ability to migrate vertically. Climatic warming will drive them further up mountains, and cooling periods will allow them to occupy broader expanses of lowland areas. Even though *degallieri* group species may occur through a wide range of elevations, the lowest elevation is the best indicator of the species' ability to persist during periods of climatic warming. If climatic warming exceeds the ability of a species to compensate through vertical upward movement, the species must evolve enhanced ability to survive previously marginal conditions, or become extinct. The highest elevations at which species occur are also determined by climatic conditions, and this limit moves up and down mountains as climates change unless the topography is limiting. In the case of the *degallieri* group, the distribution of present-day species suggests that extinction by elimination of montane refugia during warming periods has not been a major factor, as the species now occur in habitats below 2900 m in montane areas with substantially higher peaks.

Historical Correlation Analysis: Based on Southwood's (1977) ecological templet, brachyptery evolves in favorable, isolated hab-



Figs. 253–255. Cladograms of three clades of fig. 252 optimized using Farris optimization for flight wing configuration values of tables 1 and 2. **253.** Clade A. Bracketed values at nodes 85 and 79 assumed instead of unbracketed values determined by Farris optimization (see text). **254.** Clade B. **255.** Clade C. Figs. 256–258. Cladograms of three clades of fig. 252 optimized using Farris optimization for elevation index values of table 1. Ambiguity for optimization values indicated by two values at cladogram nodes. **256.** Clade A. **257.** Clade B. **258.** Clade C.

itats with reduced heterogeneity, both temporal and spatial. Where species can dispense with energetically costly dispersal activity, they can allocate greater energy input to reproduction, receiving a fitness advantage (Roff, 1990). Montane habitats have been considered more stable, and therefore more suitable for the evolution of brachyptery (Darlington, 1943).

Correlation tests have been the traditional means to test whether particular attributes of species are found in particular circumstances. An extensive review using such a procedure to test whether certain environmental attributes are correlated with the evolution of bra-

chyptery is presented by Roff (1990). Such a test ignores the fact that brachyptery *has* evolved, with common ancestors possessing the specialization more likely to pass along the identical state or a derivation thereof than a completely different configuration. The evolution of brachyptery may predispose a group to diversify, resulting in a monophyletic assemblage of many brachypterous species. That all these brachypterous species inhabit a certain type of habitat is due not so much to present day ecological conditions as to the singular event whereby their common ancestor became monomorphically brachypterous while inhabiting a particular habitat

type. Subsequent speciation without further evolution of the flight apparatus or change in habitat preference will lead to correlation of habitat and brachyptery. Correlation tests assume each species to represent an independent datum, clearly an inappropriate assumption in this case.

In the same way, if ecological preference has a basis in history, we should expect sister taxa to exhibit similar lowest elevations of preferred habitat values (table 1). Predicting a random distribution of habitat values across a phylogeny is not evolutionarily defensible, although it may be a useful null hypothesis.

To test historical correlation, flight configuration index values were first optimized on the cladogram using Farris optimization (Farris, 1970; figs. 253, 254, 255). Clades A, B and C were analyzed separately, reflecting the unresolved basal trichotomy of the consensus cladogram (fig. 252). As the original cladistic analysis utilized flight configuration as a single unit character (character 16), and this character changes state within the *degallieri* group only once in clade A (nodes 72 → 64) and once in clade C (nodes 88 → 86), with one other character supporting the topology between the latter nodes (fig. 252), worries about circularity can be minimized.

For clade A, given Farris optimization, the fully winged and wing-polymorphic taxa comprising component 72 would have evolved from ancestors that were completely brachypterous with quadrate metepisterna (node 79). Based on Dollo's Rule, this transformation series was rejected (Liebherr, 1991a: 120). Instead, all nodes basal to the paired sister species with fully macropterous wings were coded state 2, whereby brachyptery occurs within the species, while some individuals remain fully winged (fig. 253).

The lowest elevation index values were similarly optimized on the cladograms (figs. 256, 257, 258). For each pair of morphological and ecological cladograms, topologically associated state changes were recorded. Where ambiguity about optimization was present, alternate optimization values were retained on the cladograms. For clade A, elevation values transform six times on the cladogram (table 3). Flight wing configuration transforms unambiguously three times, each time in the absence of any change in state of elevation (nodes 64, 56, and 52). Depending on

TABLE 3
Tandem State Changes in Optimized Values for Elevation Index and Flight Configuration Index for Clade A

Node no.	State change, elev.	State change, flight config.	Hist. correl. ^a
85	4 → 4	3,4 → 3	0
79	2 → 4	3,4 → 4	0/+ b
72	2 → 1	3,4 → 3	0/+ a
65	2 → 2	3,4 → 4	0
64	1 → 1	3 → 1	0
57	2 → 3	3,4 → 4	0/+ b
56	4 → 4	5 → 4	0
54	2 → 1	3,4 → 3	0/+ a
52	2 → 3	3,4 → 4	0/+ b
52	2 → 2	3,4 → 2	0

^a Maximum number of positive historical correlations that can co-occur are indicated by same letter.

how the states are optimized on the cladograms, wing configuration may transform in conjunction with state changes in elevation either two or three other times. In the case of three correlated state changes (group b, table 3), one of the three correlated changes is due to the constraint that the basal value for wing configuration be 2 for component 79. There are no contrary state-change comparisons.

Comparison of wing configuration and elevational state changes in clade B suggests no direct historical correlation between evolution of brachyptery and elevation (figs. 254, 257). A total of three state changes occur on the cladograms, all involving nonresponse on the alternate cladogram.

For clade C, only two species exhibit brachypterous specialization. All state changes except one occurring on either cladogram (figs. 255, 258) are paired with nonresponse on the other cladogram. Under one optimization, a tandem state change from node 67 to node 60 involves a change from flight configuration state 1 to 3 (fig. 255) and a change from elevational state 2 to 3 (fig. 258). Moreover, of the seven species occupying higher elevational habitats (index values 3–5), only two have evolved brachyptery. In this clade, occupation of higher elevation habitats may permit brachypterous specialization, but it is not sufficient cause for such to occur.

In sum, based on the *degallieri* group, there is limited evidence for the occurrence of historically concurrent correlation involving restriction to higher elevational habitats and evolution of brachyptery. Based on clade C, restriction to higher elevations would appear a precondition for the evolution of brachyptery, but it is not alone sufficient for this to happen. This conclusion flies in the face of generalizations made about brachyptery and habitat based on correlation tests (Roff, 1990). In fact, use of such a correlation test finds a highly significant, though evolutionarily spurious, correlation between elevation and wing configuration in the *degallieri* group (Lieb-

herr, unpubl. data). Faster speciation rates within brachypterous clades after a single wing-loss event in a common ancestor would cause such a correlation. Highly fragmented upland habitats would enhance rapid speciation, synergizing the correlation of habitat and brachyptery (Kavanaugh, 1985). Comparison of the sister genera *Sericoda* (predominantly winged, 7 species) and *Elliptoleus* (predominantly brachypterous, 11 species) (Liebherr, 1991a) lends supporting evidence to this explanation. More extensive comparisons of sister groups alternately characterized by macroptery and brachyptery are the means for testing this mechanism.

BIOGEOGRAPHIC ANALYSIS

The cladistic analysis of the *degallieri* group forms the basis for interpreting the geographic patterns exhibited by the group. The aggregate distribution of the species group encompasses México, mountainous regions of Central America; northern South America; and Cuba, Hispaniola, and the Bahamas of the Greater Antilles (fig. 259). The pattern of species-level diversity shown by dividing the aggregate range of the *degallieri* group into 5° intervals is of three primary centers of diversity, one in the Sierra Madre del Sur and eastern Transvolcanic Sierra of México, a second in the highlands of Chiapas and Guatemala, and a third in the Cordillera de Talamanca in Costa Rica and Chiriquí Province, Panamá. Hispaniola has also been the site of diversification in the group, with six species now known from the island.

The biogeographic analysis first focuses on the area relationships exhibited by the *degallieri* group, relating them to more general questions of Middle American and Antillean biogeography. Secondly, the pattern of ecological diversification exhibited by the group is analyzed and compared to the general model of ecological diversification encompassed in the taxon cycle (Wilson, 1961) and taxon pulse (Erwin, 1979) hypotheses.

AREA RELATIONSHIPS

Areas of Endemism: If the individual distributions of the *degallieri* group are plotted

together (fig. 260), a number of nonoverlapping areas of endemism become evident. The distribution of *P. ovatulus* in the northern Sierra Madre Occidental and the mountains of southeastern Arizona (fig. 160) defines the Northern México (NOMEX) area of endemism. The distribution of *P. coptoderoides* in Cuba and the Bahamas (CUBAH, fig. 116) defines a second area of endemism. For convenience, the distributions of the six Hispaniolan species (fig. 134) are grouped in one area of endemism (HISP).

The numerous distributions in the center of the species group's range do not define disjunct areas of endemism, so this set of overlapping distributions was split into areas of endemism based on the more restricted species distributions. The northernmost area of this central core (MEX) was defined as México north and west of the Isthmus of Tehuantepec lowlands excluding the northern Sierra Madre Occidental. This area of endemism includes the endemic distributions of *P. robustulus* in the Sierra de Guatemala of Tamaulipas, *P. rotundatulus* centered on Jalisco, *P. elliptolellus*, *P. angustulus*, and *P. platynellus* in the Oaxacan mountains, *P. minusculus* on the Gulf Coast in southern Veracruz, *P. machetellus* near Córdoba in central Veracruz, and *P. brunnellus* ranging from San Luis Potosí south to Oaxaca (figs. 102, 160, 215). A number of widespread species occur in México plus the Chiapan-Guatemalan highlands, but the latter was recog-

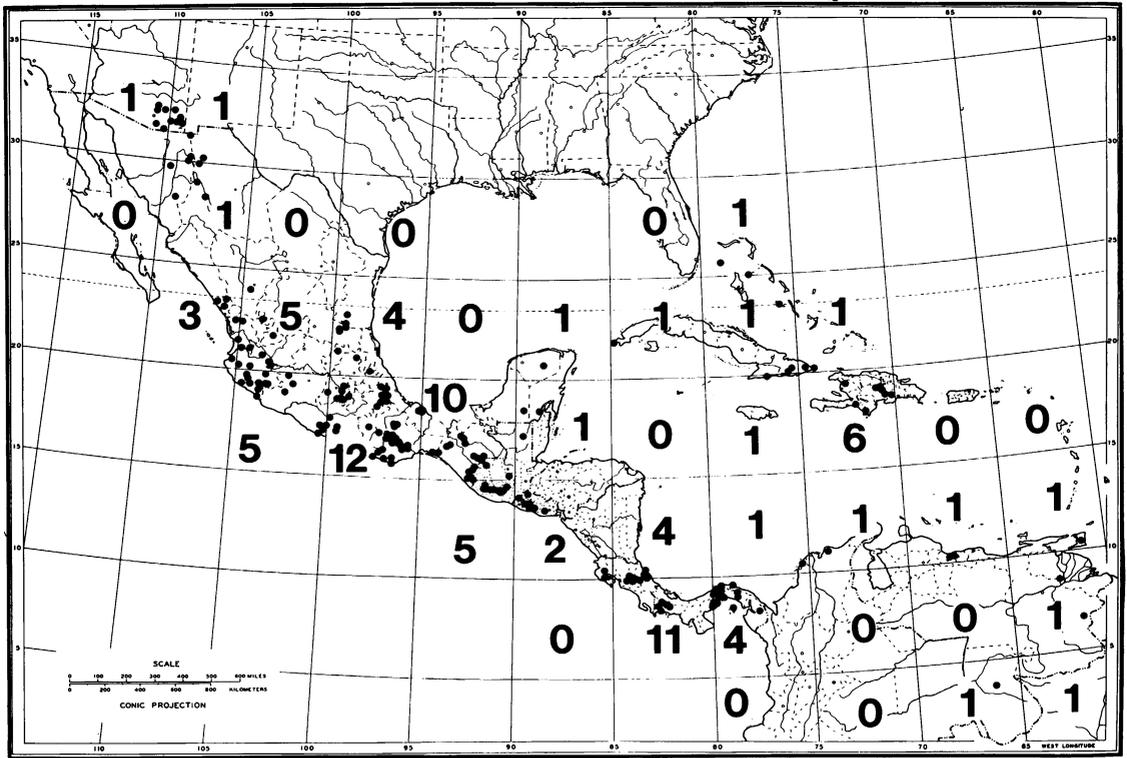


Fig. 259. Aggregate distribution of *degallieri* group species (●), and number of species with distributional records in each 5° interval of latitude and longitude.

nized as the Northern Central America (NCA) area of endemism based on the endemic distributions of *P. bacatellus*, *P. stenophthalmus*, and *P. imitativus* (figs. 102, 205). The mountains of Chiapas and Guatemala, and the various cordilleras of Costa Rica and Panamá have only two widespread species in common (figs. 205, 239). The latter are considered the Lower Central America (LCA) area of endemism, and support endemic distributions of nine species (figs. 182, 205, 239). South America (SA) is considered a separate area of endemism even though it is only characterized by parts of the distributions of the widespread *P. aeneipennis* and *P. degallieri* (fig. 182).

Cladistic Biogeography Results: The taxonomic cladogram determined in the cladistic analysis (fig. 252) was converted to a taxon-area cladogram using the above areas of endemism (fig. 261). In this taxon-area cladogram, redundant representations of areas were condensed where the redundancy occurred

within monophyletic taxonomic groupings. This reduction facilitated analysis using the COMPONENT program (Page, 1989). The taxon-area cladogram was analyzed using Assumptions 0, 1, and 2 of the COMPONENT program. Because the COMPONENT program requires input of a fully resolved taxon cladogram to compute the reduced fundamental area cladogram, two analyses are presented, the first assuming the resolution of the taxonomic cladogram to be $((A + C) + B)$ (see figs. 252, 261), the second assuming the resolution to be $((A + B) + C)$.

For the resolution of $((A + C) + B)$ analyzed under Assumption 0, a single most parsimonious fundamental area cladogram is produced in which MEX and the areas with which it shares widespread species—NCA and LCA—form one component, with SA that component's sister area (fig. 262). Area NO-MEX is the sister area to the other six areas. If the taxon-area cladogram is basally resolved as $((A + B) + C)$ under Assumption

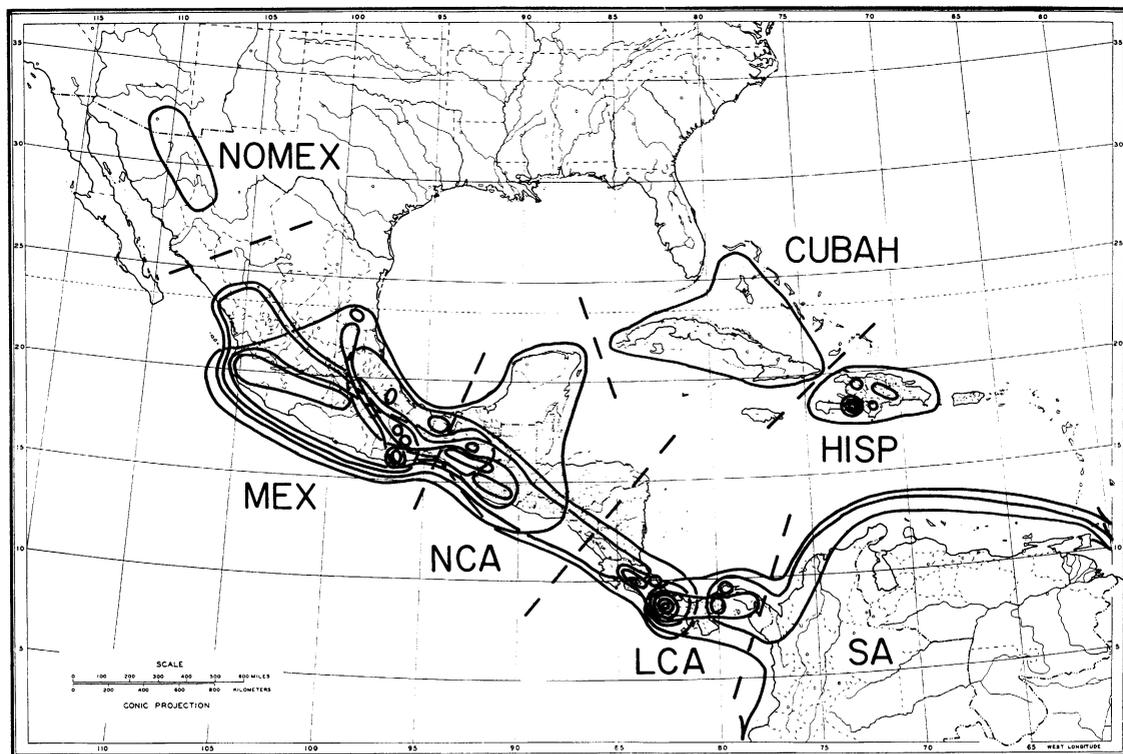


Fig. 260. Distributional limits of species in the *degallieri* group, with areas of endemism indicated for cladistic biogeographic analysis of area relationships. Limits of areas of endemism shown by dashed lines. Areas of six Hispaniolan species shown, although entire island of Hispaniola considered single area of endemism as shown by circle around island.

0, area NOMEX, represented in area-clade B, joins with areas CUBAH, and HISP, all represented in area-clade A, to form a component (fig. 263). The relationships of the other four areas remain the same.

Analysis under Assumption 1 finds 495 equally parsimonious fundamental area cladograms for each basal resolution of the taxon-area cladogram. An identical Nelson consensus cladogram results from each of the basal resolutions of the taxon-area cladogram (fig. 264). This consensus cladogram preserves two components: NCA + MEX, and CUBAH + HISP + NOMEX. Using strict consensus, all area relationships are unresolved under Assumption 1.

Using Assumption 2, five fundamental area cladograms are found for each basal resolution of the taxon-area cladogram (figs. 265–274). These two sets of five fundamental area cladograms differ in the basal resolution of

the areas. If clades A and C are considered most closely related, the Antillean areas—represented in clade A—and the lower Central and South American areas—predominant in clade C—are grouped together at the exclusion of NOMEX and MEX (figs. 265–269). Area NCA appears in five different sister-area relationships. Conversely, if clades A and B are considered most closely related, the lower Central and South American areas are excluded from an area component containing NOMEX, MEX, CUBAH, and HISP (figs. 270–274). Again, area NCA appears in five different sister-area relationships.

If we search the 495 trees found under Assumption 1 for each taxon-area cladogram basal topology, in each case we find a single tree of the 495 that is also found under Assumption 2 (figs. 266, 271). These area cladograms both contain the components 1) SA + LCA, 2) CUBAH + HISP, and 3) NOMEX

+ (MEX + NCA). They differ in whether SA + LCA is grouped with CUBAH + HISP (fig. 266), or with the mainland areas to the north (fig. 271).

The most generally acceptable fundamental area cladogram for the *degallieri* group is one which represents the lack of basal resolution in the taxon cladogram (fig. 252), and which is found under the greatest variety of analytical conditions; i.e. the consensus of Figures 266 and 271 (fig. 275).

Whereas the analytical conditions established by Assumption 0 will always determine a single fundamental area cladogram also found under Assumption 1, the set of cladograms found under Assumption 1 need not be a subset of those found under Assumption 2 if areas are represented more than once on the taxon-area cladogram, i.e., area redundancy is present (Page, 1990). In this instance, finding a single cladogram in both the set of 495 Assumption 1 cladograms and the five Assumption 2 cladograms allows presentation of a fundamental area cladogram that is independent of assumptions about dispersal of widespread taxa. Whereas Assumption 2 assumes either taxic dispersal or lack of response to vicariant events for widespread species in determining area relationships, Assumption 1 assumes only the latter. In this case, then, we can interpret the vicariance scenario of this group totally in the context of vicariance of sister groups, or the lack of response of widespread taxa to past vicariant events.

Time of Origin: The preferred fundamental area cladogram found under both Assumptions 1 and 2 (fig. 275) places the Northern México area (NOMEX) as sister to the Mexican plus Northern Central American areas. The vicariant barrier separating areas NOMEX and MEX corresponds quite closely to the basal dichotomy of areas of endemism represented by the Mexican platynine carabid genera *Calathus* and *Elliptoleus* (Liebherr, 1991b), i.e. vicariance between the Transvolcanic Sierra and lake country around Guadalajara, and the Sierra Madre Occidental north of the Río Mesquital. Two of the localities of the widespread *Platynus caerulipennis* fall within the range of the *Elliptoleus* and *Calathus* species found in the Sierra Madre Occidental (compare fig. 160 to Liebherr,

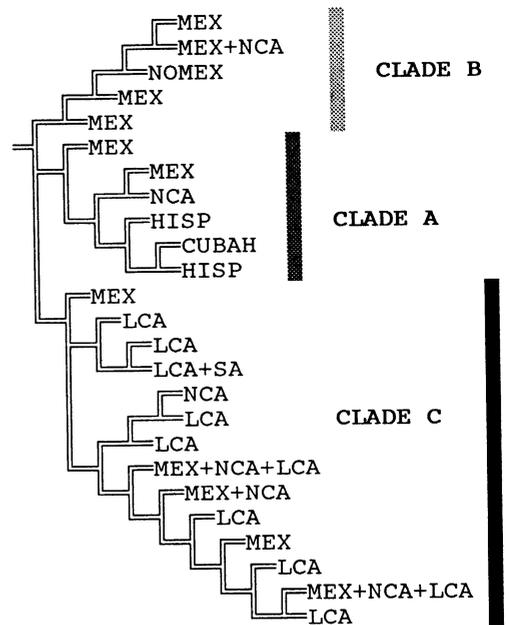
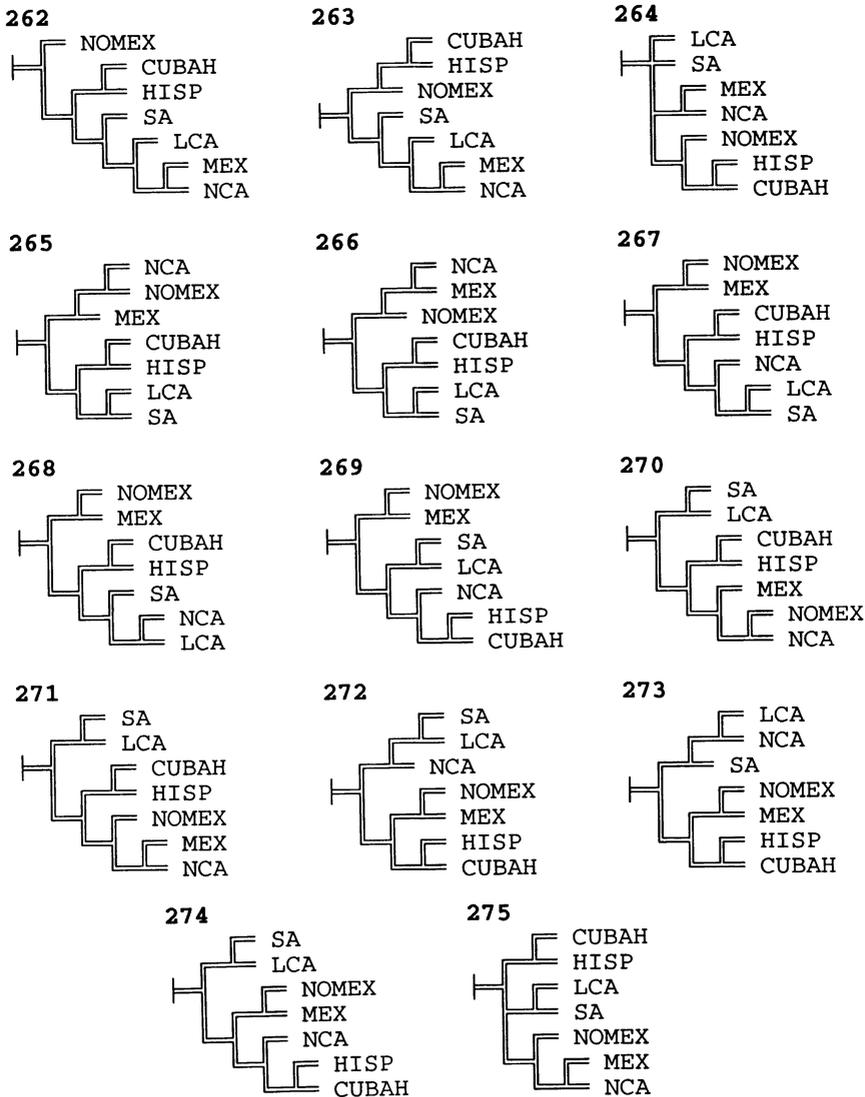


Fig. 261. Taxon-area cladogram of the *degallieri* group. Species names have been replaced with areas of endemism occupied by the species, and monophyletic sets of redundant areas have been condensed.

1991b, figs. 1, 2). However, *P. caerulipennis* is found within a broad range of habitats between 1000 and 2500 m (table 1), and could have entered highland habitats of the more montane *Elliptoleus* and *Calathus* from adjacent mid-elevation habitats. The distribution of *P. ovatulus* further north does not exactly fit the areas of endemism defined by *Elliptoleus* and *Calathus*, as *P. ovatulus* is found more to the west. Nonetheless, the area cladograms of *Elliptoleus*, *Calathus*, and the *degallieri* group agree by establishing a vicariant barrier between the Sierra Madre Occidental and areas further south that predates diversification in the more southerly areas. This vicariant event was dated as Miocene (Liebherr, 1991a) based on relative timing with other vicariance events within outgroups of *Elliptoleus*. The time of origin of the *degallieri* group is therefore dated as pre-Miocene.

Antillean Colonization: Based on a Miocene to Oligocene time of origin for the species group, it could be argued that colonization of the Antilles must have been overwater,



Figs. 262–275. Fundamental area cladograms derived from cladistic biogeographic analyses under Assumptions 0, 1, and 2. **262.** Cladogram under Assumption 0, assuming basal topology of taxon-area cladogram to be $((A + C) + B)$. **263.** Cladogram under Assumption 0, assuming basal topology of taxon-area cladogram to be $((A + B) + C)$. **264.** Nelson consensus of 495 cladograms derived under Assumption 1, using either basal taxon-area cladogram topology. **265–269.** Five equally parsimonious cladograms found under Assumption 2 assuming basal topology of taxon-area cladogram to be $((A + C) + B)$. **270–274.** Five equally parsimonious cladograms found under Assumption 2 assuming basal topology of taxon-area cladogram to be $((A + B) + C)$. **275.** Consensus of cladograms shared by analyses under Assumptions 1 and 2 (figs. 266, 271), for both basal resolutions of taxon area cladogram (fig. 261).

as the Greater Antilles would have been separated from the land at that time regardless of the type of geological model assumed (Rosen, 1985; Donnelly, 1988). However such process arguments do not make use of the

information inherent in the fundamental area cladogram (fig. 275).

Based on a geological model for the vicariant origin of the Antillean biota, Rosen (1975) proposed acceptance of vicariance as

the means of origin if the following area relationships were observed: (Antilles + (Lower Central America + Northern Central America and México)). Such a relationship would establish the vicariance of the Antillean forms prior to diversification of Lower Central American forms. Conversely, closest area relationships between México plus Northern Central America and the Antilles, excluding Lower Central America, would be compatible with post-Pliocene and postvicariant overwater colonization. For these sets of relationships, the fundamental area cladogram for the *degallieri* group (fig. 275) provides equivocal support for both patterns.

A closer look at taxon-area relationships among the Antillean species suggests the overwater colonization of the Antilles is more defensible. Assuming an Oligocene to Miocene time of origin for the group, the sister-area relationship between the Cuban-Bahamian and Hispaniolan areas would be dated as Miocene to post-Miocene. There is evidence of that eastern Cuba and northern Hispaniola were contiguous at that time (Hedges, 1982; Rosen, 1985), supporting a subsequent vicariance event between these two areas. The area relationships within the *degallieri* group do not suggest that this vicariance event influenced diversification within the group. Only *P. laetificus* and *P. metallosomus* occupy the Cordillera Central, which formed the backbone of northern Hispaniola, whereas species such as *P. baoruensis*, the sister taxon to the Cuban-Bahamian *P. coptoderoides*, occupy the mountains that formed during orogeny of southern Hispaniola. Southern Hispaniola originated as a fragment separate from northern Hispaniola, and is thought to have fused with northern Hispaniola after vicariance of eastern Cuba and northern Hispaniola (Rosen, 1985). That the Cuban species, *P. coptoderoides*, is most closely related to species in southern Hispaniola, and that northern Hispaniola is occupied only by more recently divergent taxa, suggests first that overwater colonization from a mainland source proceeded to either the Cuban-Bahamian area or southern Hispaniola. Subsequent dispersal between these two areas established the ranges now occupied by at least those species occupying the Cuban-Bahamian and southern Hispaniolan areas.

Finally, accretion of southern and northern Hispaniola may have facilitated intransland dispersal to the more northerly mountains. This last point is not determinable, however, as these two island fragments may have already fused prior to the initial overwater colonization event.

The biological attributes of the Antillean *degallieri* group species support this interpretation. Both *P. coptoderoides* and *P. baoruensis* are winged, and have been collected in flight, either at light or at flight-intercept traps. The single specimen of the Hispaniolan *P. laetificus* is fully winged. That all species in the sister group of the Antillean species are brachypterous, suggests that the progenitor of the Antillean clade was derived from a mainland taxon at least polymorphic for flight-wing configuration, with the mainland clade becoming monomorphically brachypterous after Antillean colonization. Given the variability in wing configuration of the six Hispaniolan species (table 1), such a scenario can be judged likely.

The disparity between the numbers of species on Hispaniola and Cuba may be considered surprising, but is explainable given the ecological preferences of the species. The Cuban-Bahamian *P. coptoderoides* is a more lowland species, and has been collected from 0–900 m elevation. Given the relatively low topographic relief of Cuba, however, this species can inhabit much of the land area of that island. All of the Hispaniolan species are found at elevations above 900 m, and occupy various portions of the Cordillera Central-Massif du Nord, and Sierra de Baoruco-Massif de la Selle ranges. Whatever led to the divergence in habitat preference within this clade has also resulted in disparate rates of speciation on the two islands. The taxon cycle, as one possible mechanism for this specialization, is investigated below.

South American Colonization: The *degallieri* group is represented in South America only by the widespread species *P. degallieri* and *P. aeneipennis*. These two species are sisters, and based on the fundamental area cladogram (fig. 275) their distributions represent recent colonizations of northern South America. Both species are found in lowland habitats (table 1), and both commonly fly to lights at night (table 2). There is also evidence

that *P. degallieri* is an adventive colonizer, based on a distributional disjunction between Panamá and Guyana (fig. 182), and its recent capture in interception traps in the port of Tucuruí, Pará State, Brazil. The absence of collections of *P. degallieri* in Venezuela would appear significant in light of the number of collections of *P. aeneipennis* in that country. In short, the area relationship of lower Central America and South America expressed in the area cladogram of the *degallieri* group (figs. 261, 275) more likely represents range expansion of two widespread lowland species than an accretionary geological event uniting the two areas.

General Pattern of Distribution: The *degallieri* group's distribution best fits Halffter's (1976, 1987) Meso-American Montane Pattern. Taxa exhibiting this pattern should exhibit a center of diversity in northern Central America and the tropical and cloud forests of Oaxaca, and the Atlantic and Pacific Coasts of México further north and west. They also may have South American member species. Halffter suggested that these groups most often had old South American affinities, i.e., a South American sister group, but he admitted the possibility of an old Mexican sister group. He proposed that they started their Central American diversification in the Oligocene or Miocene. Finally, he noted that groups exhibiting this pattern were closely linked to moist tropical and montane temperate forests, as well as to cloud forest and humid pine-oak forests at higher elevations.

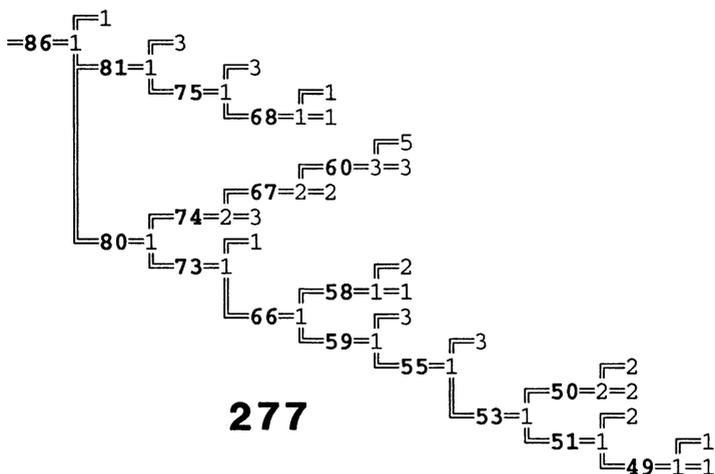
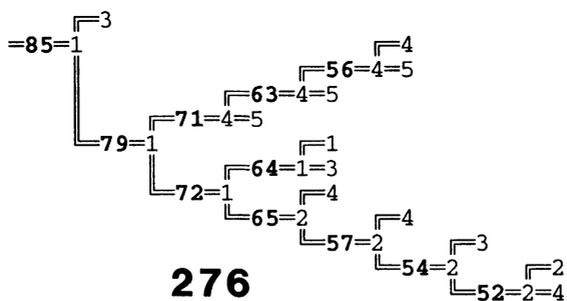
The *degallieri* group appears to represent the majority of these characteristics. Species-level diversity fits Halffter's pattern (fig. 259). Based on the provisional results of the cladistic analysis with regard to outgroups, it is likely that the group will prove to be the sister to a Mexican or northern Central American clade of *Platynus*. Certainty about whether older relationships will be with North or South America must await further cladistic analysis. But, Perrault (1991) noted that *P. degallieri* and *P. aeneipennis* were unique within the South American fauna, suggesting that it is less likely a close relative will be found there. If the relationships of the group are with groups to the north, the *degallieri* group will represent the Generalized North American-Central American Track of Rosen (1975;

Savage, 1982). A Miocene to Oligocene time of origin fits with Halffter's pattern, and allows time for diversification in northern Central America before the emergence of lands to the south. Finally, although the *degallieri* group species are often tied to moist tropical, temperate, and cloud forests, several of the more widespread species are found in drier sites at lower elevations. Examples include *P. rufulus* near sea beaches and in coastal palm forest, and *P. degallieri* in many low elevation sites in Panamá and along coastal South America.

HABITAT RELATIONSHIPS

Taxon Cycle: Ecological diversification has proceeded within the major areas of endemism, with species occupying different types of habitat both in sympatry and in allopatry. Various hypotheses assume that lineages progress from one habitat type to another during phylogenetic diversification. The taxon cycle (Wilson, 1961) assumes that taxa arriving overwater on an island will progress from lowland, peripheral, ecologically less stable habitats into more mesic forests, ending in stable rain forest. Along this progression the taxa will evolve from generalist colonizers to endemic rainforest specialists. Erwin's (1979) taxon pulse hypothesis assumes a similar evolutionary trajectory from generalist to specialist, but focuses on the evolution of Carabidae, and therefore involves ecological progression from lowland riparian habitats to various types of specialized habitats, such as montane forest, arboreal microhabitats, and caves.

If we were to look for evidence of the taxon cycle or pulse phenomena using the *degallieri* group, three clades within the group would be appropriate. Clade A with 12 species, and its subgroup of 7 Antillean species would represent the first two clades. The area relationships of the *degallieri* group point to the seven Antillean species colonizing the Antilles overwater from a source in México. If the taxon cycle has operated in this clade, the cladistically more basal species should occupy lowland, ecologically more unstable habitats, and species derived from the most recent cladistic events should be restricted to upland humid or mesic forest habitats. Another likely oc-



Figs. 276–277. Taxon-habitat cladograms with states of internal nodes determined by Camin-Sokal optimization. Node or component numbers correspond to fig. 252. Habitat transformation series determined from cladograms used to test occurrence of taxon cycle (see table 4). **276.** Taxon-habitat cladogram for Clade A. **277.** Taxon-habitat cladogram for Clade C.

currence of the taxon cycle/pulse would be during the diversification of the lower Central American fauna. Speciation since the Miocene would have resulted in progressively more specialized taxa being derived from progressively more recent cladistic events. In this case, upland specialists would be derived from generalists found in surrounding lowland habitats, much as has been hypothesized for the herpetofauna as a whole (Duellman, 1966), and salamanders in particular (Wake, 1987).

In order to test whether the patterns within the *degallieri* group conformed to the taxon cycle/pulse type of patterns, the taxonomic cladograms for clades A and C were converted to taxon-habitat cladograms (figs. 276, 277). For all of clade A, the taxon-habitat

cladogram defines a nonreversed habitat transformation series of 18 steps (table 4). For 100 random permutations of the habitat data, the 95% significance level is found at transformation series of 11 steps, making the observed pattern not significantly deviating from random. For the Antillean species taken alone—perhaps a more concise test of conditions included in Wilson’s (1961) taxon cycle model—the habitat values for the seven species apicad node 72 (fig. 276) define a habitat transformation series of nine steps. The set of 100 randomized distributions indicates that the 9-step empirical transformation series is four steps longer than the 5-step 95% significance level (table 4).

To determine whether the lower Central American radiation fits the taxon cycle/pulse

TABLE 4
Distributions of Habitat Transformation Series Lengths for Cladistic Randomization Tests of the Taxon Cycle/Pulse Hypothesis; Observed Series Length (Δ), 5% Significance Level (★)

Taxon	Transformation series lengths																									
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26			
Clade A	-	-	-	-	1	-	-	3	1	3	6	8	7	9	8	8	15	8	8	6	6	2	1			
							★								Δ											
Antillean clade	1	2	10	9	6	21	15	11	15	10	-	-	-	-	-	-	-	-	-	-	-	-	-			
		★				Δ																				
Clade C	-	-	-	-	-	-	-	1	2	2	5	12	13	19	23	15	4	4	-	-	-	-	-			
								★					Δ													

pattern, the habitat values for taxa defined by node 86 (fig. 277) were randomized. In this case, the 16-step empirical habitat transformation series is equal to or longer than 22 of the 100 randomized distributions (table 4), indicating that this pattern too does not conform to taxon cycle/pulse predictions.

These tests search for patterns of habitat transformation consistent with taxon cycle predictions, using the criterion of lowest elevation (Liebherr and Hajek, 1990). This criterion has been criticized as arbitrary and contentious (Frانيا, 1991), yet it offers several advantages over Frانيا’s method of coding missing values for those species with wide elevational ranges. As admitted by Frانيا, the use of missing values allows elevational generalists to be given an elevational value based on the most parsimonious habitat transformation series possible. Thus generalists, which might be expected to provide little information for testing the taxon cycle, actually can provide strong corroborative evidence. We view the lowest elevation index as no more contentious than fitting data using

parsimoniously optimized missing values. If a taxon cycle pattern were present, we should expect basal derivatives of a group to be in primitive habitats (= low elevational habitats). We should expect specialists to be restricted to high elevations. Generalists would most likely be cladistically basal, but at least should not be nested high in the cladogram. Under our scheme occurrence of a taxon cycle will be supported as long as high elevation specialists are cladistically apical, and low elevation and generalist species are not. This bias toward finding a taxon cycle gives strong evidence for its absence if results do not deviate from randomness, as observed above. We have no argument opposing the lowest elevation index as arbitrary given the vicissitudes of local conditions (Liebherr and Hajek, 1990: 55), but it is also an objective datum available both from modern specimen labels and maps. The conclusion to be drawn from this is not that the coding for habitats is wrong and that we have failed to uncover a taxon cycle that must exist, but that the taxon cycle is a hypothesis that has no ex-

TABLE 5
Overlap in Range and Elevation for Sister Species of *degallieri* Group

Node no.	Species pair	Range overlap	Elev. overlap
56	<i>machetellus-elliptolellus</i>	allopatric	-
64	<i>coptoderoides-baorucensis</i>	allopatric	-
52	<i>metallosomus-pavens</i>	allopatric	+
62	<i>rotundatulus-crypticulus</i>	allopatric	+
68	<i>degallieri-aeneipennis</i>	sympatric	+
60	<i>stenophthalmus-imitativus</i>	allopatric	-
58	<i>marginissimus-decorellus</i>	sympatric	+
50	<i>flavomarginatus-dominicensis</i>	parapatric	+
49	<i>nevermanni-purpurellus</i>	allopatric	+

planatory power for the patterns observed herein.

Sister Species: The manner of habitat shifts at speciation can be best examined by comparing sister species, representing the most recent hypothesized speciation events. For the nine sister species pairs (table 5, fig. 252), six involve allopatric sister taxa, one is of a parapatric species pair, and only two exhibit secondary sympatry (assuming allopatric speciation). Three of the allopatric pairs exhibit nonoverlapping elevational ranges. *P. machetellus* is a lower elevation sister to *P. elliptolellus* (fig. 102, table 1), *P. coptoderoides* is a low elevation widespread species (fig. 116) with the Dominican endemic *P. baorucensis* (fig. 134) as sister, and *P. imitativus* is a lower elevation sister to the high elevation endemic *P. stenophthalmus* (fig. 205). The six other allopatric, parapatric, and sympatric species pairs exhibit overlap in elevational range, three pairs coded as differing in the elevational index (based on lowest elevation), and three pairs identically coded (tables 1, 5). Thus, for six of the nine species pairs, speciation is associated with either elevational divergence or incomplete overlap in elevational preference.

The four species of the two pairs of sympatric sisters all occur below 1000 m elevation (table 1), and have been recorded in flight (table 2). One pair—*P. degallieri* and *P. aeneipennis*—are found as low as sea level, whereas the other pair—*P. marginissimus* and *P. decorellus*—are found as low as 30 or 640 m elevation respectively. Thus, extensive secondary sympatry is associated with well-developed powers of dispersal, and occupation of broadly distributed lowland habitats.

These species are among the most commonly collected species of this group, accounting for 40% of the material examined for the 36 species. They are also the ones most likely to survive the impending deforestation of México and Central America.

ACKNOWLEDGMENTS

This project would not have been possible without the comprehensive collections of Mexican and Central American material amassed by George E. Ball and Terry L. Erwin. I thank them for access to this material. I thank Pierre Moret and Georges Perrault for their cooperation and correspondence. Although we disagree on the means, we agree on the end of understanding the Neotropical platynine radiation. Konjev Desenders, Institut Royal des Sciences de Belgique, provided me with types of Chaudoir species during my search for described species of the *degallieri* group. John Boggan deserves thanks for his tireless efforts in databasing the date-locality information. I thank Amy Trabka for her stipple drawings of pronota and aedeagi, Frances Fawcett for her carbon dust rendering of *P. marginissimus*, and Ann Hajek for supplying randomized data for the habitat relationships analysis. I also thank John Doyen, Vince Lee, Almar Millman, and Dave Yager for assistance and companionship on field trips to México. Finally, I thank David H. Kavanaugh and David R. Maddison for friendly, and extremely constructive reviews of the manuscript. This project was completed under the support of Hatch project NY(C)139406, and National Science Foundation grant no. BSR-8614628.

REFERENCES

- Bates, H. W.
 1882. *Biologia centrali-americana*, Insecta, Coleoptera, Carabidae 1(1): 40–152, 3 pls.
 1884. *Biologia centrali-americana*, Insecta, Coleoptera, Cicindelidae suppl., Carabidae suppl. 1(1): 257–299, 1 pl.
- Blackwelder, R. E.
 1944. Checklist of the Coleopterous Insects of Mexico, Central America and the West Indies, and South America, Part 1. *Bull. U.S. Natl. Mus.* 185: 188 pp.
- Bonelli, F. A.
 1810. Observations entomologiques, première partie [including] *Tabula Synoptica* exhiben genera Carabiorum in sectiones et stirpes disposita. *Mem. Acad. Imp. Sci. Litt. Beaux-Arts Turin* 18 (*Mem. pres.* 4): 21–78, table.
- Bremer, K.
 1990. Combinable component consensus. *Cladistics* 6: 369–372.
- Camin, J. H., and R. R. Sokal
 1965. A method for deducing branching se-

- quences in phylogeny. *Evolution* 19: 311–326.
- Chaudoir, M.
1859. Monographie du genre *Colpodes* Mac Leay. *Ann. Soc. Entomol. France ser. 3*, 7: 287–364.
1878. Révision des genres *Onychopterygia*, *Dicranoncus* et *Colpodes*. *Ann. Soc. Entomol. France ser. 5*, 8: 275–382.
- Cracraft, J.
1989. Speciation and its ontology: the empirical consequences of alternative species concepts for understanding patterns and processes of differentiation. In D. Otte and J. A. Endler (eds.), *Speciation and its consequences*, pp. 28–59. Sunderland, MA: Sinauer Assoc.
- Csiki, E.
1931. Coleopterorum Catalogus 115 (Carabidae: Harpalinae 5): 739–1022.
- Darlington, P. J., Jr.
1935. West Indian Carabidae II: itinerary of 1934; forests of Haiti; new species; and a new key to *Colpodes*. *Psyche* 42: 167–215.
1937a. West Indian Carabidae III: new species and records from Cuba, with a brief discussion of the mountain fauna. *Mem. Soc. Cubana Hist. Nat.* 11: 115–136.
1937b. West Indian Carabidae IV: three new *Colpodes*. *Psyche* 44: 122–124.
1943. Carabidae of mountains and islands: data on the evolution of isolated faunas, and on atrophy of wings. *Ecol. Monogr.* 13: 37–61.
- Dejean, P. F. M. A.
1831. *Species général des Coléoptères*. . . 5: 1–883.
- Donnelly, T. W.
1988. Geologic constraints on Caribbean biogeography. In J. K. Liebherr (ed.), *Zoogeography of Caribbean insects*, pp. 15–37. Ithaca, NY: Cornell Univ. Press.
- Duellman, W. E.
1966. The Central American Herpetofauna: an ecological perspective. *Copeia* 1966: 700–719.
- Eberhard, W. G.
1985. *Sexual selection and animal genitalia*. Cambridge, MA: Harvard Univ. Press.
- Erwin, T. L.
1979. Thoughts on the evolutionary history of ground beetles: hypotheses generated from comparative faunal analysis of lowland forest sites in temperate and tropical regions. In T. L. Erwin, G. E. Ball, D. R. Whitehead, and A. L. Halpern (eds.), *Carabid beetles: their evolution, natural history, and classification*, pp. 539–587. The Hague: Dr. W. Junk.
- Farris, J. S.
1970. Methods for computing Wagner trees. *Syst. Zool.* 19: 83–92.
1988. HENNIG, HENNIG86, version 1.5 [a computer program for cladistic analysis]. Port Jefferson Station, New York.
1989. The retention index and the rescaled consistency index. *Cladistics* 5: 417–419.
- Frania, H. E.
1991. Displacement of one taxon by another as the cause of certain ecological shifts in *Eustilicus* Sharp (Coleoptera: Staphylinidae): a test of the evidence. *Proc. Entomol. Soc. Washington* 93: 437–448.
- Germar, E. F.
1817. [Review of] Franc-André Bonelli, *Observations entomologiques*. . . *Mag. Entomol.* 2: 301–304.
- Halffter, G.
1976. Distribucion de los insectos en la zona de transicion Mexicana, relaciones con la entomofauna de Norteamerica. *Fol. Entomol. Mexicana* 35: 1–64.
1987. Biogeography of the montane entomofauna of Mexico and Central America. *Ann. Rev. Entomol.* 32: 95–114.
- Hedges, S. B.
1982. Caribbean biogeography: implications of recent plate tectonic studies. *Syst. Zool.* 31: 518–522.
- Horn, G. H.
1892. Random studies in North American Coleoptera. *Trans. Am. Entomol. Soc.* 19: 40–48.
- Humphries, C. J., and L. Parenti
1986. *Cladistic biogeography*. Oxford: Clarendon Press.
- Kavanaugh, D. H.
1985. On wing atrophy in carabid beetles (Coleoptera: Carabidae), with special reference to Nearctic *Nebria*. In G. E. Ball (ed.), *Taxonomy, phylogeny and zoogeography of beetles and ants*, pp. 408–431. Dordrecht: Dr. W. Junk Publishers.
- Liebherr, J. K.
1986. Cladistic analysis of North American Platynini and revision of the *Agonum extensicolle* species group (Coleoptera: Carabidae). *Univ. Calif. Publ. Entomol.* 106: 1–198.
1987. A taxonomic revision of the West Indian *Platynus* beetles (Coleoptera: Carabidae). *Trans. Am. Entomol. Soc.* 112[1986]: 289–368.

1988. General patterns in West Indian insects, and graphical biogeographic analysis of some circum-Caribbean *Platynus* beetles (Carabidae). *Syst. Zool.* 37: 385–409.
1989. Redefinition of the *Platynus jaegeri* group and a taxonomic revision of the Mexican and Central American species (Coleoptera: Carabidae: Platynini). *Trans. Am. Entomol. Soc.* 114[1988]: 167–214.
- 1991a. Phylogeny and revision of the *Anchomenus* clade: the genera *Tetraleucus*, *Anchomenus*, *Sericoda*, and *Elliptoleus* (Coleoptera: Carabidae: Platynini). *Bull. Am. Mus. Nat. Hist.* 202: 163 pp.
- 1991b. A general area cladogram for montane Mexico based on distributions in the platynine genera *Elliptoleus* and *Calthus* (Coleoptera: Carabidae). *Proc. Entomol. Soc. Washington* 93: 390–406.
- 1991c. Synonymical notes on North American Platynini (Coleoptera: Carabidae), with special reference to names proposed by T. L. Casey, and a redescription of *Agonum imitans* Notman. *J. New York Entomol. Soc.* 99: 115–124.
- Liebherr, J. K., and A. E. Hajek
1990. A cladistic test of the taxon cycle and taxon pulse hypotheses. *Cladistics* 6: 39–59.
- Maddison, D. R.
1991. The discovery and importance of multiple islands of most-parsimonious trees. *Syst. Zool.* 40: 315–328.
- Maddison, W. P., M. J. Donoghue, and D. R. Maddison
1984. Outgroup analysis and parsimony. *Syst. Zool.* 33: 83–103.
- Madge, R. B.
1975. The type-species of Bonelli's genera of Carabidae (Coleoptera). *Quaest. Entomol.* 11: 579–586.
- Miyamoto, M. M.
1985. Consensus cladograms and general classifications. *Cladistics* 1: 186–189.
- Moret, P.
1989. Démembrement du genre *Colpodes* auctorum. I. individualisation et définition des genres Néotropicaux *Dyscolus* Dejean et *Stenocnemion* gen. nov. (Col. Caraboidea Platyninae). *Bull. Soc. Entomol. France* 93: 133–148.
1990. Démembrement du genre *Colpodes* auctorum. II. le genre Néotropical *Dyscolidion* n. gen. (Coleoptera, Caraboidea, Platyninae). *Rev. Fr. Entomol. n. ser.*, 12: 67–80.
1991. Contribution à la connaissance du genre *Stenocnemion* (Coleoptera, Harpalidae, Platyninae). *Rev. Fr. Entomol. n. ser.*, 13: 65–74.
- Nelson, G., and N. Platnick
1981. Systematics and biogeography: cladistics and vicariance. New York: Columbia Univ. Press.
- Page, R. D. M.
1989. COMPONENT, release 1.5 [a computer program for cladistic biogeography and component analysis]. Auckland, New Zealand.
1990. Component analysis: a valiant failure? *Cladistics* 6: 119–136.
- Patterson, C.
1982. Morphological characters and homology. In K. A. Joysey and A. E. Friday (eds.), *Problems of phylogenetic reconstruction*. *Syst. Assoc. Spec. Vol.* 21: 21–74. London: Academic Press.
- Perrault, G. G.
1990. Études sur les Carabidae des Andes septentrionales. VII. Platynini de la Cordillera de Merida (Vénézuéla) (1) (Coleoptera). *Nouv. Rev. Entomol. n. ser.*, 7: 179–197.
1991. Études sur les Carabidae des Andes septentrionales. VIII. démembrement du genre *Glyptolenus* Bates et description d'un genre voisin (Coleoptera). *Nouv. Rev. Entomol. n. ser.*, 8: 43–59.
- Reiche, L.
1843. Coleoptera colombiana. *Rev. Zool.* 1843: 177–180.
- Roff, D. A.
1990. The evolution of flightlessness in insects. *Ecol. Monogr.* 60: 389–421.
- Rosen, D. E.
1975. A vicariance model of Caribbean biogeography. *Syst. Zool.* 24: 431–464.
1979. Fishes from the uplands and intermontane basins of Guatemala: revisionary studies and comparative geography. *Bull. Am. Mus. Nat. Hist.* 162: 275–376.
1985. Geological hierarchies and biogeographic congruence in the Caribbean. *Ann. Missouri Bot. Gard.* 72: 636–659.
- Savage, J. M.
1982. The enigma of the Central American herpetofauna: dispersals or vicariance? *Ann. Missouri Bot. Gard.* 69: 444–547.
- Southwood, T. R. E.
1977. Habitat, the temple for ecological strategies? *J. Anim. Ecol.* 46: 337–365.
- Swofford, D. B.
1991. PAUP: Phylogenetic analysis using par-

- simony, version 3.0q [a computer program for cladistic analysis]. Illinois Natural History Survey, Champaign, IL.
- Wake, D. B.
1987. Adaptive radiation of salamanders in Middle American cloud forests. *Ann. Missouri Bot. Gard.* 74: 242–264.
- Watrous, L. E., and Q. D. Wheeler
1981. The out-group comparison method of character analysis. *Syst. Zool.* 30: 1–11.
- Whitehead, D. R.
1973. Annotated key to *Platynus*, including *Mexisphodrus* and most “*Colpodes*”, so far described from North America including Mexico (Coleoptera: Carabidae: Agonini). *Quaest. Entomol.* 9: 173–217.
1974. An annotated key to described species of the Neotropical genus *Glyptolenus* (Coleoptera: Pterostichini: Agoni). *Coleopt. Bull.* 28: 123–132.
- Wiley, E. O.
1987. Methods in vicariance biogeography. *In* P. Hovenkamp (ed.), *Systematics and evolution: a matter of diversity*, pp. 283–306. Institute for Systematic Botany, Utrecht University.
- Wilson, E. O.
1961. The nature of the taxon cycle in a tropical ant fauna. *Evolution* 13: 122–144.
- Zandee, M., and M. C. Roos
1987. Component-compatibility in historical biogeography. *Cladistics* 3: 305–332.

APPENDIX 1
 Character state matrix for *degallieri* group cladistic analysis;
 primitive state (0), derived state (1), state unknown (?).

Taxa	Character					
	10	20	30	40	50	59
Ingroup <i>Platynus</i>						
<i>robustus</i>	0100000000	0000110000	100??00??0	0000000000	1000000000	011000101
<i>bacatellus</i>	0100000010	0000010000	0000000110	0000010001	????000000	011000101
<i>platynellus</i>	0110000010	0000010000	0000000000	0000000001	1000000000	011000101
<i>machetellus</i>	0110000000	0000110001	0000000110	0000110001	1000000000	011000101
<i>elliptolellus</i>	0110000010	0000110001	0000000000	0000010001	1000000000	011000101
<i>coptoderoides</i>	0000100000	0000000001	0000000000	0100110010	1110000000	011000101
<i>baorucensis</i>	0000000000	0000000000	0000000000	0000001010	1110000000	011000101
<i>agonellus</i>	0100000000	0000011000	0000000000	00000?0000	1110000000	011000101
<i>sellensis</i>	0100000000	0000011000	0000000000	0000011000	1110000000	011000101
<i>laetificus</i>	0101000000	0000001000	0000000000	00000?1100	????000000	011000101
<i>metalloscymus</i>	0100000001	0000011000	0000000000	0000011100	1100000000	011000101
<i>pavens</i>	0100100001	0010011000	0000000000	0000001100	1110000000	011000101
<i>brunnellus</i>	0000000000	0000110100	1000001101	0011000000	0000000000	011000101
<i>caerulipennis</i>	0000000000	0000110100	0000000000	1101100000	0000000000	011000101
<i>ovatus</i>	0001000000	0000110110	0001100000	1101000000	0000000000	011000101
<i>rotundatus</i>	0000000000	0000110110	0001010000	1100100000	0001000000	011000101
<i>crypticulus</i>	0000000000	0000110110	1001010000	1100110000	0001000000	011000101
<i>minusculus</i>	0000000000	0000000000	1010000000	0100000000	0000000000	011000101
<i>nitidulus</i>	0000000000	0011000001	1000000000	0000100000	0000000000	011000101
<i>margaritulus</i>	0000011100	0001000001	0000000000	1000000000	0000000000	011000101
<i>degallieri</i>	1000011100	0101000001	0001010000	1110100000	1000000000	011000101
<i>aeneipennis</i>	1000011100	0111000000	1100000000	1100100000	0000000000	011000101
<i>rugulellus</i>	0000010100	1000000000	1000000110	0000010000	0000000000	011000101
<i>barbarellus</i>	0000000000	1000000001	000?000??0	00000?0000	0000000000	011000101
<i>imitativus</i>	0000100001	1001010001	100???????	???????????	0000000000	011000101
<i>stenophthalmus</i>	0110100011	1000010001	0000000110	00000?0000	0000000000	011000101
<i>rufulus</i>	1000000000	0000000000	0001010101	1000010000	0000000000	011000101
<i>marginissimus</i>	1000010000	0000000000	1101011101	0000000000	0000000000	011000101
<i>decorellus</i>	0000000000	0000000100	1101011101	0000100000	0000000000	011000101
<i>woldai</i>	0000010100	0001000001	0001011101	0000110000	0000000000	011000101
<i>angustus</i>	0000000000	0010000001	1011011101	0000010000	????000000	011000101
<i>flavomarginatus</i>	0000000000	1110000001	0001011101	0000100000	0000000000	011000101
<i>dominicensis</i>	0000100000	1110000001	0001011101	0000000000	1000000000	011000101
<i>mimulus</i>	1000010100	1111000000	1001011101	00000?0000	0000000000	011000101
<i>nevermanni</i>	1000100000	0101000001	1011011101	0000000000	0000000000	011000101
<i>purpurellus</i>	1000110000	1111000001	1011011101	00001?0000	????000000	011000101
Primary Outgroup <i>Platynus</i>						
<i>acuminatus</i>	0000100000	1001000000	1101100000	0000000000	0000000001	011111011
<i>assimilis</i>	0000100000	1010100110	0000000000	0000000000	0000100000	010001000
<i>ballorum</i>	0110000000	0000111000	0001100000	0000010000	0000011110	011001111
<i>concisus</i>	0000100010	0000110000	1000000000	0000000000	0000100000	010001101
<i>franiai</i>	0110000000	0000110001	0000000000	0000000000	0000000010	011001111
<i>lugens</i>	0110100001	1000110110	0000000000	0000000000	0000011101	110101010
<i>lyratus</i>	0000100000	1000010000	0000000000	0000000000	0000001100	011101011
<i>memnonius</i>	0000100001	1000000000	0000000000	0000000000	0000001001	111101011
<i>moestus</i>	0110110011	0000111110	0000000000	0000000000	0000011101	110001000
<i>nugax</i>	0110100010	0000110100	0000000000	0000000001	0000101100	010001111
<i>pygmaeus</i>	0000000010	0001000000	0010000000	0000000000	0000000000	011111101
Secondary Outgroups						
<i>An. dorsalis</i>	0000100010	0000011110	1000000000	0000000000	0000111110	000000100
<i>Ag. marginatum</i>	0001000001	0000101110	1000000000	0000000000	0000000000	000000000

THIS PUBLICATION IS PRINTED ON ACID-FREE PAPER.

