A taxonomic teview of the subtribe Pericalina (Coleoptera: Carabidae: Lebiini) in the Western Hemisphere, with descriptions of new species and notes about classification and zoogeography

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Abstract: A taxonomic review of the lebiine subtribe Pericalina in the Western Hemisphere, this paper includes a treatment of the genus-groups, a key to the genera, keys to subgenera, species groups, and species of each polybasic genus, descriptions of new species and new subgenera, new locality records for previously described species, re-rankings, and new synonymy. In total, 111 species and subspecies are treated, 26 of which are described as new.

A review of the taxonomically useful mandibular structure, based on stereo-electron (SEM) photographs, requires changes in previously published names of various structures. A review of adhesive vestiture on the front tarsi of males shows 3 different types each characteristic of different taxa.

In the eastern Brazilian montane genus *Oreodicastes* Maindron, 5 species are recognized, of which 3 are described as new (with type localities): *O. aeacus* and *O. minos* (Campos de Jordão, State of São Paulo, Brazil); and *O. rhadamanthus* (Serra do Caraça, State of Minas Gerais, Brazil).

In the wide-ranging genus *Stenognathus* Chaudoir, 19 species are recognized, and arranged in the following subgenera: the monobasic *Prostenognathus,* new subgenus (type species *S. onorei*, new species); the monobasic *Gnathostenus* new subgenus (type species *S. dentifemoratus*, new species); the polybasic *Stenognathus (s. str.)* (type species *Anchomenus melanarius* Dejean), with 16 species; and the monobasic *Pristolomus* Chaudoir (type species *S. dentifer* Chaudoir). *Stenognathus cayennensis* Buquet 1835 is a *nomen dubium*. The species of subgenus *Stenognathus* are arranged in 4 species groups: the *S. stricticollis* species group, with 4 species; the monospecific *S. procerus* species group; the *S. nigropiceus* species group (including *Phloeotherates* Bates and *Ferus* Chaudoir), with 6 species; and the *S. melanarius* species group, with 5 species. New species (with type localities) described herein: *S. (Prostenognathus) onorei* (West of Chiriboga, Pichincha Province, Ecuador); *S. (Gnathostenus) dentifemoratus* ("Colombia"); *S. (sensu stricto, nigropiceus* group) *plaumanni* (Nova Teutonia, State of Santa Catarina, Brazil); and *S. (sensu stricto, nigropiceus* group) *jauja* (Sani Beni, Jauja Province, Departamento Junin, Peru). Descriptions and new locality records are reported for the species known previously.

For the principally Middle American genus *Phloeoxena* Chaudoir, the new monobasic subgenus *Oxephloena* is described: type species, *P. turrialba,* new species (Turrialba, Cartago Province, Costa Rica). *Ochropisus* Bates is included as a subgenus in *Phloeoxena*, and the following 5 new species (with type localities) are described: *P. (O.) davidsoni* (15 km. northwest of El Paraiso, State of Guerrero, México); *P. (O.) henryi* (northeast slope of Volcan Tacaná, State of Chiapas, México); *P. (O.) nevermanni* (western slopes of Volcan Irazu, Costa Rica.); *P. (O.) turnbowi* (near the trailhead of the Continental Divide Trail, Chiriqui Province, Panamá); and *P. (O.) lamuralla* (Parque Nacional La Muralla, Olancho Department, Honduras). In *Phloeoxena (Oenaphelox)*, the following 4 new species are described: *P. (O.) totontepec* (16.6 km south of Totontepec, State of Oaxaca, México); *P. (O.) brooksi* (El Guisayote, 24 km east of Ocotepeque, Ocotepeque Department, Honduras); *P. (O.) ashei* (Parque Nacional La Muralla, 14 km north of La Union, Olancho Department, Honduras); and *P. (O.) viridis* (El Guisayote, 24 km east of Ocotepeque, Ocotepeque Department, Honduras). In *Phloeoxena (s. str.),* the following 2 new species are described: *P. (P.) nitida* (51.5 km south of Valle Nacional, State of Oaxaca, México); and *P. (P.) obscura* (vicinity of Coscomatepec, State of Veracruz, Mexico). Based on study of the holotype, *Phloeoxena biundata* Steinheil is included in the subgenus *Phloeoxena.* The status of *P. (P.) picta batesi* Ball is changed from subspecies to species, based on new locality data indicating extensive range overlap of *P. picta (sensu lato)* and *P. batesi.* New locality records are provided for the following previously described species of *Phloeoxena*: *P. (Tacana) herculeano* Ball; *P. (Ochropisus) concolor* Ball (substantial range extension in western México); *P. (Ochropisus) caudalis* Bates; *P. (Oenaphelox) newtoni* Ball (a second record); *P. (Oenaphelox) undata* Chaudoir; *P. (Oenaphelox) geniculata* Chaudoir; *P. (Oenaphelox) signata* Dejean; *P. (s. str.) dealata* Darlington; *P. (s. str.) imitatrix* Darlington; *P. (s. str.) schwarzi* Darlington; *P. (s. str.) portoricensis* Darlington; *P. (s. str.) megalops erwinorum* Ball (range extension from Costa Rica to Panamá; *P. (s. str.) limbicollis* Bates; *P. (s. str.) nigricollis* Ball; *P. (s. str.) picta franiae* Ball; *P. (s. str.) picta unicolor* Chaudoir; *P. (s. str.) picta picta* Chaudoir; *P. (s. str.) picta apicalis* Ball; and *P. (s. str.) batesi* Ball.

Two monobasic species and 1 dibasic species of the pantropical genus *Catascopus* Kirby are recognized. New synonymy is as follows: *C. obscuroviridis* Chevrolat 1835 = *C. mexicanus* Chaudoir 1877 = *C. angulicollis* Bates 1878; *C. validus* Chaudoir 1854 = *C. guatemalensis* Bates 1883; *C. brasiliensis* Dejean 1825 includes the South American *C. b. brasiliensis* (new status) = *C. cayennensis* Chaudoir 1872 and the Middle American *C. b. chontalensis* Bates 1878 (new status). New locality records for the 3 Middle American species, *C. obscuroviridis, C. validus,* and *C. b. chontalensis* show extensive range overlap. Nonetheless, *C. validus* seems to be isolated altitudinally from the other 2 species. *Catascopus b. brasiliensis* is a rather varied species and wide-ranging in South America, from the Brazilian Atlantic Forest to the Upper Amazon Basin, in Peru and Ecuador.

The monospecific Chilean-Argentinian genus *Catascopellus* Straneo (type species *C. crassiceps* Straneo) is removed from the *Somotrichus* genus-group and placed in the monogeneric *Catascopellus* genus-group, primarily on the basis of divergence in the combination of structural details of the mouthparts and adhesive vestiture of the front tarsi of males. The *Catascopellus* genus-group in many of its diagnostic features is much like the *Thyreopterus* genus-group, but males of the 2 groups differ from one another in the adhesive vestiture of the fore tarsi. The known geographical range of *C. crassiceps* is extended from eastern Chile to western Argentina.

The precinctive Neotropical *Eurycoleus* genus-group, including only *Lelis* Chaudoir and *Eurycoleus* Chaudoir, is recharacterized, with special reference to details of the mandibles and labium. The 4 valid species of *Lelis*, (with synonyms of the valid names) follow: the South American *L. obtusangula* (Chaudoir) 1852; the South American *L. quadrisignata* (Buquet) 1834 = *L. polygona* (Bates), 1869 = *L. bifasciata* Chaudoir 1869, new synonym = *L. latipennis* (Bates) 1869, new synonym; the South American-Middle American *L. rutila* (Bates) 1869 = *L. viridipennis Chaudoir* 1869 = *L. cyanipennis* Steinheil 1875, new synonym = *L. insculpta* (Bates) 1893, new synonym; and the Middle American *L. bicolor Chaudoir 1869.* Putative adelphotaxon relationships, based on structural details of adults, are: *L. obtusangula (L. quadrisignata (L. rutila + L. bicolor)).*

Based on color pattern, the 8 species of the genus *Eurycoleus* Chaudoir are arranged in 2 species groups: the *E. poecilopterus* group with 2 species; and the *E. tredecimpunctatus* group, with 6 species. The species of the latter species group are arranged in 2 subgroups, the *septemplagiatus* subgroup, with 2 species, and the *tredecimpunctatus* subgroup, with 4 species, including *E. erwini*, new species (Estación Sirena, Playa Sirena, Puntarenas, Costa Rica). Both species groups and both subgroups are represented in South America and Middle America by precinctive species. New locality records for *Eurycoleus poecilopterus* Buquet extend its range to northern Argentina, the southernmost area for the genus.

The sole genus in the Western Hemisphere of the *Pericalus* genus-group, *Coptodera* Dejean, another pantropical genus, is represented by 44 species. New locality records are recorded for the following: *C. elongata* Putzeys; *C. schaumi* Chaudoir; *C. megalops* Bates (range extension into Middle America, from South America); *C. championi* Bates; *C. versicolor* Bates; *C. nigrostriata* (Reiche); *C. lineata* (Bates); *C. transversa* (Reiche); *C. relucens* Bates; *C. festiva* Dejean; *C. aeneorufa* Bates; *C. tripartita* Chaudoir; *C. cupreotincta* Bates; *C. chalcites* Bates; *C. acutipennis* Buquet (all recently acquired males were assigned to previously established morphs based on details of the armature of the internal sac); *C. picea* Dejean; *C. nitidula* Buquet; and *C. brunnea* Shpeley and Ball.

A review of the classification of the Neotropical indigenous *Eucheila* genus-group, based on characters of newly discovered species, and on re-evaluation of relationships, indicates recognition of a single genus, *Eucheila* Dejean, with the following newly ranked taxa as subgenera: *Hansus* Ball and Shpeley (type species *Hansus reichardti* Ball and Shpeley); *Bordoniella* Mateu (type species *Bordoniella lucida* Mateu); *Inna* Putzeys (type species *Inna punctata* Putzeys); and *Eucheila* Dejean (type species *Eucheila flavilabris* Dejean). *Pseudoinna* Mateu (type species *I. boliviana* Mateu), described as a subgenus of *Inna,* is recognized as a subgenus of *Eucheila.* In subgenus *Eucheila*, a new species group is proposed: *E. erwini* species group, with 2 species. New species are: *E. (Hansus) kiplingi* (Puerto Misahuali, Napo Province, Ecuador); *E. (Bordoniella) marginata* (Rio Tambopata Reserve [12°50'S 069°20'W], Departamento Madre de Dios, Peru); *E. (Pseudoinna) mateui* (Pakitza, Departamento Madre de Dios, Peru); *E. (P.) surinamensis* (Rainville, Suriname district, Surinam); *E. (Eucheila) erwini* (Rio Napo Explomapo camp [03°15'S 072°55'W], Loreto Department, Peru); and *E. (E.) pilosa* (about 75 km south-southeast of Apoera, Nickerie District, Surinam). New distribution records are provided for the following species: *E. (H.) reichardti* (Ball and Shpeley) (range extension to Upper Amazon Basin in Peru, from Guyana in northeastern South America); *E. (I.) purpurea* (Ball and Shpeley); *E. (I.) breviformis* (Chaudoir); *E. (I.) costulata* (Chaudoir); *E. (I.) boyeri* (Solier) (range extension from mainland to Aruba, Dutch West Indies); *E. (I.) nevermanni* (Liebke) (range extension from Costa Rica to Panamá); *E. (I.) megala* (Reichardt); *E. (P.) inpa* (Ball and Shpeley) (range extension from Central to Upper Amazon Basin); *E. (P.) boliviana* (Mateu) (range extension from Bolivia to Peru and Ecuador); *E. (E.) strandi* Liebke; *E. (E.) cordova* Ball and Shpeley (range extension from a single locality in Veracruz State, México to Belize, in Middle America); *E. (E.) adisi* Ball and Shpeley (range extension from Central to Upper Amazon Basin, in Peru and Ecuador).

Study of the mouthparts suggests that their evolution in the Pericalina of the Western Hemisphere has involved changes in form, reductions through loss or consolidation, and gains represented by additional setae.

Overall, 2 basic types of mouthparts are recognizable: Type A, characteristic of the *Eucheila* genus-group; and Type B, characteristic of the *Thyreopterus*, *Catascopellus*, *Pericalus*, and *Eurycoleus* genus-groups. Type A exhibits more numerous modifications than Type B, but the markedly derived features of Type A are combined with retention of plesiotypic features, suggesting that the *Eucheila* genus-group separated early from those genus-groups with Type B mouthparts. The basic Type B pattern has substantial modifications, useful for taxonomic recognition; both within and between genus-groups that exhibit this type of mouthparts, and probably for phylogenetic analysis. From a functional perspective, the less derived forms of mouthparts, as in, for example, the thyreopteroid *Stenognathus onorei*, or the eucheiloid *Eucheila marginata*, indicate general predaceous feeding, involving particulate matter. The most striking modifications of the mouthparts, as seen in the subgenus *Eucheila,* suggest a profound change in food or feeding mechanisms, from consumption of particulate matter to consumption of liquids, or liquefied tissue.

The distribution pattern of genera and species is fitted to a general model purporting to explain such patterns, in terms of plate tectonics, refuge theory, and climatic change during the Tertiary Period.

Concluding remarks offer explanation of and justification for the taxonomic changes, including proposal of monobasic taxa and recognition of species based on limited material.

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Introduction

Recent entomological activity by field workers in the tropics of the Western Hemisphere has produced a rich assemblage of carabid beetles. Many collections have come to us on loan for identification and study, adding significantly to the material that we and our immediate associates have gathered during the past 2 decades. Because of our interest in Neotropical pericaline Lebiini expressed in several publications (principally Ball 1975a; Ball and Shpeley 1983; and Shpeley and Ball 1993), we have paid particular attention to this subtribe.

In spite of our previous work, in which we treated many of the pericalines known at the time, we found in the recently acquired material a number of undescribed species in the genera that we had revised. As well, we found in older collections in museums a number of undescribed Neotropical pericalines. Review of all of this material caused us to reconsider some of the morphological and taxonomic conclusions that we had published previously.

The purpose of this paper is to make known the new species that have been discovered, and new information about previously described species. This basically descriptive work has provided the opportunity to revise most of the pericaline genera of the Western Hemisphere. The Neotropical component of the genus *Coptodera* Dejean was revised recently (Shpeley and Ball 1993), but recent collections, especially in the upper Amazon Basin, have yielded fine material, which is worthy of note. We take this opportunity also to correct some previous errors and to present our revised understanding of some of the supraspecific taxa that we treated previously. Much of this information is summarized in the included keys.

Material, Methods, and Terms

Material

This study is based on examination of 1768 pericaline Lebiini. Some of the material was available in the Strickland Museum, Department of Biological Sciences, University of Alberta (UASM). Additional material was borrowed from, or deposited in, the following institutions and private collections, noted in the text by the associated codens. Names of owners or curators are included, in parentheses.

AMNH Department of Entomology, American Museum of Natural History, Central Park West at 79th Street, New York, New York, U.S.A. 10024 (L. H. Herman)

BMNH Department of Entomology, British Museum (Natural History), Cromwell Road, London, England SW7 5BD (M. J. D. Brendell, S. J. Hine)

CASC Department of Entomology, California Academy of Sciences, Golden Gate Park, San Francisco, California, U.S.A. 94118 (D. H. Kavanaugh)

CMNC Canadian Museum of Nature, Entomology, P.O. Box 3443, Station D, Ottawa, Ontario, Canada K1P 6P4 (R. S. Anderson, F. Génier)

CMNH Section of Entomology, Carnegie Museum of Natural History, 4400 Forbes Avenue, Pittsburgh, Pennsylvania, U.S.A. 15213 (R. L. Davidson)

CNCI Canadian National Collection, Agriculture and Agri-Food Canada, K. W. Neatby Building, Ottawa, Ontario, Canada K1A 0C6 (Y. Bousquet)

CUIC Department of Entomology, Comstock Hall, Cornell University, Ithaca, New York, U.S.A. 14850 (J. K. Liebherr, K. W. Will)

EMEC Essig Museum, Division of Entomology and Parasitology, University of California-Berkeley, Berkeley, California, U.S.A. 94720 (J. A. Chemsak)

FMNH Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, Illinois 60605, U.S.A. (M. Thayer, A. Newton, Jr.)

FSCA Florida State Collection of Arthropods, Division of Plant Industry, Florida Department of Agriculture, P.O. Box 147100, Gainesville, Florida, U.S.A. 32614 (R. E. Woodruff)

HFRE H. Freude, I-60015 Falconara, Via Sadegna 7, Italy

HNHM Zoological Department, Hungarian Natural History Museum, H-1088 Budapest, Baross u. 13, Hungary (O. Merkl)

IEMM Instituto de Ecología, A.C., Departamento de Ecología y Comportamiento Animal, Apartado Postal 63, Xalapa 91000, Veracruz, México (E.D. Montes de Oca)

INBC Instituto Nacional de Biodiversidad, Apto. 22-3100, Santo Domingo de Heredia, 3100, Heredia, Costa Rica (A. Solis)

ISNB Institut Royal des Sciences Naturelles de Belgique, Rue Vautier 29, B1040, Brussels, Belgium (K. Desender, A. Drumont and P. Grootaert)

JMCA Joaquin Mateu, Laboratorio de Entomología, Estación Experimental de Zonas Aridas, General Segura, 1, 04001 Almería, Spain

JEWC J. E. Wappes, 179 Fall Creek, Bulverde Texas, U.S.A., 78163

JMPR Julio Micheli, 14 Baldorioty St.-Mariani, Ponce, Puerto Rico, U.S.A. 00731

LSUC Department of Entomology, Louisiana State University, Baton Rouge, Louisiana, U.S.A. 70803-1710 (C. E. Carlton)

MAIC Michael A. Ivie, Department of Entomology, Montana State University, Bozeman, Montana, U.S.A. 59717
MCZC Department of Entomology, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A. 02138 (P. D. Perkins, B. D. Farrell)
MNHB Zoologisches Museum, Museum für Naturkunde der Humboldt-Universität zu Berlin, 104 Berlin, 43 Invalidenstrasse, Germany (F. Hieke)
MNHC Museo Nacional de Historia Natural, La Habana 2, Ciudad de la Habana 10200, Cuba (P. Valdez Ruiz)
MNHP Entomologie, Muséum National d'Histoire Naturelle, 45 Rue Buffon, Paris, 75005, France (H. Perrin, T. Deuve)
MPEG Departmento de Entomologia, Museu Paraense Emilio Goeldi, C.P. 399, Belem, Para 66000, Brazil (W. Overal)
MZSP Museo de Zoologia da Universidade de São Paulo, Biblioteca, 7172, 01.051 São Paulo, Brazil (C. Costa)
OSUC Department of Entomology, Ohio State University, 1735 Neil Avenue, Columbus, Ohio, U.S.A. 43210 (C. A. Triplehorn)
OXUM Hope Entomological Collections, University Museum, Parks Road, Oxford, OXI 3PW, United Kingdom (G. C. McGavin; D. J. Mann)
PKLC P. K. Lago, Department of Biology, University of Mississippi, University, Mississippi, U.S.A., 38677
PMCT Pierre Moret, 13, rue Léo Delibes, 31200 Toulouse, France
PVRC Pavel Valdez Ruiz Collection, Avenida 71 e/zz y 24, no. 2220, Cotorro, 2349 La Habana 2, CP 10200, Cuba
QCAZ Quito Catholic Zoology Museum, Departamento de Biologia, Pontificia Universidad Catolica del Ecuador, 12 de Octubre y Carrion, Apto. 2184, Quito, Ecuador (G. Onore)
RHTC Robert H. Turnbow, Directorate of Engineering and Housing, Building 1404, Fort Rucker, Alabama, U.S.A. 36362-5137
RMNH National Museum of Natural History, P. O. Box 9517, 2311 RA., Leiden, The Netherlands (J. van Tol)
RSAC Robert S. Anderson, Canadian Museum of Nature, Entomology, P.O. Box 3443, Station D, Ottawa, Ontario, Canada K1P 6P4
SEMC Snow Entomological Museum, The University of Kansas, Lawrence, Kansas, U.S.A. 66045-2119 (J. S. Ashe, R. E. Brooks)
TAMU Department of Entomology, Texas A&M University, College Station, Texas, U.S.A. 77843 (H. R. Burke)
UCDC University of California, Davis Collection (L. S. Kimsey)
UDAE S. L. Straneo Collection, Department of Entomology, University of Arkansas, Fayetteville, Arkansas, U.S.A. 72701 (J. B. Whitfield)
UMMZ Division of Insects, University of Michigan, Museum of Zoology, Ann Arbor, Michigan, U.S.A. 48109-1079 (M. F. O'Brien)
USNM Department of Entomology, United States National Museum of Natural History, Smithsonian Institution, Washington, D. C., U.S.A. 20560 (T. L. Erwin, W. Steiner)
ZMAN Instituut voor Taxonomische Zoologie, Zoologisch Museum, Universiteit van Amsterdam, Plantage Middenlaan 64, 1018 DH Amsterdam, The Netherlands (J.P. Duffels)
ZMUC Department of Entomology, Zoological Museum, University of Copenhagen, Universitetsparken, DK-2100, Köbenhavn, Denmark (O. Martin)

Methods

Taxonomic concepts, principles, criteria for ranking, and general working methods were the same as those described previously (Ball 1975a, 1978; Allen and Ball 1980).

Measurements

Measurements were made with an ocular micrometer in a Wild M5 stereoscopic microscope, at 12X, 25X, and 50X. Measurements of body parts and abbreviations used for them in the text are:

Length of head (**Hl**) - linear distance from base of left mandible to posterior margin of left compound eye;
Width of head (**Hw**) - maximum distance across head, including eyes;
Width of frons (**Fw**)- distance across head between base of eyes;
Length of pronotum (**Pl**) - linear distance from anterior to posterior margin, measured along the midline;
Width at apex (anterior margin) of pronotum (**Pwa**) - linear transverse distance from anteriolateral angle to anteriolateral angle;
Maximum width of pronotum (**Pwm**) - greatest linear transverse distance;
Width at base (posterior margin) of pronotum (**Pwb**) - linear transverse distance from posteriolateral angle to posteriolateral angle;
Length of elytra (**El**) - linear distance from basal ridge to apex of longer elytron (if the pair of elytra is asymmetrical), measured along the suture;
Length of labial palpomere 3 (**L3l**) - linear distance from base to apex;
Width of labial palpomere 3 (**L3w**) - linear distance across apical margin;
Standardized Body Length (**SBL**), used as an index of overall size, is the sum of Hl, Pl, and El. Values for various ratios (more or less diagnostic for species) were computed, using the measurements above.

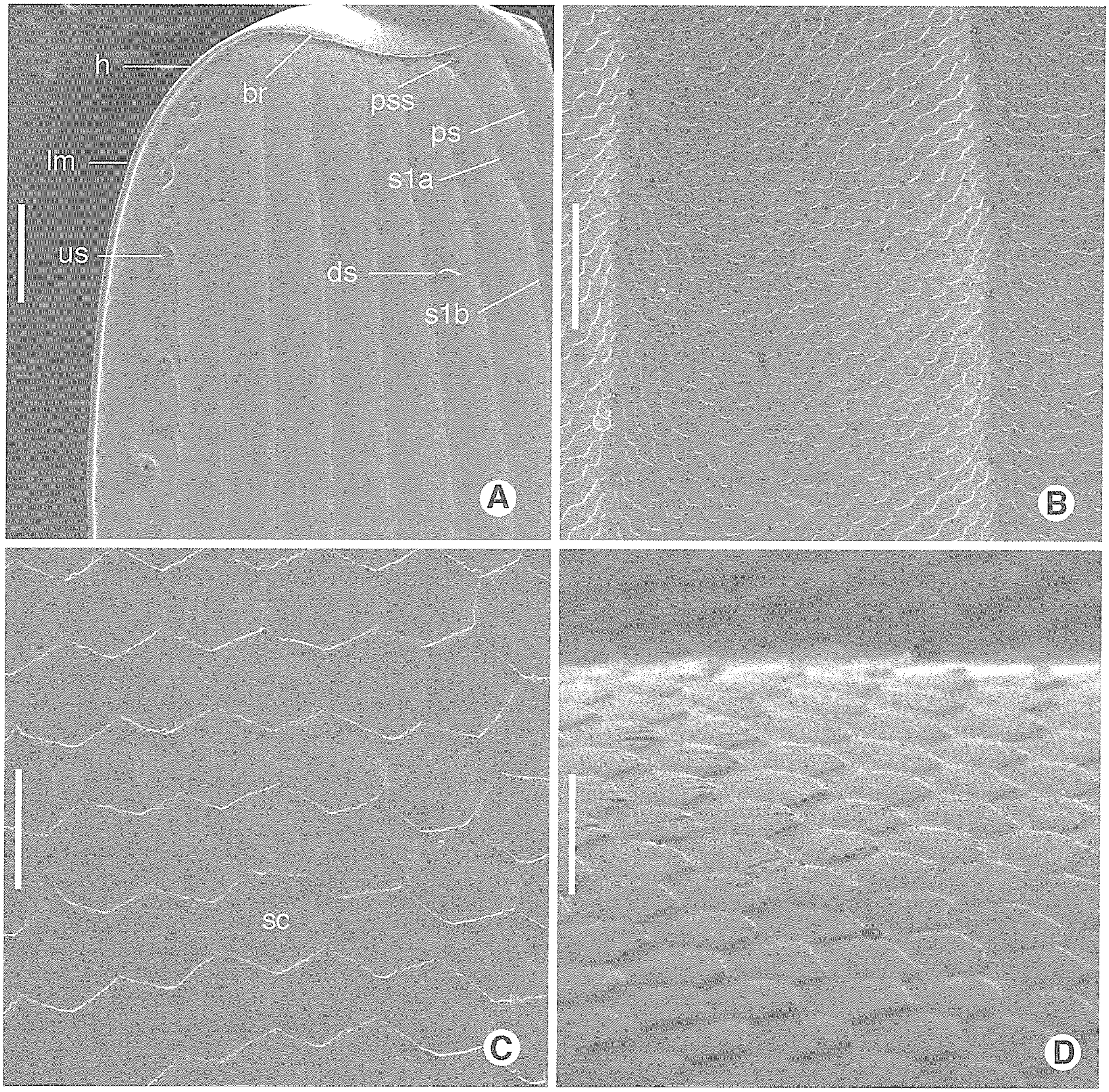


Figure 1. SEM photographs of elytra and elytral microsculpture, dorsal aspect of *Stenognathus (Prostenognathus) onorei*, new species. **A**, left elytron, basal portion. **B-D**, microsculpture: **B-C**, plan view; **D**, view from left lateral angle. Scale bars: **A** = 500 µm.; **B** = 100 µm.; **C** and **D** = 20 µm. Legend: **br**, basal ridge; **ds**, discal seta; **h**, humerus; **lm**, lateral margin; **ps**, parascutellar interneur; **pss**, parascutellar setigerous puncture; **s1a**, interneur 1, basal diagonal portion; **s1b**, interneur 1, apical portion; **sc**, sculpticell; and **us**, umbilical setigerous puncture.

Preparation of material. Dissections were made by using standard techniques. Genitalia and other small structures were preserved in glycerine in microvials, pinned beneath the specimens from which they were removed. Larger structures and those that were gold-coated for study with the SEM were glued to cards pinned beneath the specimens from which they were removed.

Photographs of isolated structures were taken with a Cambridge S-250 Scanning Electron Microscope and a JEOL JSM 6301 FXV field emission SEM. Line drawings of selected body parts were prepared by using a camera lucida on a Wild W5

Table 1. Comparison of terms used for parts of the mandibles[1].

Present system[2]	Ball (1975)
left supraterebral ridge	left terebral margin
left supraterebral tooth	left terebral tooth
left terebral ridge	left retinacular ridge
left terebral tooth	left posterior retinacular tooth
molar tooth	premolar tooth
	Shpeley and Ball (1993)
left premolar ridge	left retinacular ridge

[1] Terms not noted are the same for all systems
[2] Based on Acorn and Ball (1991)

stereoscopic microscope. Plates were prepared by using Adobe Photoshop 4.0.1.

Descriptions. To avoid repetition, character states of lower ranking taxa recorded in the descriptions of higher-ranking taxa are not repeated in the descriptions of the included lower-ranking taxa. Thus, the complete description of a species must be assembled from its taxonomic placement. Such a description can be obtained by reading the descriptions and diagnoses of the sequence of higher-ranking taxa in which the lower-ranking taxon is placed.

Phylogenetic relationships. A general analysis was not attempted, nor are phylogenetic relationships postulated for all taxa. For many species, we felt sufficiently confident to offer an assessment of their relationships, because of overall similarity plus features considered apotypic based on generalized outgroup comparison or on previous phylogenetic analyses of various pericaline genera or genus-groups.

Supraspecific ranking. Clusters of species are evident, based on features postulated to be synapotypic, and on distribution pattern, or chorological similarity. To designate these putative monophyletic clusters, the categories used are: species group; subgenus; genus; and genus-group. We have adopted a broad generic concept to make this categorical level useful to a wide variety of biologists rather than restricting it, so that its value is limited to carabid specialists.

Label data. For type material, the information on each label is reproduced as exactly as is possible using ordinary type. Information on each label is enclosed in quotation marks; as well, a semicolon marks the end of a label. A slash mark (/) indicates the end of each line of text. Enclosed in square brackets is information about color of label paper (other than white) or printing (other than black), form of the label (other than rectangular), and coden for collection in which type material is housed.

For other material, only the actual locality and depository of specimens are given. Label data about altitude and date of collection are reported in summary fashion under "Habitat" and "Material examined", respectively.

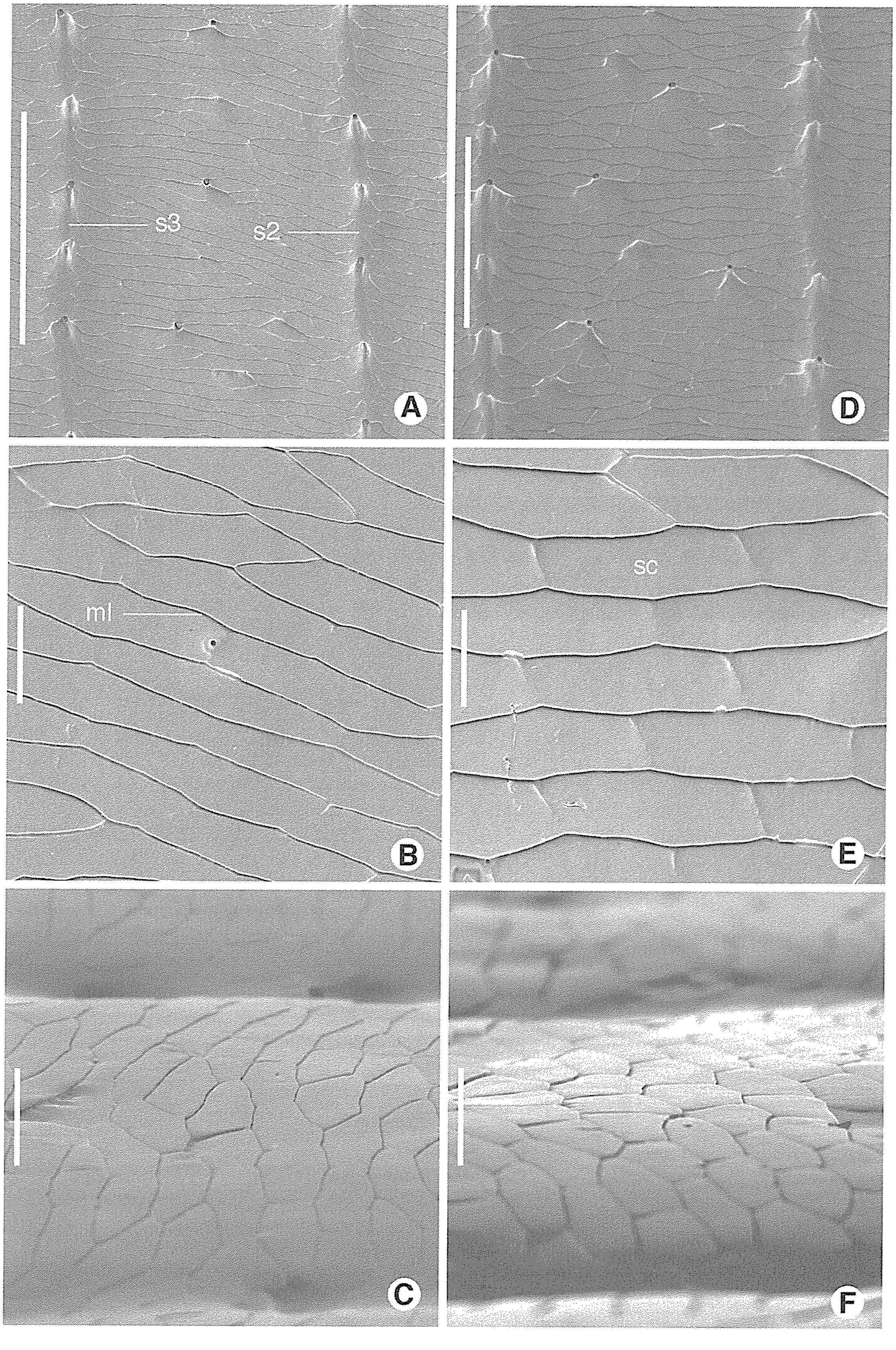
Terms for structural features

Most of the terms used to designate details of structures are found in textbooks of general entomology, or are used by coleopterists, generally. Other words, used to designate particular structures or parts thereof, are not in general use, though they have been used by us in previous publications. We provide information about these words here, as well as names that have been changed for certain structural features.

Microsculpture. A "sculpticell" is the space on the surface of the cuticle enclosed by adjacent microlines of the integumental system of microsculpture (Allen and Ball 1980:485-486). Microsculpture of the elytra varies from mesh pattern isodiametric, with sculpticells shingled (Figs. 1B-D) to transverse, with sculpticells flat (Figs. 2A-F), to longitudinal, with sculpticells distinctly keeled (Figs. 3B-D). Regardless of previous practice with reference to mesh pattern, *length* of a sculpticell refers to its longer dimension, with *width* referring to the shorter dimension.

Chaetotaxy. This term refers to the fixed setae, which are the long, evidently tactile, commonly encountered setae on carabids: dorsal labral (6); clypeal (1 pair); supraorbital (2 pairs); suborbital (1 pair, Fig. 4); stipital (1 to several on each stipes); palpiferal; submental; mental; glossal; palpigeral; pronotal; elytral parascutellar, discal, and umbilicate (or lateral); coxal, trochanteral, femoral, and tarsomeral; and abdominal sternal ambulatory. For descriptions of species of the genus *Stenognathus*, we included in chaetotaxy the long setae on the femora of males.

Body parts. The term "segment" is restricted for use to those body parts that reflect embryonic somites; thus, somite-like portions of the abdomen are referred to as segments. Abdominal segments are designated


s3
s2
A
D
ml
B
sc
E
C
F

by Roman numerals corresponding to their respective somites. The first complete sternum is III, and the last one normally exposed is VII. For numbering the genital somites, we follow Bils (1976).

Portions of appendages are designated by the suffix "-mere", the prefix depending on the appendage in question: antenno-, palpo-, tarso-, etc.

Labrum. Setae are designated as dorsal, lateral, and anterior, depending on their respective positions. Elements of the ventral epipharynx are designated according to a system devised by Ball et al. (1995: 305, Fig 9A and 309, Fig. 13A), based on a system used for the elements of the epipharynx of melolonthine scarab larvae (Böving 1942:8-10, Fig. 3). The carabid epipharynx is much simpler (Figs. 5B, D, F, H), comprising a central concave area, the pedium (**ped**) that narrows basally either markedly in the form of a V (Figs. 5B, D), or more broadly, in the form of a U (Figs. 5F, H), with a sparse covering of short sensilla. Laterally a pair of parapedial ridges is terminated basally in a narrow parapedial projection (**pp**, Figs. 5B, D) that is more or less developed, or the termination is a simple arc (Figs. 5F, H). Laterad the parapedial ridges each side is a row of parapedial setae (**ps**) extended nearly to the base of the labrum. These setae vary from closely spaced and prominent (Figs. 5B, D, F), to widely spaced, few, and relatively small (Fig. 5H). Basally, the parapedial setae are flanked each side by a deep groove, the crepis (**cr**). More anteriorly, the lateral areas are glabrous (Figs. 5B, D, F) or sparsely, irregularly setose (Fig. 5H).

Mandibles. Shpeley and Ball (1993:11 and 15) characterized the mandibles of the pericaline genus *Coptodera* Dejean, and illustrated the major features with SEM figures. Ball et al. (1995:289-290) characterized the mandibles for the subtribe Pericalina in a cladistic analysis of the subtribes of Lebiini. Another review is required here because the range of variation in structural details of the Neotropical pericalines is more extensive than believed previously, and some interpretations reported in the references noted above and in Ball (1975a) require correction (Table 1).

Changes of names used by Ball (1975a) for parts of the occlusal margins of the mandibles were based on a more extensive and detailed study of the subject by Acorn and Ball (1991). The most important consequence involves interpretation of the dentition of *Mormolyce* Hagenbach (Ball 1975a:148). The prominent tooth of the left mandible declared by Ball (1975a:148, Fig. 1A, **tt**) to be the terebral tooth, is clearly a projection of the supraterebral ridge, a structure that in most other carabids does not have such a projection (but see Fig. 6G, **stt**). Thus, rather than being plesiotypic and placing *Mormolyce* in a basal position within the Pericalina, this feature is more likely apotypic, and does not require a primitive position for this genus.

The change in designations for the basal parts of the left mandible from that of Shpeley and Ball (1993) is the result first, of a cladistic analysis of lebiine subtribes (Ball et al. 1995), showing a complete complement of mandibular dentition (i.e., distinct left retinacular tooth and ridge, and premolar tooth and ridge on both left and right mandibles, in addition to other features) in close relatives of the subtribe Pericalina, and second, of a detailed study of the mandibles of the less derived subgenera of *Eucheila* Dejean *(Hansus* Ball and Shpeley, and *Inna* Putzeys), In these taxa, it is clear that the retinacular ridge of the left mandible is located ventrad the terebral tooth, that is, in the normal location (**rr,** Figs. 9E, M). Further, the right mandible characteristic of these subgenera exhibits a distinct premolar tooth and ridge, the first evidence that this part of the mandible is present in the Pericalina. In summary, details of the left and right mandibles show a left retinacular ridge in the normal position, and presence of a right premolar tooth and ridge. These points, then, are interpreted as evidence that these features were present in the mandibles of the ancestral stock of the subtribe Pericalina.

Previously, this was not clear. Thus, it seemed reasonable to interpret the left mandibular ridge between molar and terebral teeth as being retinacular on the basis that the right mandible had an unquestionable retinaculum, and no premolar. With the evidence now available, it seems more reasonable to assume that the ridge in question on the left mandible is the premolar ridge, rather than a retinacular ridge that has moved posteriorly.

Figs. 6 to 9 illustrate the mandibles representing the *Thyreopterus, Catascopellus, Eurycoleus*, and *Eucheila* genus-groups. Illustrations of the mandibles representative of the *Pericalus* genus-group are in

Figure 2. SEM photographs of elytral microsculpture, dorsal aspect of *Phloeoxena (Ochropisus)*. **A-C**, *P. caudalis* (Bates): **A-B**, plan view; **C**, view from left lateral angle. **D-F**, *P. lamuralla*, new species: **D-E**, plan view; **F**, view from left lateral angle. Scale bars: **A** and **D** = 100 μm.; **B**, **C**, **E**, and **F** = 10 μm. Legend: **ml**, microline; **s2**, interneur 2; **s3**, interneur 3; and **sc**, sculpticell.

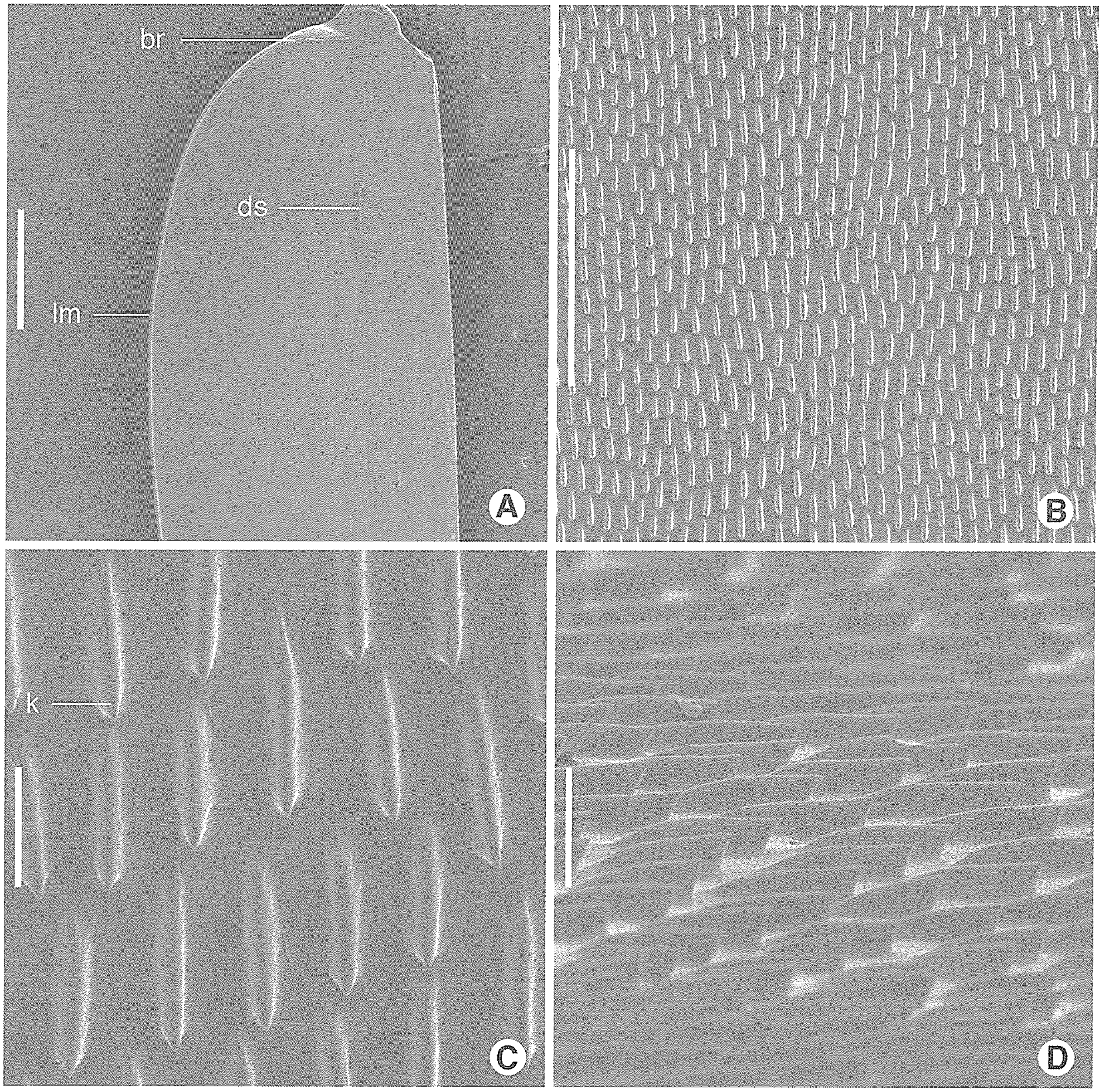


Figure 3. SEM photographs of elytra and elytral microsculpture, dorsal aspect of *Phloeoxena (Oenaphelox) totontepec*, new species. **A**, elytron, basal portion. **B-D**, microsculpture: **B-C**, plan view; **D,** view from left lateral angle. Scale bars: **A** = 500 µm.; **B** = 100 µm.; **C** and **D** = 10 µm. Legend: **br**, basal ridge; **ds**, discal seta; **k**, microkeel; and **lm**, lateral margin.

Shpeley and Ball (1993: 14, 16-17, Figs. 2-4). Details of structural features are summarized in Table 2.

Trigonal in form, the mandibles exhibit generally an elongate terebral area and a relatively short basal or molar area. Laterally, the scrobes are setose or asetose. Width varies markedly from narrow (scrobes concealed in dorsal aspect (Figs. 6A, B) to markedly broad (scrobes evident dorsally, Fig. 11O, P), principally as a result of the lateroventral margins (**lvm**, Fig. 7C) being extended laterally. Dorsal surfaces are variously sculptured (strigulose, Figs. 9A, B) smooth, with dentiform projections (**dp**, Figs. 8B, Q), or without them, the right mandible with an oblique terebral ridge (**otr**, Fig. 8H) or without one. The terebral ridge (**tr**) varies from about 2/3 the length of the occlusal margin (Fig. 6A) to about the total length of the occlusal margin (Fig. 9Q). The lateroventral margin is interrupted by a lateroventral

Table 2. Characters and character states of the mouthparts of representative taxa of Western Hemisphere Pericalina.

		Taxa[1]											
Char. No.	Characters & Char. States	Ste ono	Ste den	Ste nig	Phl her	Cat obs	Cat cra	Lel ins	Eur mac	Cop sal	Euc mar	Euc bre	Euc adi
1	Labrum: L/Wm 0, <0.90 1, 0.90-1.00 2, 1.01-1.07	1	1	1	0	2	0	1	2	2	1	1	2
2	Labrum: Wb/Wm 0, 0.94-1.00 1, 0.80-0.90 2, <0.80	0	0	0	1	0	0	0	0	0	0	1	2
3	Labrum: lateral margins 0, parallel-sided 1, convergent from base toward apex 2, rounded, divergent to max. width	0	0	0	1	0	0	0	0	0	1	1	2
4	Labrum: anterior margin 0, subtruncate, medially shallowly concave 1, subtruncate, medially deeply, narrowly notched 2, broadly rounded, protruded	0	0	0	0	1	0	0	0	0	0	0	2
5	Labrum: anterior setae 0, row of 6, dorsally near ant. margin 1, row of 4, dorsally nr. ant. marg., 2, post., laterally on dorsal surface 2, row of 4, on anterior surface	0	0	0	0	0	0	0	0	0	1	1	2
6	Labrum: lateral setae 0, 2-5, anterior half 1, 6-9, entire margin 2, 10, entire margin	0	0	0	0	0	0	0	0	0	1	1	2
7	Epipharynx, pedium 0, narrow, elongate, w/ parapedial ridges 1, narrow, elongate, w/o parapedial ridges 2, wide, w/o parapedial ridges	0	0	0	0	0	0	0	0	0	1	1	2
8	Epipharynx, parapedial setae 0, single row each side, converg.post. 1, scattered laterally, not aligned	0	0	0	0	0	0	0	0	0	0	0	1
9	Mandibles: TRL/OL 0, 0.60-0.63 1, 0.64-0.70	0	1	0	0	1	0	1	0	0	1	1	1
10	Mandibles: BW/ OL 0, 0.35-0.40 1, 0.41-0.45	1	1	0	1	1	0	1	1	1	0	0	1

Table 2. Continued.

Char. No.	Characters & Char. States	Ste ono	Ste den	Ste nig	Phl her	Cat obs	Cat cra	Lel ins	Eur mac	Cop sal	Euc mar	Euc bre	Euc adi
11	Mandibles: TW/BW 0, 0.54-0.66 1, 0.80-0.88 2, 0.90-1.28	0	0	0	0	0	0	2	2	0	1	1	1
12	Mandibles, lateral explanation 0, not explanate 1, slightly-moderately explanate 2, markedly explanate	0	0	0	0	0	0	1	2	0	1	1	1
13	Mandibles, terebral curvature 0, same for left and right mandibles 1, diff. for left and right mandibles	0	0	0	0	0	0	1	1	0	0	0	0
14	Mandibles, terebra, dorsal surface 0, strigulation slight 1, strigulation pronounced 2, smooth	0	0	0	0	0	1	2	2	1	2	2	2
15	Mandibles, basal area 0, strigulose 1, smooth	0	0	0	0	0	0	1	1	0	1	1	1
16	Mandibles, setation 0, scrobes asetose 1, scrobes sparsely setose, setae short	0	0	0	0	0	1	0	0	0	0	0	0
17	Mandibles, basal brushes 0, present 1, absent	0	0	0	0	0	0	0	0	0	0	0	1
18	Mandibles ventral grooves 0, straight or curved slightly 1, sinuate 2, absent	0	0	0	1	0	1	0	0	0	2	2	2
19	Mandibles, sensory grooves 0, present 1, absent	0	0	0	0	0	0	0	0	0	1	1	1
20	Mandibles, lateroventral grooves 0, absent 1, present	0	0	0	1	0	0	0	0	0	0	0	0
21	Left mandible, dorso-lat. dentif. proj. 0, absent 1, present	0	0	0	0	0	0	0	0	0	0	0	1
22	Right mandible, dorsal oblique terebral ridge 0, absent 1, short, near lateral margin, only 2, long, across entire surface	1	1	1	1	2	0	2	2	0	1	1	1
23	Right mandible, dorso-lat. dentif. proj. 0, absent 1, present	0	0	0	0	0	0	0	0	0	1	1	1

Table 2. Continued.

Char. No.	Characters & Char. States	Ste ono	Ste den	Ste nig	Phl her	Cat obs	Cat cra	Lel ins	Eur mac	Cop sal	Euc mar	Euc bre	Euc adi
24	Left mandible, supraterebral ridge 0, complete, straight, not toothed 1, complete, sinuate, not toothed 2, complete, sinute, toothed 3, incomplete	0	2	3	0	0	0	1	1	0	0	0	0
25	Left mandible, terebral tooth 0, large, prominent 1, small, or absent	1	1	1	1	1	1	1	1	1	0	0	0
/26	Left mandible, retinaculum 0, present, anteriad 1, jpresent, basad, only 2, absent	0	2	2	2	2	2	2	2	2	0	0	1
27	Left mandible, anterior occlusal groove 0, slight indentation, only 1, absent	0	1	1	0	0	1	1	1	0	1	1	1
28	Left mandible, posterior occlusal groove 0, present, deep, distinct 1, present, shallow, indistinct 2, absent	1	2	2	2	2	2	2	2	2	0	0	2
29	Left mandible, premolar ridge 0, moderately prominent 1, markedly prominent 2, absent	0	0	0	1	0	0	0	0	0	2	2	2
30	Left mandible, premolar groove 0, narrow 1, broad	0	1	1	1	0	0	1	1	0	NA	NA	NA
31	Left mandible, molar ridge 0, complete, with occlusal portion & basal extension 1, incomplete, occlusal portion absent 2, indistinct, complete or not	0	1	1	1	1	1	1	2	1	0	0	1
32	Right mandible terebral tooth 0, distinct 1, very small or absent	1	1	1	1	1	1	1	1	1	0	0	0
33	Right mandible, retinaculum 0, present 1, absent	0	0	0	0	0	0	0	0	0	0	0	1
34	Right mandible, anterior retinacular tooth 0, present 1, absent	0	0	0	0	0	0	0	0	0	1	0	NA
35	Right mandible, retinacular ridge 0, prominent, evident in dorsal aspect 1, not prominent, concealed beneath terebral ridge	0	0	0	1	1	1	1	1	0	0	1	NA

Table 2. Continued.

Char. No.	Characters & Char. States	Ste ono	Ste den	Ste nig	Phl her	Cat obs	Cat cra	Lel ins	Eur mac	Cop sal	Euc mar	Euc bre	Euc adi
36	Right mandible posterior retinacular tooth 0, short, not prominent 1, long, flat 2, long, prominent 3, absent	1	1	2	1	1	3	2	2	0	0	0	NA
37	Right mandible, post. retinac. tooth, dorsal surface 0, relatively smooth 1, strigose	0	0	0	0	0	0	1	1	0	0	0	NA
38	Right mandible, premolar tooth 0, present 1, absent	1	1	1	1	1	1	1	1	1	0	0	1
39	Right mandible, molar tooth 0, present, projected 1, present & indistinct, or absent	0	0	0	0	0	0	1	1	0	0	0	1
40	Right mandible, molar ridge 0, complete 1, incomplete or absent	0	0	0	0	1	0	0	0	0	0	0	1
41	Right mandible, anterior occlusal groove 0, present 1, absent	1	1	1	1	1	1	1	1	1	0	0	NA
42	Right mandible, posterior occlusal groove 0, present 1, indistinct or absent	0	0	0	0	0	0	0	0	0	0	0	NA
43	Right mandible, retinacular tooth, dorsal surface, macrosculpture 0, smooth 1, strigose	0	0	0	0	0	0	1	1	0	0	0	NA
44	Right mandible, retinacular ridge, ventral surface, macrosculpture 0, smooth 1, strigose	0	0	1	1	0	1	1	1	0	1	1	NA
45	Maxilla, number of stipital setae 0, 1 1, 2-3	0	0	0	0	0	0	0	1	0	0	0	0
46	Maxilla, palpiferal seta 0, directed laterad 1, directed anteriad	0	0	0	0	0	0	0	0	0	1	1	1
47	Maxilla, lacinia, occlusal margin, setation 0, moderately dense 1, dense 2, more sparse	0	0	0	0	0	0	1	1	0	2	2	2

Table 2. Continued.

Char. No.	Characters & Char. States	Ste ono	Ste den	Ste nig	Phl her	Cat obs	Cat cra	Lel ins	Eur mac	Cop sal	Euc mar	Euc bre	Euc adi
48	Maxilla, galea 0, galeomeres slender, subcylindrical, completely articulated, & 1>2 1, galeomeres broader, medial face concave, fused laterally, & 1<2	0	0	0	0	0	0	0	0	0	1	1	1
49	Maxilla, palpus, palpomere 1 0, asetose 1, with 2 rows of 3 short setae	0	0	0	0	0	0	0	1	0	0	0	0
50	Maxilla, palpus, palpomeres 3 &4 0, subequal in length 1, palpomere 4 longer than 3	0	0	0	0	0	1	1	1	1	1	1	1
51	Maxilla, palpomere 4, form 0, slender, tapered to narrow apex 1, broad, not tapered, apical margin subtruncate	0	0	0	0	0	0	0	0	0	1	1	1
52	Labium, mentum, length of basal portion medially 0, subequal to or longer than length of lateral lobe 1, less than length of lateral lobe	0	0	0	0	0	0	0	0	0	0	0	1
53	Labium, mentum, epilobes 0, present 1, absent	0	0	0	0	0	0	0	0	0	0	0	1
54	Labium, mentum, apex of lateral lobe 0, broadly, obtusely angulate 1, broadly subtruncate 2, narrowly rounded	0	0	0	0	0	0	1	1	0	0	0	2
55	Labium, mentum, tooth 0, present 1, absent	0	0	0	0	0	0	1	1	1	0	0	1
56	Labium, prementum, paraglossae 0, membranous 1, partially sclerotized 2, completely sclerotized	0	0	0	0	0	0	0	0	0	0	1	2
57	Labium prementum, paraglossae, length 0, longer than glossal sclerite 1, as long as glossal scelrite	0	0	0	0	0	0	0	0	1	1	1	1
58	Labium, prementum, paraglossae, lateral margins 0, asetose, or with 1 or 2 setae 1, with more than 10 setae	0	0	0	0	0	0	0	0	0	0	0	1
59	Labium, prementum, glossal sclerite, apical setae 0, 4 1, 2	0	0	0	0	0	0	1	0	1	1	1	1

Table 2. Continued.

Char. No.	Characters & Char. States	Ste ono	Ste den	Ste nig	Phl her	Cat obs	Cat cra	Lel ins	Eur mac	Cop sal	Euc mar	Euc bre	Euc adi
60	Labium, prementum, glossal sclerite, medial setae 0, absent 1, present, 1 pair	0	0	0	0	0	0	0	0	0	1	1	1
61	Labium, prementum, palpiger 0, asetose 1, with single long seta	0	0	0	0	0	0	0	0	1	0	0	0
62	Labium, prementum, palpus, palpomere 3, form 0, narrow, parallel-sided 1, broad, securiform	0	0	0	0	0	0	0	0	0	1	1	1
TOTAL SCORE		9	19	19	20	19	19	36	39	18	31	33	58

[1] Legend for names of taxa: **Cat cra**, *Catascopellus crassiceps* Straneo; **Cat obs**, *Catascopus obscuroviridis* Chevrolat; **Cop sal**, *Coptodera sallei* Shpeley & Ball; **Euc adi**, *Eucheila (sensu stricto) adisi* Ball & Shpeley; **Euc bre**, *Eucheila (Inna) breviformis* Chaudoir; **Euc mar**, *Eucheila (Bordoniella)* marginata, new species; **Eur mac**, *Eurycoleus macularius* Chevrolat; **Lel ins,** *Lelis insculpta* Bates; **Phl her,** *Phloeoxena (Tacana) herculeano* Ball; **Ste den**, *Stenognathus (Gnathostenus) dentifemoratus*, new subgenus and species; **Ste ono,** *Stenognathus (Prostenognathus) onorei*, new subgenus and species; and **Ste nig**, *Stenognathus (s.str.) nigropiceus* Bates.

Table 3. Classification of the Western Hemisphere genera, subgenera and species groups of Subtribe Pericalina.

***Thyreopterus* genus-group**

Oreodicastes Maindron, 1905

Stenognathus Chaudoir, 1843
- Subgenus *Prostenognathus*, **new subgenus**
- Subgenus *Gnathostenus*, **new subgenus**
- Subgenus *Stenognathus* (*sensu stricto*)
  - *Phloeotherates* Bates 1869 (junior subjective synonym)
- Subgenus *Pristolomus* Chaudoir, 1869

Phloeoxena (*sensu lato*) Chaudoir, 1869
- Subgenus *Tacana* Ball, 1975
- Subgenus *Ochropisus* Bates, 1883, **new status**
- Subgenus *Oxephloena*, **new subgenus**
- Subgenus *Oenaphelox* Ball, 1975
  - *P. pluto* species group
  - *P. signata* species group
- Subgenus *Phloeoxena* (*sensu stricto*)
  - *P. schwarzi* species group
  - *P. picta* species group

Catascopus Kirby, 1825
- Subgenus *Catascopus* (*sensu stricto*)
  - *C. brasiliensis* species group

***Catascopellus* genus-group**

Catascopellus Straneo, 1969

***Eurycoleus* genus-group**

Lelis Chaudoir, 1869

Eurycoleus Chaudoir, 1848
- *E. poecilopterus* species group
- *E. ornatus* species group

***Pericalus* genus-group**

Coptodera Dejean, 1825
- *Stenoglossa* Chaudoir, 1825 (junior subjective synonym)
- *Haplocrepis* Jeannel, 1949 (junior subjective synonym)

***Eucheila* genus-group**

Eucheila Dejean, 1829
- Subgenus *Hansus* Ball and Shpeley, 1983, **new status**
- Subgenus *Bordoniella* Mateu, 1989, **new status**
- Subgenus *Inna* Putzeys, 1863, **new status**
  - *Periglossium* Liebke, 1929 (junior subjective synonym)
- Subgenus *Pseudoinna* Mateu, 1989
- Subgenus *Eucheila* (*sensu stricto*), **new status**
  - *E. strandi* species group
  - *E. flavilabris* species group
  - *E. erwini* species group

***Somotrichus* genus-group**

Somotrichus Seidlitz, 1887

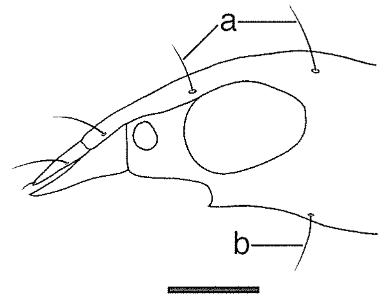


Figure 4. Line drawing of generalized head capsule, labrum and mandible, left lateral aspect, of Pericalina, showing major setae of head capsule. Scale bar = 0.25 mm. Legend: **a**, supraorbital setae; and **b**, suborbital seta.

groove near the apex of the scrobe (**lvg**, Figs. 7E, F), or continuous, without such a groove. Ventrally, the ventral groove (**vg**, Fig. 6C) is without microtrichia, and the secretory groove is present (**sg**, Fig. 8C), or absent.

The left mandible dorsally has, toward the occlusal margin, a supraterebral ridge (**str**) which is complete in length, but without a supraterebral tooth (Fig. 6A), or complete in length, straight, or slightly to markedly sinuate, and with a supraterebral tooth (Fig. 6G, **stt**), or incomplete in length, and without a supraterebral tooth (Fig. 8G). The terebral ridge (**tr**, Fig. 6A) is curved throughout its length and curves gradually into the base of the incisor tooth, or is straight basad the incisor area, and bent sharply toward the incisor (Figs. 7G and 8O). The premolar tooth (**pm**) is not projected, though its base is evident (Fig. 6A), or it is fused with the molar tooth. The premolar area, if present, is marked by anterior (**aog**) and posterior (**pog**) occlusal grooves (Fig. 6A). The anterior occlusal groove is a shallow indentation, and the posterior occlusal groove is either shallow, relatively indistinct, or deep and distinct (**pog**, Fig. 9I). The molar area varies from distinctly dentate (**m**, Fig. 6A) to being almost totally reduced, being evident only as the ventrally located molar ridge (**mr**, Fig. 9U). We believe that the absence of a molar tooth from the left mandible in the *Thyreopterus, Catascopellus* and *Eurycoleus* genus-groups is a result of disappearance of the posterior occlusal groove, and hence fusion of premolar and molar.

The ventral surface of the left mandible exhibits various ridges near the occlusal margin. A short retinacular ridge is evident in the *Eucheila* genus-group (**rr**, Figs. 9E, M, U), but not in the members of the other genus-groups, Shpeley and Ball (1993) not withstanding. The premolar ridge (**pmr**) is variously developed, from larger (Figs. 7E, M) to moderate in size (Figs. 6C, K) to rather indistinct (Figs. 8K, S), or

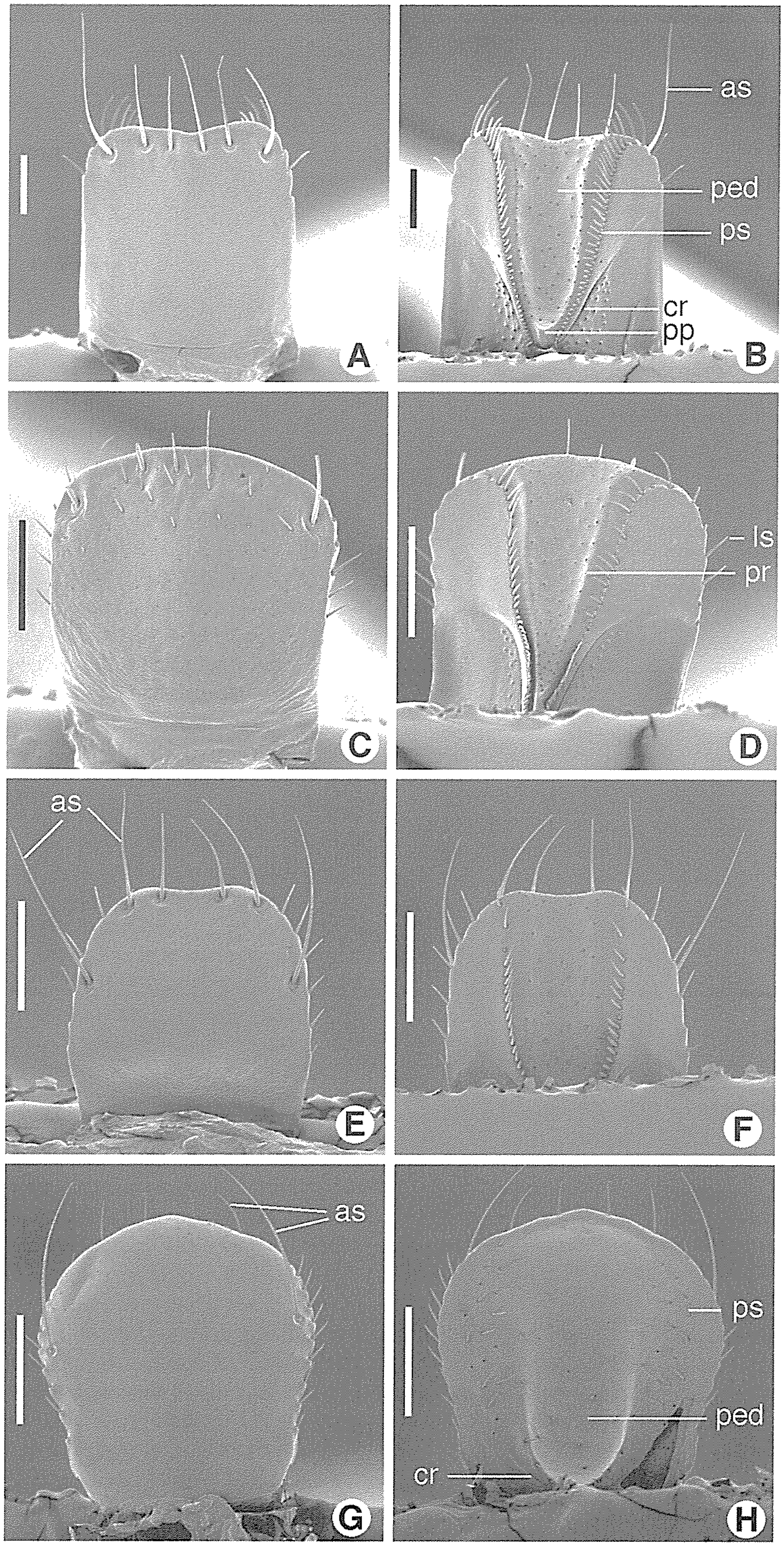

as
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Table 4. Data about variation in Standardized Body Length (mm.) and various proportions for species of *Oreodicastes* Maindron.

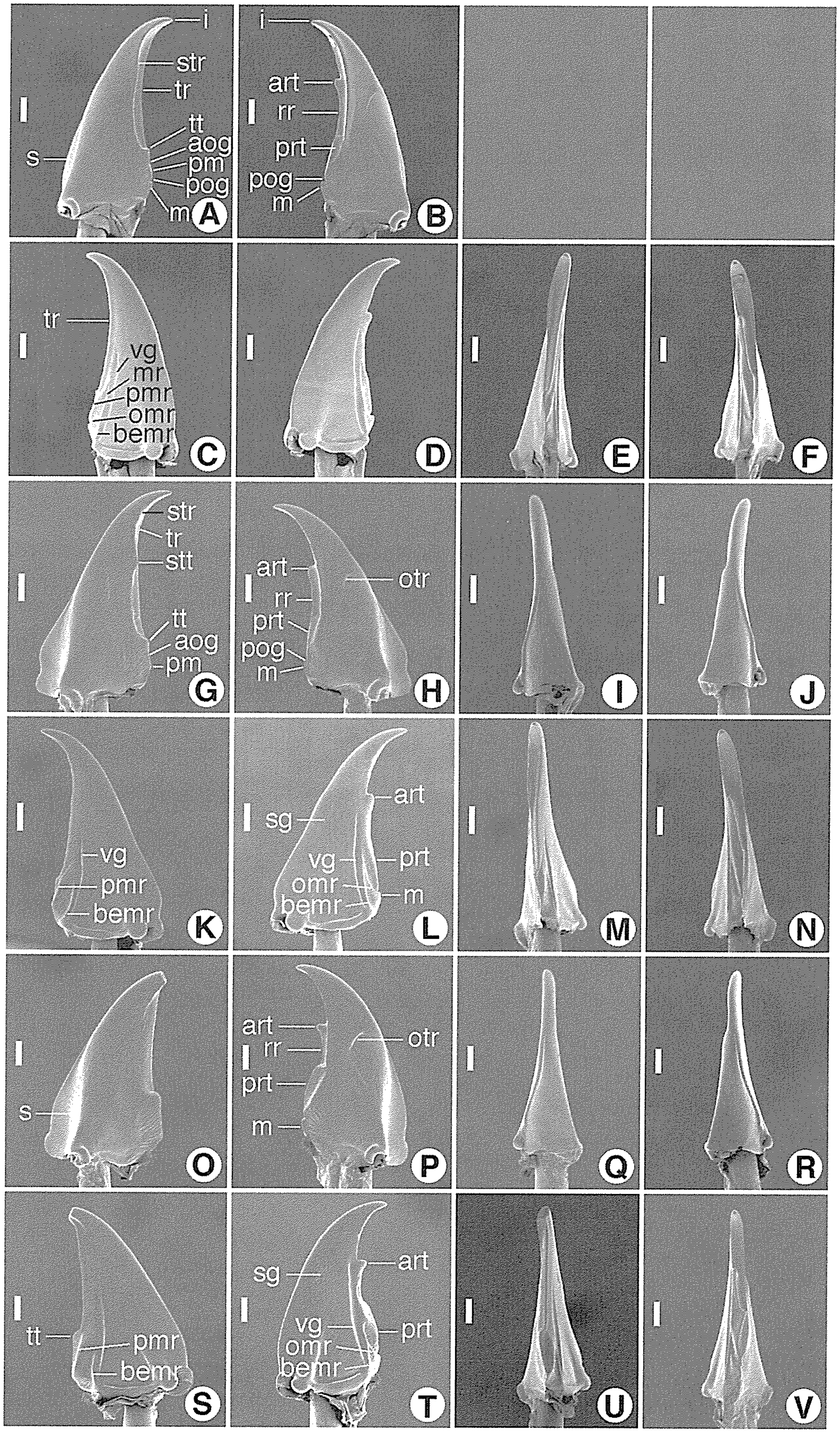
Value/ Ratio	Species	Males			Females		
		N	Range	Mean	N	Range	Mean
SBL (mm)							
	O. aeacus, n. sp.				1	10.96	
	O. gounellei Maindron	1	8.84		1	9.44	
	O. minos, n. sp.	1	8.92		2	9.36- 9.40	9.38
	O. subcyaneus (Chaudoir)	2	10.36		4	9.96-12.08	10.70
	O. rhadamanthus, n. sp.	6	9.60-11.24	10.48	6	9.80-11.80	10.79
Hw/Fw							
	O. aeacus, n. sp.				1	1.404	
	O. gounellei Maindron	1	1.389		1	1.385	
	O. minos, n. sp.	1	1.468		2	1.470-1.499	1.492
	O. subcyaneus (Chaudoir)	2	1.486-1.499	1.492	4	1.473-1.488	1.492
	O. rhadamanthus, n. sp.	6	1.464-1.543	1.506	6	1.277-1.499	1.484
Hw/Pwm							
	O. aeacus, n. sp.				1	0.756	
	O. gounellei Maindron	1	0.769		1	0.818	
	O. minos, n. sp.	1	0.723		2	0.704-0.722	0.713
	O. subcyaneus (Chaudoir)	2	0.659-0.696	0.677	4	0.681-0.716	0.699
	O. rhadamanthus, n. sp.	6	0.634-0.692	0.656	6	0.649-0.679	0.668
Pl/ Pwm							
	O. aeacus, n. sp.				1	0.846	
	O. gounellei Maindron	1	0.769		1	0.818	
	O. minos, n. sp.	1	0.800		2	0.722-0.761	0.741
	O. subcyaneus (Chaudoir)	2	0.756-0.772	0.764	4	0.745-0.773	0.757
	O. rhadamanthus, n. sp.	6	0.753-0.785	0.769	6	0.739-0.767	0.750
Pl/El							
	O. aeacus, n. sp.				1	0.373	
	O. gounellei Maindron	1	0.338		1	0.348	
	O. minos, n. sp.	1	0.356		2	0.333-0.351	0.342
	O. subcyaneus (Chaudoir)	2	0.359-0.367	0.363	4	0.339-0.350	0.346
	O. rhadamanthus, n. sp.	6	0.375-0.409	0.393	6	0.363-0.384	0.371

lacking (Fig. 9U). The molar ridge varies from complete, with occlusal portion, apical portion, and basal extension (**omr, mr, bem,** Fig. 6C) to partial, with occlusal portion absent (Fig. 7E), or occlusal portion absent, and only part of the basal extension evident (Fig. 7M).

The right mandible dorsally exhibits a curved terebral ridge terminated anteriad the anterior or posterior occlusal groove in a distinct blunt tooth (**tt**, Fig. 9B) or is rounded or slightly angulate and not projected, hardly dentiform (Fig. 6B). Ventrad the terebral ridge is the retinaculum, with an anterior retinacular tooth (**art**, Fig. 6B) or without one (Fig. 9B). The posterior retinacular tooth (**prt**) is a low swelling, more prominent (Fig. 6H) or less so (Fig. 6B), or absent (Fig. 9R). Between the retinacular teeth, or anteriad the posterior tooth, the retinacular ridge (**rr**) is located, being visible dorsally (Fig. 6B) or not (Fig. 8B), or like the teeth, the ridge is also absent (Fig. 9R). Posteriad the retinaculum, a premolar tooth (**pm**) is present (Fig. 9B) or not (Fig. 6B). Similarly, a molar tooth (**m**) is developed, more (Fig. 6B) or less (Figs. 9H and 9R) prominently.

Ventrally, most of the occlusal margin is occupied by the retinaculum (**art + rr + prt,** Fig. 6D [see 6B for labels]), or not so, with the retinaculum lacking (Fig.

Figure 5. SEM photographs of labra of Pericalina: **A-B**, dorsal and ventral aspects, respectively, of *Stenognathus (Prostenognathus) onorei*, new species; **C-D**, dorsal and ventral aspects, respectively, of *Eurycoleus macularius* (Chevrolat); **E-F**, dorsal and ventral aspects, respectively, of *Eucheila (Bordoniella) marginata*, new species; and **G-H**, dorsal and ventral aspects, respectively, of *Eucheila (s. str.) adisi* Ball and Shpeley. Scale bars = 200 µm. Legend: **as**, apical seta; **cr**, crepis; **ls**, lateral seta; **ped**, pedium; **pp**, parapedial projection; **ps**, parapedial seta; and **pr**, parapedial ridge.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9V). Posteriad the posterior retinacular tooth is a premolar ridge (**pmr**, Fig. 9F), or molar ridge (**omr** + **bemr** + **mr**). The molar ridge is complete, with the occlusal portion (**omr**), basal extension (**bemr**), and anterior portion (**mr**) more or less developed.

Maxillae. Except for the bizarre galea of *Eucheila* adults, the parts of the pericaline maxilla are standard for Carabidae. For the seta-like structures on the occlusal edge of the lacinia, we use the term macrotrichium (macrotrichia, pl.. **lmt**, Fig. 10A). Setae are named according to the sclerites on which they are inserted.

Labium. Like the maxillae, the pericaline labia are standard for Carabidae. For the combined glossae and paraglossae, we use the standard term ligula. The central sclerotized, apically setiferous structure is the glossal sclerite (**gsc**, Fig. 11). The setae are named according to the sclerites on which they are inserted.

Elytra. Longitudinal grooves on the dorsal surface (striae of most authors) are designated as "interneurs" (Erwin 1974:3-5).

Male tarsal vestiture. 3 types of adhesive vestiture (Stork 1980) on the ventral surface of the fore tarsi are exhibited by pericaline males. Those of the *Catascopellus* genus group have adhesive vestiture on tarsomeres 1-4 of articulo-setae (Figs. 12D -F), 1 and 4 with vestiture apicad only, 2 and 3 with entire surface covered; each articulo-seta with shaft rugose on distal surface, plate oblong, sides rounded, pointed distally; tactile setae ventrally one row each side. Males of the other genus-groups have vestiture on fore tarsomeres 1-3, only, of biseriate squamo-setae (Figs. 12A-C, 32A-H), or uniseriate squamo-setae (Figs. 32I-L).

Male genitalia. The surface of the median lobe treated by convention as dorsal is really the ventral surface, and vice versa (Deuve 1993:88). We have chosen to remain with the conventional usage. Median lobes were classified as: anopic, with the ostium dorsad; catopic, with ostium ventrad; or pleuropic, with ostium lateral and internal sac directed laterally in everted position, left or right.

Noonan (1973:275) provided terms to designate parts of the median lobe (Fig. 19B): a proximal enlarged bulb-like region, the basal bulb (**bb**) with basal orifice (**bo**) through which passes the ejaculatory duct; the more or less cylindrical portion between basal bulb and preapical orifice (**po**) is the shaft (**s**); and the apical portion (**ap**) is between the distal end and preapical orifice. The preapical orifice marks the juncture between sclerotized and membranous parts of the median lobe, and through this opening the internal sac everts. The term apex is reserved for the tip of the apical portion of the median lobe.

Ovipositor. Although Deuve (1993) presented a useful general system for naming the parts of the adephagan ovipositor, for the sclerites, we have elected to remain with the older system used by Ball and Shpeley (1983:746-749). To compare the systems, we note that for stylomere 2, stylomere 1, and valvifer, Deuve (1993) uses respectively gonocoxite IX, gonosubcoxite IX, and laterotergite IX. For sense organs, Deuve (1993) used "subapical setose organ" for the structure designated by Ball and Shpeley as the "sensory furrow", and the included "furrow peg setae" and "nematoid setae". Here, we adopt subapical setose organ as the collective term for the entire complex, retaining the names that we used previously for the respective parts, except that nematiform is used in place of "nematoid", following Liebherr (1987:295).

For the stylomeres, the surfaces that are ventral in the infolded position are lateral when the ovipositor is extended; thus such surfaces are designated as lateral, and the other surfaces are designated accordingly. Stylomere 2 exhibits the following features (Fig. 13B): **bl**, basal lobe; **bla**, blade; **sso**, subapical setose organ; and **les** and **mes**, lateral and medial ensiform setae respectively. Details of the subapical setose organ are illustrated in Fig. 13C: **fp**,

Figure 6. SEM photographs of mandibles of genus *Stenognathus* Chaudoir. **A-F**, *S. (Prostenognathus) onorei*, new species: **A**, **C**, and **E**, left mandible, dorsal, ventral, and occlusal aspects, respectively; **B**, **D**, and **F**, right mandible, dorsal, ventral, and occlusal aspects, respectively. **G-N**, *S. (Gnathostenus) dentifemoratus*, new species: **G**, **I**, **K**, and **M**, left mandible, dorsal, lateral, ventral, and occlusal aspects, respectively; **H**, **J**, **L**, and **N**, right mandible, dorsal, lateral, ventral, and occlusal aspects, respectively. **O-V**, *S. (Stenognathus) nigropiceus* (Bates): **O**, **Q**, **S**, and **U**, left mandible, dorsal, lateral, ventral, and occlusal aspects, respectively; **P**, **R**, **T**, and **V**, right mandible, dorsal, lateral, ventral, and occlusal aspects, respectively. Scale bars: **A-N** = 200 µm.; **O-V** = 100 µm. Legend: **aog**, anterior occlusal groove; **art**, anterior retinacular tooth; **bemr**, molar ridge, basal extension; **i**, incisor tooth; **m**, molar tooth; **mr**, molar ridge; **omr**, molar ridge, occlusal portion; **otr**, oblique terebral ridge; **pm**, premolar tooth; **pmr**, premolar ridge; **pog**, posterior occlusal groove; **prt**, posterior retinacular tooth; **rr**, retinacular ridge; **s**, scrobe; **sg**, sensory groove; **str**, supraterebral ridge; **stt**, supraterebral tooth; **tr**, terebral ridge; **tt**, terebral tooth; and **vg**, ventral groove.

furrow peg seta; and **ns**, nematiform seta. The furrow itself is unlabelled: it is the depression containing the setae of the organ.

Geographical terms

An important landmark that extends north-south in South America is the Andean mountain system. Areas to the west of the Andes are designated *trans*-Andean; those to the east, as *cis*-Andean. The term *Middle America* refers to México plus the republics of Central America, collectively.

Biogeographical terms

Following Frank and McCoy (1990), we use "indigenous" (synonyms autochthonous, native) for a taxon that achieved its current taxonomic status in the area where it is living. If an indigeneous taxon occurs nowhere else, it is referred to as "precinctive" (from Latin, meaning to gird, or encircle).

A taxon that achieved its taxonomic status elsewhere than in a given area where it occurs now, is "adventive" in that area. An adventive taxon is either "introduced" if moved to a given area by man; or it is "immigrant" if it was not introduced.

To facilitate zoogeographic discussion, the following terms are used: *Nuclear Middle America*, which includes northern Nicaragua, the Central American republics north thereof, and México; and *Lower Central America*, which includes the southern part of Nicaragua, Costa Rica, and Panamá, a region which, until the Pliocene Epoch, consisted of a series of isolated volcanic islands.

Phylogenetic terms

In place of sister group or sister taxon, we use "adelphotaxon" (Ax 1987:36), for reasons given by that author. In place of "plesiomorphic" and "apomorphic", we use "plesiotypic" and "apotypic", on the basis that the latter pair have a more general connotation than the former pair (Tuomikoski 1967).

Subtribe Pericalina

To the characterization of this subtribe (Ball 1975a:147), we add the following putatively apotypic features. Head, dorsal surface, with more or less distinct depression between paired frontal impressions. Labrum ventrally with epipharynx with pedium long, and crepis short (not extended nearly to anterior margin of labrum, Figs. 5B, D, F, H). Mandibles with terebra relatively long, basal or molar area short, and ventral microtrichia absent (Figs. 6A, C); left mandible without retinaculum or only short retinacular ridge (Figs. 6A, 9E), ventrad terebral tooth, premolar present but blunt, or absent (Figs. 6A, 8A), and anterior occlusal groove shallow or absent (Figs. 6A, 6G). Labium with paraglossae (Fig. 11) adnate for most (or all) of length of glossal sclerite. Fore tarsus of males with adhesive vestiture either of squamo-setae (Figs. 12A-C) of one or 2 rows (Figs. 32A-L) or articulo-setae (Figs. 12D-F). Female reproductive tract (cf. Fig. 51): spermatheca bipartite, with smaller portion and a larger portion (the "blind sac", Shpeley and Ball 1993: 28: Figs. 13A, B); duct of spermathecal gland attached to either portion. Both portions exhibit substantial variation in size among different taxa.

A key (p. 29) summarizes the more easily seen features used to recognize the pericaline genera and subgenera.

Relationships and Classification

Ball et al. (1995:297-299), as part of a cladistic analysis of lebiine subtribes, concluded that the Pericalina are the adelphotaxon of the Sugimotoina and Actenonycina. In turn, this assemblage of 3 subtribes is the adelphotaxon of the remaining lebiine subtribes. We have not made a formal phylogenetic analysis of the pericaline genera, but we have recognized several assemblages of genera that we believe to be monophyletic.

Ball (1975a:153) offered the first classification of the New World genera of Pericalina, recognizing 4 assemblages not ranked formally: "Thyreopteroids"; "Somotrichoids"; "Eurycoleoids"; and "Pericaloids". Ball and Shpeley (1983:751) recognized these groups, which they designated as "complexes", and added to them the Eucheiloid complex.

Basilewsky (1984) ranked the lebiines as a subfamily, and based principally on form of the ovipositor, provided a classification of the African genera of this taxon. Recognizing 3 lebiomorph supertribes (Cyclosomitae, Lebiitae, and Zuphiitae), he included the pericalines *(sensu lato)* in the Lebiitae. For the pericalines (sense of Ball), 3 groups were recognized and ranked as tribes: Mormolycini; Pericalini; and Somotrichini. Mormolycines (including subtribes Mormolycina, Thyreopterina, and Eucheilina) were treated as closely related to Pericalini *(sensu stricto)*, and both groups were placed

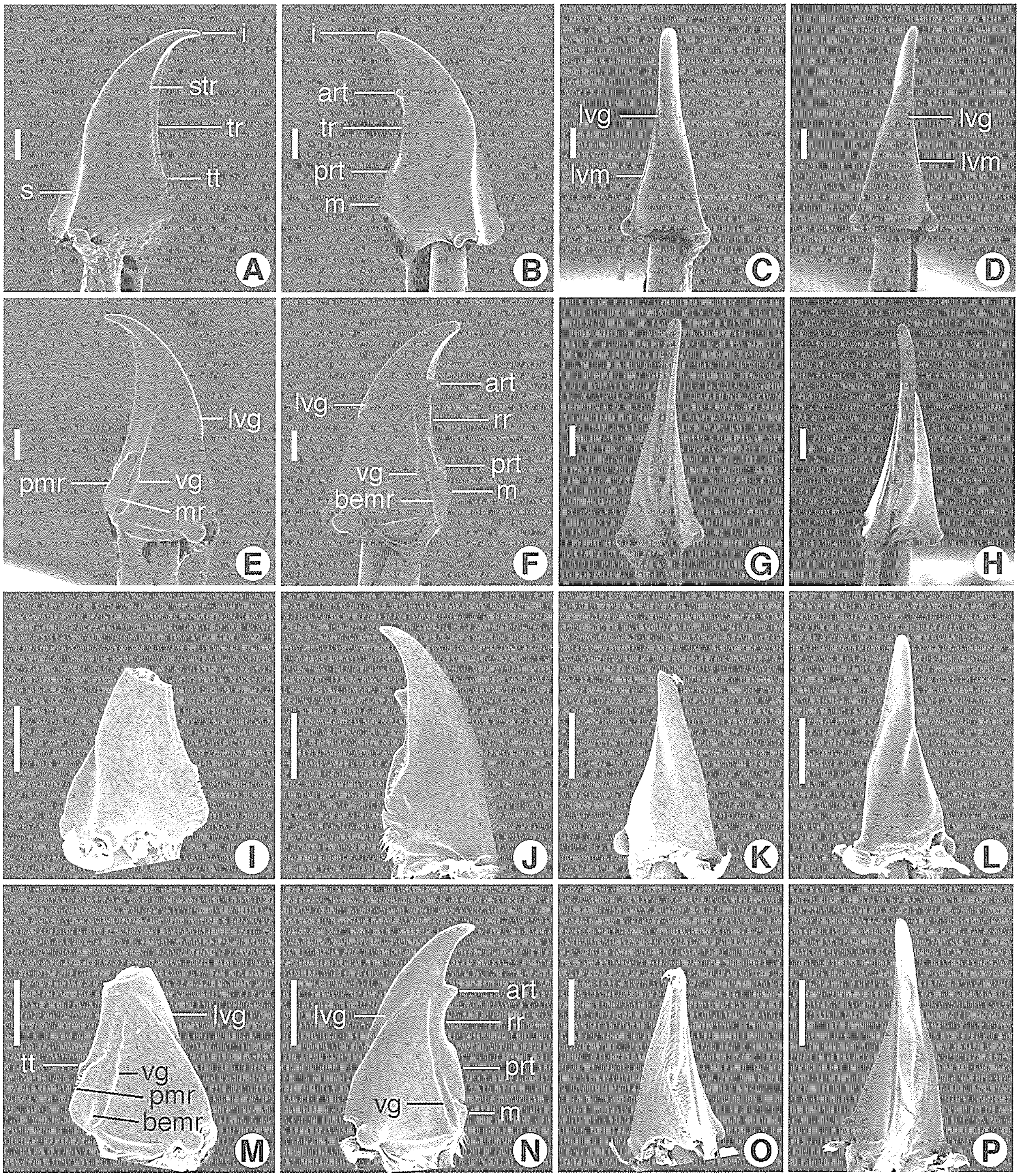
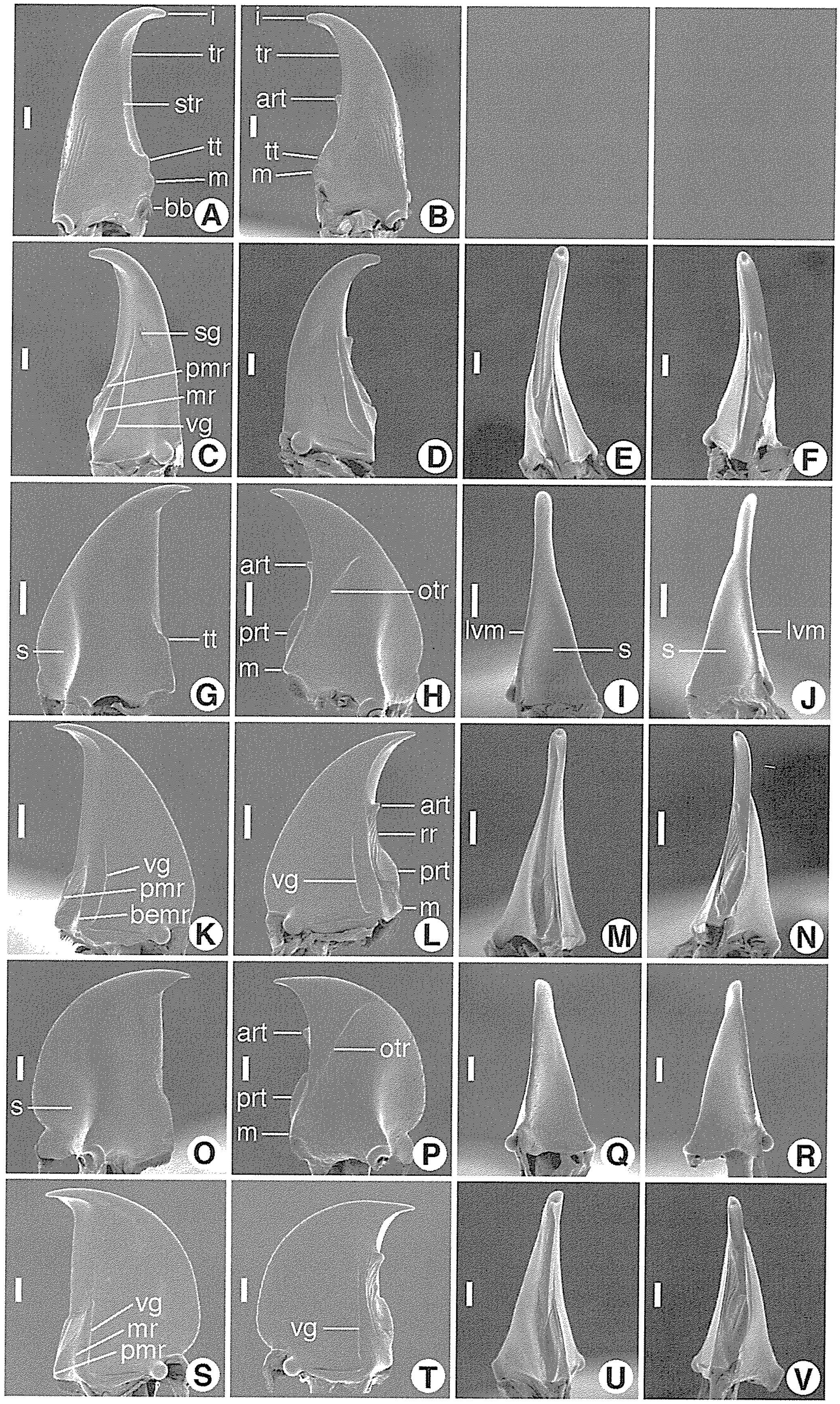


Figure 7. SEM photographs of mandibles of genus *Phloeoxena* Chaudoir. **A-H**, *P. (Tacana) herculeano* Ball: **A**, **C**, **E**, and **G**, left mandible, dorsal, lateral, ventral, and occlusal aspects, respectively; **B**, **D**, **F**, and **H**, right mandible, dorsal, lateral, ventral, and occlusal aspects, respectively. **I-P**, *P. (Oxephloena) turrialba*, new species: **I**, **K**, **M**, and **O**, left mandible, apex damaged, dorsal, lateral, ventral, and occlusal aspects, respectively; **J**, **L**, **N**, and **P**, right mandible, dorsal, lateral, ventral, and occlusal aspects, respectively. Scale bars = 100 μm. Legend: **art**, anterior retinacular tooth; **bemr**, molar ridge, basal extension; **i**, incisor tooth; **lvg**, lateroventral groove; **lvm**, lateroventral margin; **m**, molar tooth; **mr**, molar ridge; **pmr**, premolar ridge; **prt**, posterior retinacular tooth; **rr**, retinacular ridge; **s**, scrobe; **str**, supraterebral ridge; **tr**, terebral ridge; **tt**, terebral tooth; and **vg**, ventral groove.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close to the Metallicini. In contrast, Somotrichini (as defined by Mateu 1963) were placed far from the Metallicini + Mormolycini + Pericalini, and shown as if closely related to the Lichnasthinini and Peliocypini, and more distantly related to the Dromiini and Pseudotrechini (Basilewsky 1984: 556, Fig. 8). This arrangement was based primarily on the fused labial mentum and submentum (absence of the mental suture), and the group thus formed we refer to here as the dromiine assemblage. According to Casale (1998:388, 403), absence of the mental suture is taxonomically unreliable at the tribal (or subtribal) level: for example, among the Oriental species of Peliocypina, the mentum is free or not (mental suture present or absent); among African taxa, adults of the otherwise typical dromiine complex, *Metaxymorphus* and allies, have a distinct mental suture; and similarly, among New World dromiines, *Xenodromius* Bates exhibits said suture, whereas it is not evident among other dromiine genera. Accordingly, we do not accept Basilewsky's arrangement, and continue to include *Somotrichus* and its allies in the Pericalina (Ball 1975a:169).

We continue to recognize the complexes noted above, referred to here as "genus-group". Also, for reasons presented below, we exclude *Catascopellus* Straneo from the *Somotrichus* genus-group, placing it in a group of its own. We consider that the *Catascopellus, Thyreopterus, and Eurycoleus* genus-groups are mormolycine, but prefer to leave them as separate entities pending postulation of their relationships to the Old World Tropical genera. Further, we consider that the *Eucheila* genus-group is not mormolycine, and likely should be included in a group of its own that is equivalent to the mormolycine assemblage.

Concerning suprageneric nomenclature, Basilewsky (1984:538) used the name Mormolycini for the assemblage including the Oriental *Mormolyce* Hagenbach (and its putative Madagascan relatives) and the thyreopterines. Ball (1975a: 148) left *Mormolyce* unclassified as to subtribe, questioning its putative thyreopterine affinities. However, if Basilwesky is correct, the name for the collective assemblage including all of the above, using the principle of priority, must be based on *Mormolyce* rather than *Thyreopterus,* as the former was used first for a suprageneric group (Mormolycites) in 1845, but the first usage of the latter name for this purpose was 1869 (Thyreopterides) (Madge: 1989: 465 and 468). Table 3 is a synopsis of the classification used by us.

Key to the genera of Pericalina of the Western Hemisphere, based on character states of adults.

1 Labium with mentum and submentum fused, mental suture absent. Dorsal surface of body setose. Body color pale, overall, elytra bicolored .... *Somotrichus* Seidlitz, p. 172
1' Labium with mentum and submentum separated by a distinct suture. Dorsal surface of body glabrous or setose. Color various 2

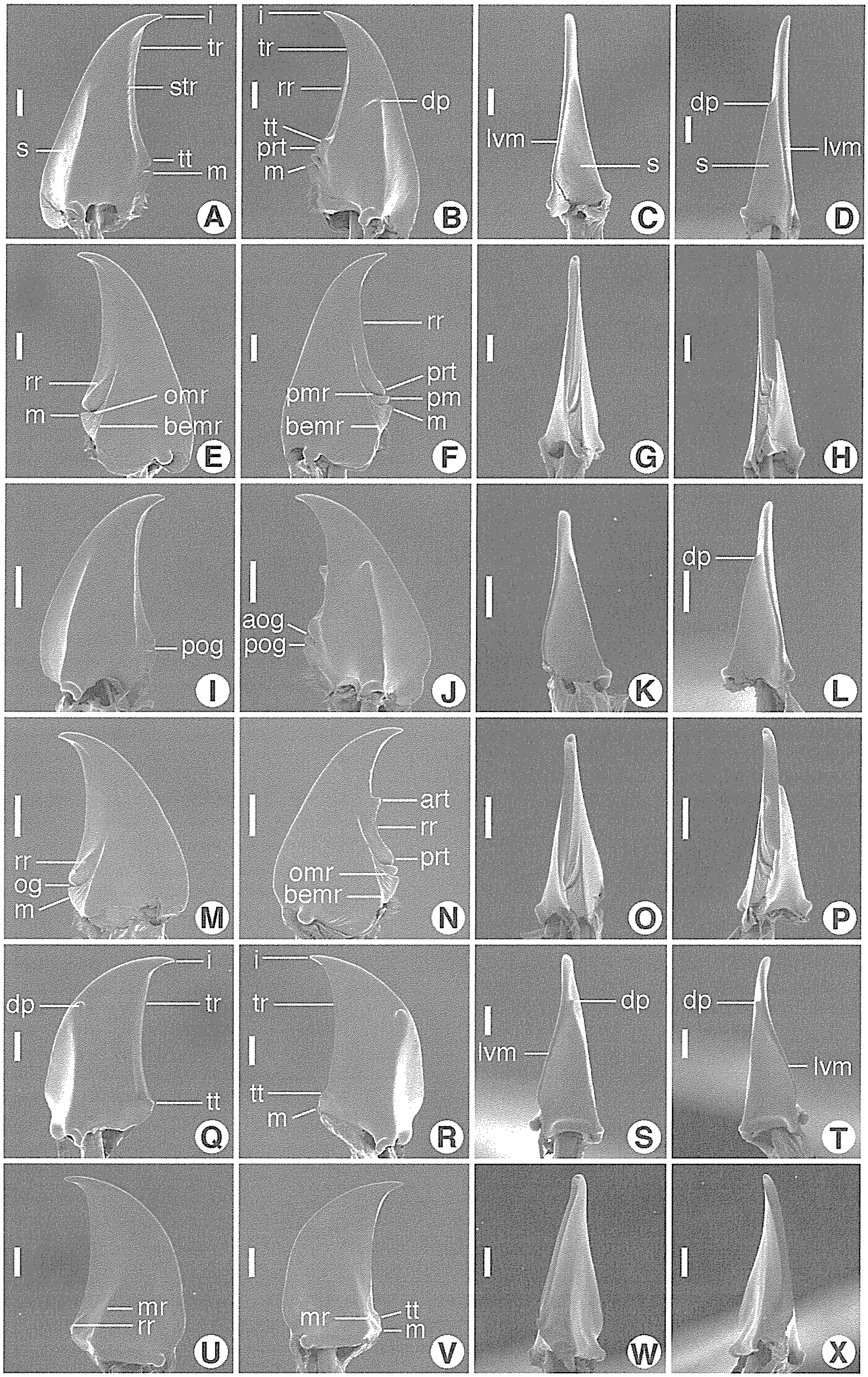
2(1') Labial palpomere 3 securiform, apical margin much wider than apical margin of maxillary palpomere 4. Glossal sclerite with pair of preapical setae. Dorsal surface more or less coarsely punctate . ... *Eucheila (sensu lato)* Dejean, p. 149
2' Labial palpomere 3 fusiform, similar to maxillary palpomere 4. Glossal sclerite with setae apical, only. Dorsal surface more or less smooth, without punctures 3

3(2') Labial mentum with median tooth 4
3' Mentum edentate 8

4(3) Dorsal surface of pronotum and elytra, and ventral surface of abdominal sterna setose. Head large, longer than pronotum .... *Catascopellus* Straneo, p. 125
4' Dorsal surface of pronotum and elytra glabrous (except for normal fixed setae). Abdominal sterna glabrous or more or less setose. Head not markedly enlarged 5

5(4') Mandible with lateroventral margin interrupted near anterior margin of scrobe by a medioventral groove (Figs. 7A, E, **lvg**). Specimen from Middle America or Southeastern North America .... *Phloeoxena (sensu lato)* Chaudoir, p. 76

Figure 8. SEM photographs of mandibles of Pericalina. **A-F**, *Catascopellus crassiceps* Straneo: **A**, **C**, and **E**, left mandible, dorsal, ventral, and occlusal aspects, respectively; **B**, **D**, and **F**, right mandible, dorsal, ventral, and occlusal aspects, respectively. **G-N**, *Lelis rutila* (Bates): **G**, **I**, **K**, and **M**, left mandible, dorsal, lateral, ventral, and occlusal aspects, respectively; **H**, **J**, **L**, and **N**, right mandible, dorsal, lateral, ventral, and occlusal aspects, respectively. **O-V**, *Eurycoleus macularius* (Chevrolat): **O**, **Q**, **S**, and **U**, left mandible, dorsal, lateral, ventral, and occlusal aspects, respectively; **P**, **R**, **T**, and **V**, right mandible, dorsal, lateral, ventral, and occlusal aspects, respectively. Scale bars = 100 μm. Legend: **art**, anterior retinacular tooth; **bb**, basal brush; **bemr**, molar ridge, basal extension; **i**, incisor tooth; **lvm**, lateroventral margin; **m**, molar tooth; **mr**, molar ridge; **otr**, oblique terebral ridge; **pmr**, premolar ridge; **prt**, posterior retinacular tooth; **rr**, retinacular ridge; **s**, scrobe; **sg**, sensory groove; **str**, supraterebral ridge; **tr**, terebral ridge; **tt**, terebral tooth; and **vg**, ventral groove.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5' Mandible with lateroventral margin not interrupted near anterior margin of scrobe by a medioventral groove (Fig. 8I, **lvm**). Specimen from South or Middle America 6

6(5') Pronotum without lateral setae; posteriolateral angles broadly rounded .... *Oreodicastes* Maindron, p. 27

6' Pronotum with 2 pairs of lateral setae; posteriolateral angles obtuse or rectangular, not broadly rounded 7

7(6') Integument dorsally dark green or blue. Labrum with anterior margin medially deeply and narrowly notched. Ventrally, middle coxae, metathorax, and abdominal sterna III and IV glabrous or with few long setae. Labium with glossal sclerite apically broad, subtruncate .... *Catascopus* Kirby, p. 112

7' Integument dorsally black or very dark piceous. Labrum with anterior margin shallowly, broadly, and angularly concave. Ventrally, middle coxae, middle of metathorax, and abdominal sterna III-IV densely setose. Labium with glossal sclerite apically narrow, rounded .... *Stenognathus (sensu lato)* Chaudoir, p. 37

8(3') Labial mentum with lateral lobes apically pointed, or narrowly rounded; palpiger ventrally with 1 seta. Mandibles slender basally, not explanate .... *Coptodera* Dejean, p. 143

8' Labial mentum with lateral lobes apically subtruncate; palpiger asetose. Mandibles at base moderately to markedly explanate 9

9(8') Body very broad, pronotum and elytra broadly explanate; mandibles broadly explanate. Labium with glossal sclerite with 4 or 5 setae apically; paraglossae setose laterally .... *Eurycoleus* Chaudoir, p. 134

9' Body narrower, mandibles, pronotum and elytra not broadly explanate laterally. Labium with glossal sclerite apically with 2 setae; paraglossae glabrous laterally .... *Lelis* Chaudoir, p. 126

Thyreopterus genus-group

To the characterization of the New World thyreopteroids, the following plesiotypic features are added: males with adhesive vestiture on fore tarsomeres 1-3 biseriate squamo-setae (Figs. 12A-C), mouthparts (see Table 2 for complete characterization) with labrum nearly quadrate, distinctly longer than clypeus, row of 6 setae dorsally, near anterior margin; mandibles (Figs. 6 and 7) not explanate, without dorsal projections, terebrae narrow, scrobes hardly visible in dorsal aspect, ventral grooves present, and left mandible with supraterebral ridge complete and terebral ridge curved evenly into incisor tooth; maxilla (Figs. 10A, B) with galea slender, galeomere 2 shorter than 1; labium with submentum separated from mentum by distinct mental suture, mentum (Fig. 11) with prominent tooth, lateral lobes prominent, epilobes widened preapically, prementum with glossal sclerite apically quadrisetose, without pair of paramedial setae, and palpiger asetose; labial palpomere 3 narrow, not securiform. The only apotypic features postulated previously (Ball and Shpeley 1983:751) for the New World thyreopteroids were those of ovipositor stylomere 2: basal lobe narrow, medial ensiform seta ventrad, and nematiform setae absent. To these we add: left mandible without retinaculum, and terebral tooth, premolar and molar more or less composite.

Genus *Oreodicastes* Maindron

Oreodicastes Maindron 1905:95.

Type species. *Oxyglossus subcyaneus* Chaudoir (by monotypy)

Comments. Chaudoir (1843:424) proposed the genus *Oxyglossus* for a single new species, *O. subcyaneus* Chaudoir. This generic name proved to be a junior homonym, and was replaced by *Oreodicastes* Maindron (1905:95). See Ball (1975a:156) for details.

Chaudoir (1843:426), following an excellent, detailed description, declared *Oxyglossus* to be a

Figure 9. SEM photographs of mandibles of genus *Eucheila* Dejean. **A-H**, *E. (Bordoniella) marginata,* new species: **A**, **C**, **E**, and **G**, left mandible, dorsal, lateral, ventral, and occlusal aspects, respectively; **B**, **D**, **F**, and **H**, right mandible, dorsal, lateral, ventral, and occlusal aspects, respectively. **I-P**, *E. (Inna) breviformis* (Chaudoir): **I**, **K**, **M**, and **O**, left mandible, dorsal, lateral, ventral, and occlusal aspects, respectively; **J**, **L**, **N**, and **P**, right mandible, dorsal, lateral, ventral, and occlusal aspects, respectively. **Q-X**, *E. (s. str.) adisi* Ball and Shpeley: **Q**, **S**, **U**, and **W**, left mandible, dorsal, lateral, ventral, and occlusal aspects, respectively; **R**, **T**, **V**, and **X**, right mandible, dorsal, lateral, ventral, and occlusal aspects, respectively. Scale bars = 100 µm. Legend: **aog**, anterior occlusal groove; **art**, anterior retinacular tooth; **bemr**, molar ridge, basal extension; **dp**, dorsal projection; **i**, incisor tooth; **lvm**, lateroventral margin; **m**, molar tooth; **mr**, molar ridge; **og**, occlusal groove; **omr**, molar ridge, occlusal portion; **pm**, premolar tooth; **pmr**, premolar ridge; **pog**, posterior occlusal groove; **prt**, posterior retinacular tooth; **rr**, retinacular ridge; **s**, scrobe; **str**, supraterebral ridge; **tr**, terebral ridge; and **tt**, terebral tooth.

connecting link between the platynine genera "*Dyscolus*" (= *Platynus* Bonelli) and "*Agonum*". Subsequently, Chaudoir (1869a:114) recognized the lebiine affinities of *Oxyglossus*, and placed it in his Thyreopterides.

Recognition. See key, above, and Ball (1975a:158, Fig. 20). Adults are *Agonum*-like in form, size moderate (ca. 8.5-12.0 mm.), and ventral surfaces of thorax and abdomen glabrous except for standard chaetotaxy, with body black.

Description. The following supersedes the description of *Oreodicastes* by Ball (1975a:159). Ball described the median lobe as "anopic", meaning, at the time, that it was not catopic. Shpeley and Ball (1993:15) used the term "pleuropic" for median lobes with the ostia predominantly laterad, either left or right. The median lobe of *Oreodicastes* is clearly pleuropic left. (Figs. 15A-H).

With character states of Pericalina and the *Thyreopterus* genus-group, restricted or amplified and with additional features, as follows. Habitus *Agonum*-like. Body rather narrow, moderately convex. SBL and values for selected ratios as in Table 4.

Color. Body black, as noted in "Recognition" section, above. Antennae, palpi and legs rufopiceous to rufous.

Macrosculpture. Head dorsally and ventrally with surface smooth. Pronotum with disc smooth. Middle and hind tibiae with posterior (dorsal) surfaces smooth.

Microsculpture. Head: dorsally microlines distinct on clypeus, frons and vertex, sculpticells flat, mesh pattern isodiametric, posteriorly microlines distinct, mesh pattern isodiametric, or slightly transverse; ventrally microlines transverse. Mouthparts: labrum with microlines distinct, mesh pattern isodiametric, sculpticells slightly convex; mentum with mesh pattern on lateral lobes isodiametric, or microlines absent medially. Pronotum: mesh pattern of disc transverse, microlines very fine, sculpticells narrow; anterior and posterior margins with sculpticells wider, nearly isodiametric; lateral grooves with sculpticells longitudinal, narrow. Proepisternal mesh pattern diagonal to longitudinal, sculpticells narrow, flat; proepimeral mesh pattern transverse; prosternal mesh pattern transverse, sculpticells narrow, flat. Pterothorax: mesh pattern of mesepisternum and mesepimeron diagonal, sculpticells long and narrow; metepisternum laterally with mesh pattern slightly transverse or slightly elongate, medially with sculpticells narrower and distinctly transverse; sternal mesh pattern transverse. Elytron: dorsal surface with mesh pattern on intervals transverse, sculpticells narrow, flat; in interneurs, mesh pattern isodiametric; epipleural mesh pattern longitudinal, sculpticells narrow, long and flat. Abdominal sterna: most of surface mesh pattern transverse, sculpticells narrow, flat; laterally mesh pattern almost isodiametric.

Luster. Dorsal surfaces generally shiny, disc of elytra iridescent or not; pterothoracic sclerites, especially pleura of mesothorax, subiridescent to iridescent; abdominal sterna with ventral surfaces iridescent medially.

Chaetotaxy. Pronotum asetose; otherwise, with standard chaetotaxy for Pericalina, as follows. Head capsule: 1 pair clypeal, 2 pairs supraorbital, 1 pair suborbital. Elytron: 1 parascutellar seta; 2 discal setae in interval 3; umbilical series with punctures in 3 parts, anterior and posterior series each with 5 or 6 setae, medial with 1 seta. Legs (fore, middle, hind): coxae (0, 5, 2); trochanters (1, 1, 1); femora (1 [posterior surface], 3-5 [anterior surface, ventrad], 2-3 [anterior surface, ventrad]); tibiae (1 row, 4 rows, 4 rows); tarsomere 5 with several setae on each ventrolateral margin. Abdominal sterna IV-VI each with 1 pair of ambulatory setae; VII with 4 setae in both males and females.

Vestiture. Dorsal surface glabrous, except fixed setae noted above. Ventral surface more densely setose in males than in females. Thorax with prosternum preapically and intercoxal process apically sparsely setose; mestasternum setose generally, or in triangular pattern with apex toward middle coxae and with bare area anteriad antecoxal piece; antecoxal piece glabrous or partially or completely setose. Abdominal sterna ventrally variously setose or glabrous.
Male fore tarsus ventrally with adhesive vestiture of biseriate squamo-setae on apical part of tarsomere 1 and on tarsomeres 2 and 3.

Head. Dorsal surface with frontal impressions approximately linear, moderately deep; gena (between eye and gnathal sinus) narrower than antennomere 1. Eyes moderately convex, not bulged. Antenna with antennomeres 1, 3, and 4 subequal, each distinctly longer than antennomere 2, and slightly longer than antennomeres 5-11.

Mouthparts. Labrum, maxillae, and labium average for *Thyreopterus* genus-group (for details, see: labrum, Figs. 5A-B; mandibles, Figs. 6A-N; maxilla, Figs. 10A-B; and labium, see Ball [1975a:161, Fig. 26]). Left mandible: dorsally, supraterebral ridge incomplete, neither toothed nor extended to terebral tooth (cf. Fig. 6K); ventrally, without molar tooth or occlusal extension of molar ridge (cf. Fig. 6K); basal extension of molar ridge plus molar ridge extended anteriorly nearly to premolar ridge (cf. Fig. 6C). Right mandible: posterior retinacular tooth flat, retinacular ridge markedly concave (cf. Figs. 6B and H).

Prothorax. Pronotum (Figs. 14A-E) moderately to markedly narrower than elytra, moderately to markedly transverse; narrowed anteriorly and posteriorly markedly to slightly. Anterior margin distinctly concave; lateral margins not sinuate posteriorly; posterior margin straight medially, sloped anteriorly laterally; anteriolateral angles slightly to markedly prominent;

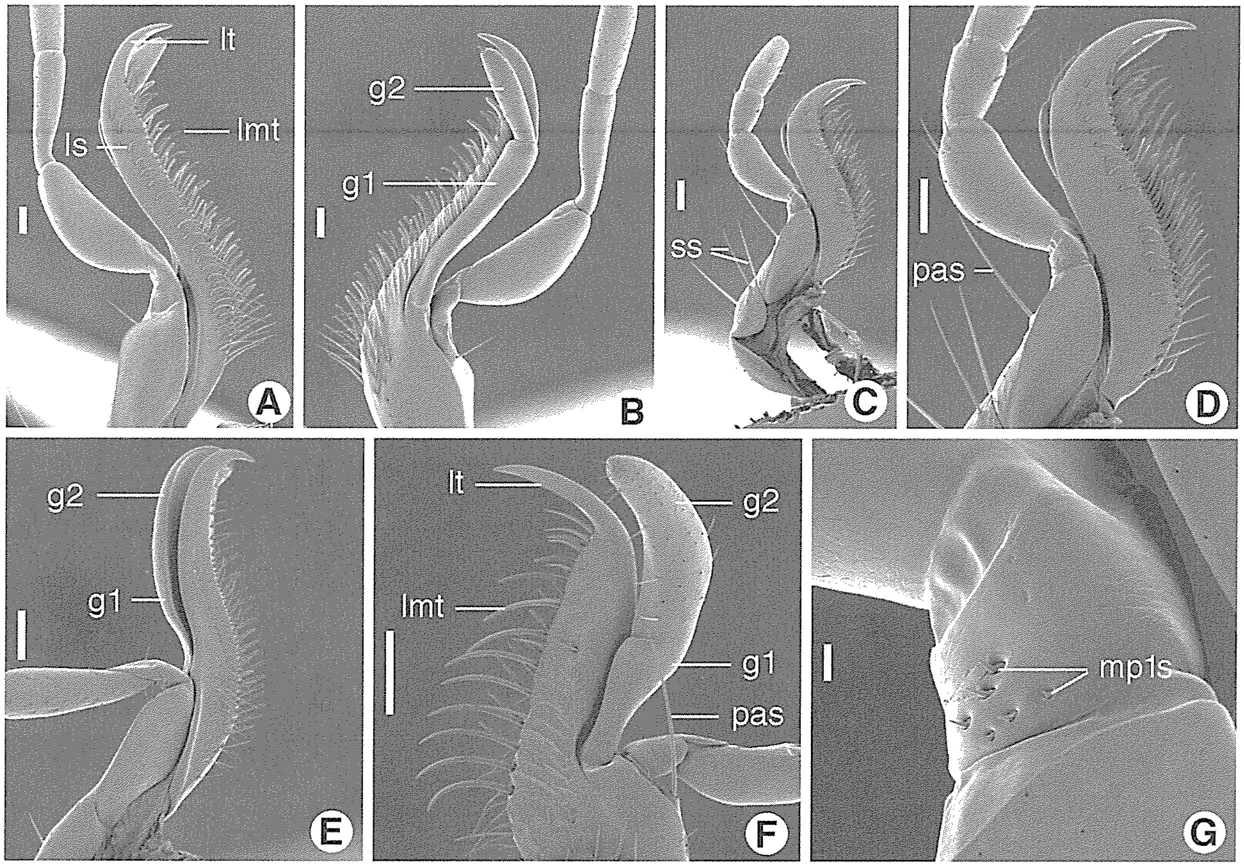


Figure 10. SEM photographs of left maxillae of Pericalina. **A-B**, dorsal and ventral aspects respectively, of *Stenognathus (Prostenognathus) onorei,* new species; **C-D**, dorsal and ventral aspects respectively, and **G**, palpomere 1, ventral aspect, of *Eurycoleus macularius* (Chevrolat); **E**, dorsal aspect of *E. (Bordoniella) marginata,* new species; and **F**, ventral aspect, of *Eucheila (s. str.) adisi* Ball and Shpeley. Scale bars: **A-D**, **F**, and **G** = 100 μm.; **E** = 10 μm. Legend: **g1**, galeomere 1; **g2**, galeomere 2; **lmt**, lacinial macrotrichium; **ls**, lacinial seta; **lt**, lacinial tooth; **mp1s**, maxillary palpomere 1 setae; **pas**, palpiferal seta; and **ss**, stipital seta.

posteriolateral angles obtuse, narrowly to broadly rounded. Surface with disc more or less convex, median longitudinal impression shallow; anterior transverse impression indistinct; lateral grooves narrow anteriorly, widened slightly to markedly posteriorly; posteriolateral impressions basin-like, each continuous or not laterally, with adjacent lateral groove. Proepipleuron broad, sloped dorsad, with lateral margins thus distinctly elevated.

Pterothorax. Metepisternum with lateral and anterior margins subequal, metasternum short.

Elytra. Elongate, deplanate, with slightly sloped apical declivity. Elytron: humerus broadly rounded to subangulate, lateral margin smooth, rounded and widened preapically; preapical margin distinctly sinuate, apex distinctly angulate. Interneurs moderately deep, smooth; parascutellar interneur separate from interneur 1. Intervals moderately convex.

Hind wings. Represented by short stubs.

Legs. Middle and hind tibia with posterior surface rounded. Tarsal claws serrate.

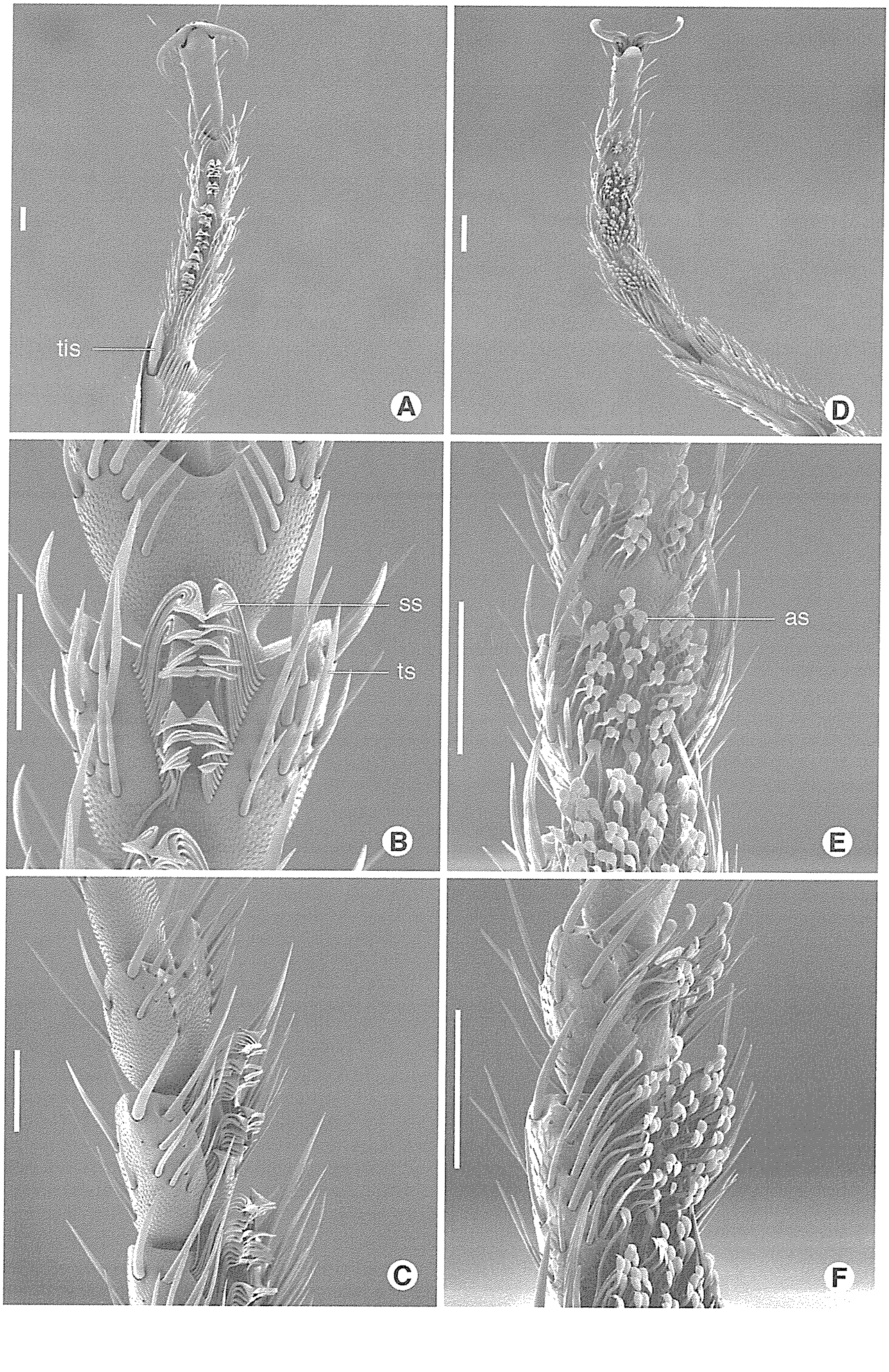
Abdominal sterna. Suture between sterna III and IV medially very shallow to absent, more distinct laterally; sternum VII of males with posterior margin shallowly notched medially.

Male genitalia (Figs. 15A-H). Median lobe left pleuropic; basal bulb small, basal opening narrow; shaft long and narrow, irregularly tubular; apical portion very short, apex in dorso-ventral aspect narrowly obtuse to subtruncate. Internal sac with little armature, variously lobed. Left paramere much larger than right paramere, apical margin more or less broadly obtuse.

Female genitalia. Ovipositor (cf. Figs. 13A-E) and internal genitalia average for *Thyreopterus* genus-group.

Habitat. Unspecified by previous authors, but probably leaf litter in Atlantic Forest of southeastern Brazil.

Geographical distribution (Fig. 21). This precinctive South American genus is known only from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the Atlantic Forest region of eastern Brazil, most species from the São Paulo-Rio de Janeiro area.

Chorological affinities. Among pericalines, the range of this genus probably is overlapped by those of *Stenognathus*, *Eurycoleus*, and *Coptodera*.

Phylogenetic relationships. This genus is postulated to be the adelphotaxon of *Stenognathus* because of numerous resemblances between the 2 groups. However, in the absence of an outgroup, clear synapotypic features have not been identified.

Included taxa. The genus *Oreodicastes* contains 5 species, treated below. Of these, 3 were undescribed. With the generic name being based partly on the Greek noun "dicastes", meaning judge, it seemed appropriate to use as specific epithets the names of judges known in Graeco-Roman times. We chose the 3 mythical judges of the dead, who resided in Hades: Aeacus, Minos, and Rhadamanthus.

Key to the species of *Oreodicastes* Maindron, based on character states of adults

1 Size smaller, SBL of males less than 9.0 mm., of females, less than 9.5 mm 2

1' Size larger, SBL of males more than 9.0 mm., of females, more than 9.5 mm 3

2 (1) Head with eyes smaller, value for ratio Hw/Fw 1.389. Pronotum (Fig. 14B) more constricted basally .... *O. gounellei* Maindron, p. 32

2' Head with eyes larger, values for ratio Hw/Fw 1.486-1.499. Pronotum less constricted basally (Fig. 14C) .... *O. minos*, new species, p. 34

3 (1') Pronotum (Fig. 14A) relatively narrow (Hw/Pwm more than 0.750); lateral grooves narrow posteriorly .... *O. aeacus*, new species, p. 31

3' Pronotum (Figs. 14D-E) relatively broad (Hw/Pwm less than 0.725); lateral grooves widened posteriorly 4

4 (3') Elytron with surface of disc markedly shining, distinctly iridescent; microlines hardly evident at 50X, sculpticells very short. Pronotum (Fig. 14D) relatively longer (males, Pl/El more than 0.370, females more than 0.360) .... *O. rhadamanthus*, new species, p. 36

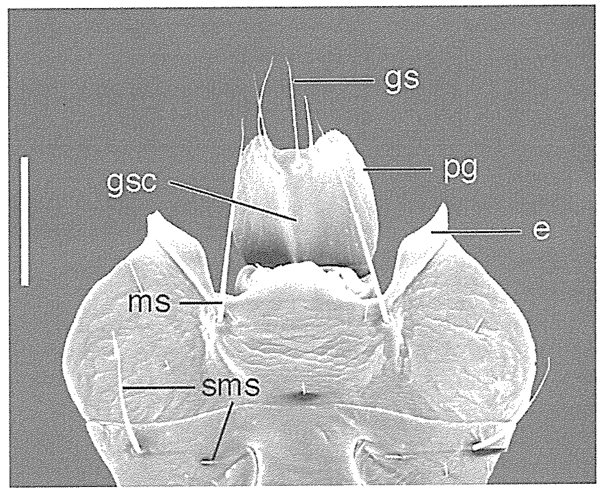

Figure 11. SEM photograph of labium ventral aspect, of *Phloeoxena (Oxephloena) turrialba*, new species. Scale bar = 100 μm. Legend: **e**, epilobe; **gs**, glossal seta; **gsc**, glossal sclerite; **ms**, mental seta; **pg**, paraglossa; and **sms**, submental setae.

4' Elytron with surface of disc shining but not iridescent, with metallic blue luster; microlines distinctly visible at 50X, sculpticells distinctly transverse, but longer. Pronotum (Fig. 14E) relatively shorter (males, Pl/El less than 0.370; females less than 0.355) .... *O. subcyaneus* (Chaudoir), p. 35

Oreodicastes aeacus, new species
Figs. 14A and 21

Type material. One specimen, HOLOTYPE female, labelled: "Campos de [sic!] Jordão/ Est. de S. Paulo/ Lüderwaldt, 1906/ 17.II" [MZSP].

Type locality. Campos do Jordão, State of São Paulo, Brazil.

Specific epithet. See "Included species" in the generic treatment, above.

Recognition. In addition to features noted in the key, adults of this species are recognized by form of the pronotum (Fig. 14A) and of the elytral humeri.

Figure 12. SEM photographs of male fore tarsi of Pericalina, showing adhesive vestiture. **A-C**, *Coptodera elongata* Putzeys: **A**, base of left tibia, and tarsomere 1-5, ventral aspect; **B**, tarsomeres 3-4, ventral aspect, with two rows of squamo-setae on tarsomere 3; **C**, tarsomeres 2-4, lateral aspect, with squamo-setae on tarsomere 2 and 3. **D-F**, *Catascopellus crassiceps* Straneo: **D**, base of left tibia and tarsomeres 1-5, ventral aspect; **E**, tarsomeres 2-4, ventral aspect, with pads of articulo-setae on each article; and **F**, tarsomeres 2-4, lateral aspect, with articulo-setae on each article. Scale bars = 100 μm. Legend: **as**, articulo-seta; **ss**, squamo-seta; **tis**, tibial spur; **ts**, tactile seta.

Description. With character states of the genus, restricted or amplified as follows. For body size and values for ratios Fw/ Hw, Hw/ Pwm, Pl/Pwm, and Pl/ El, see Table 4.

Microsculpture. Head, dorsal surface, with mesh pattern uniformly isodiametric. Elytron, dorsal surface, with microlines easily seen at 50X, mesh pattern transverse, sculpticells 2 to 4 times longer than wide.

Luster. Elytron with dorsal surface shining, coppery tinged in indirect light, but not iridescent.

Pronotum. Form as in Fig. 14A; lateral grooves each side narrow, not markedly widened posteriorly; anteriolateral angles slightly projected, posteriolateral angles rather narrowly rounded.

Elytra. Elytron: basal ridge slightly sinuate, humerus broadly rounded, not projected anteriorly.

Male genitalia. Not known.

Habitat. Probably Atlantic Forest, at an altitude of about 1800 m.

Geographical distribution (Fig. 21). This species is known only from the type locality.

Chorological affinities. This species and *O. minos*, new species evidently are sympatric. The locality in which they were collected, Campos de Jordão, is at the southern extremity of the known range of *Oreodicastes*.

Phylogenetic relationships. Based on the narrow lateral grooves of the pronotum and the non-projected elytral humeri, we postulate that *O. aeacus* is the most primitive known species of *Oreodicastes*, and is the adelphotaxon of the other 4 known species.

Material examined. Holotype, only. See above, for details.

Month of collection. February.

Oreodicastes gounellei Maindron
Figs. 14B, 15A- B, and 21

Oreodicastes gounellei Maindron 1906a:195. TYPE MATERIAL: 1 specimen, in the Collection Général (MNHP), associated with the following box label: "Gounellei/ Maindr." HOLOTYPE female, labelled as follows: "BRÉSIL/ ET Rio DE JANEIRO/ ITATIA 2400 M/ E. Gounelle 2-99"; "Oreodicastes/ gounellei/ m." [handwritten]; MUSEUM PARIS/ Ex. Coll M. Maindron/ Coll. G. Babault 1930" [green paper].

Type locality. Itatiaya (= Agulhas Negras Parque), State of Rio de Janeiro, Brazil.

Recognition. In addition to pronotal form (Fig. 14B) and projected humeral angles, male genitalic features (Figs. 15 A -B) are useful for identification of this species.

Description. With character states of the genus, restricted or amplified as follows. For body size (SBL) and values for ratios Fw/ Hw, Hw/ Pwm, Pl/Pwm, and Pl/ El, see Table 4.

Microsculpture. Head, dorsal surface, with mesh pattern uniformly isodiametric. Elytron, dorsal surface, with microlines easily seen at 50X, mesh pattern transverse, sculpticells 2 to 4 times longer than wide.

Luster. Elytron with dorsal surface shining, but without metallic overtones.

Pronotum. Form as in Fig. 14B; lateral groove each side widened posteriorly; anteriolateral angles broadly, prominently projected, posteriolateral angles rather narrowly rounded.

Elytra. Elytron: basal ridge markedly sinuate, humerus projected angularly anteriorly.

Male genitalia. Median lobe: in dorsal aspect (Fig. 15A) apical portion short, slender, apex narrowly subtruncate; in left lateral aspect (Fig. 15B) ventral surface of shaft about straight, curved abruptly to basal bulb. Internal sac long, rather slender, widened preapically.

Habitat. See this topic above, in treatment of *Oreodicastes*. Specimens were collected at altitudes of 2200-2300 m.

Geographical distribution (Fig. 21). This species is known from the type locality and vicinity, only.

Chorological affinities. This species is geographically isolated from the other species of *Oreodicastes*, but near the ranges of *O. aeacus* and *O. minos* to the west, and *O. subcyaneus* to the east.

Phylogenetic relationships. With their widened posteriolateral grooves of the pronota, and projected humeri of the elytra, adults are similar to *O. minos, O. subcyaneus*, and *O. rhadamanthus*, new species. But the pronotum of *O. gounellei* is constricted posteriorly and the posteriolateral angles are narrowly rounded, as in the plesiotypic *O. aeacus*. We postulate, then, that *O. gounellei* is the most primitive member of the *O. gounellei-minos-subcyaneus-rhadamanthus* complex, and is the adelphotaxon of the latter 3 species.

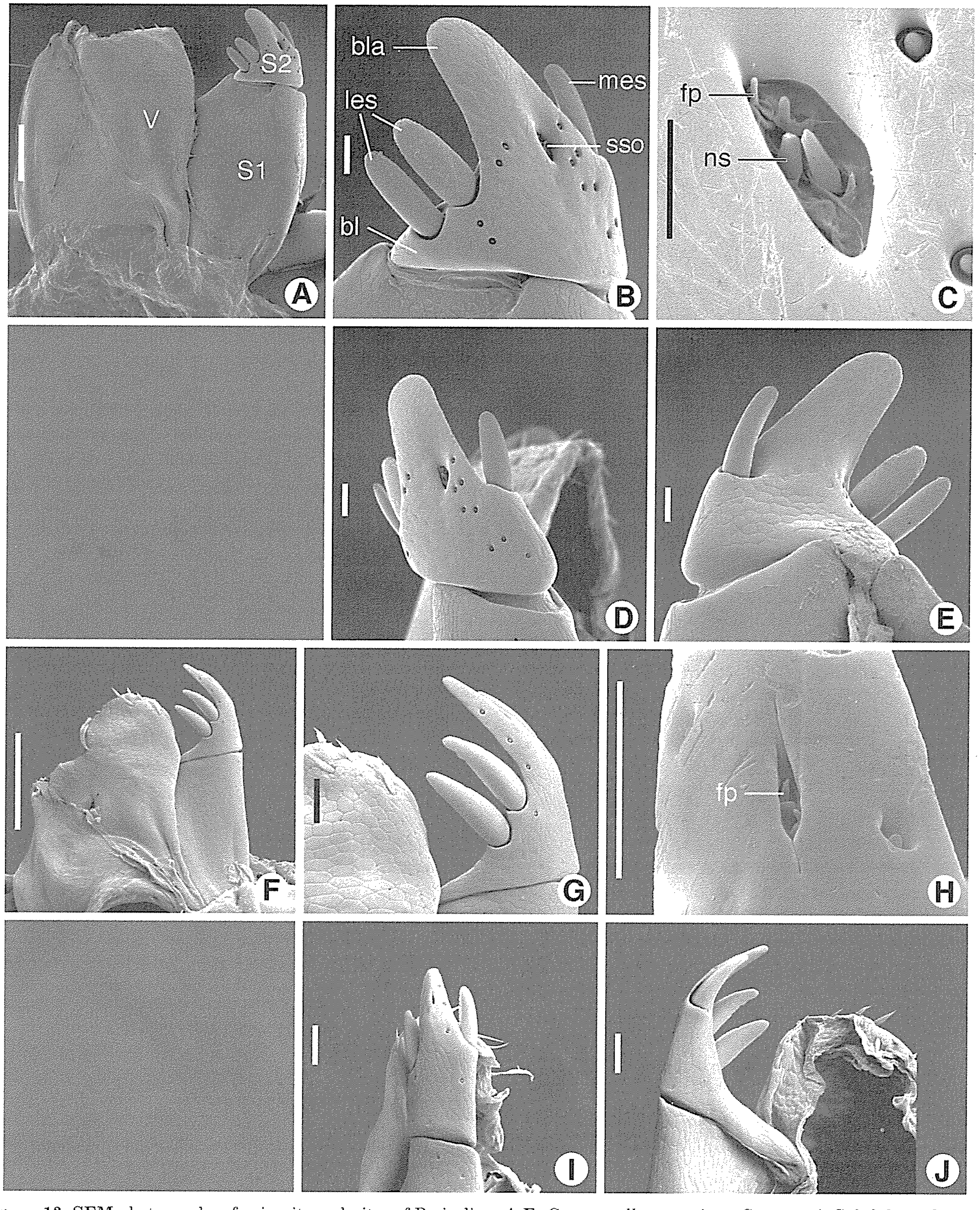

Figure 13. SEM photographs of ovipositor sclerites of Pericalina. **A-E**, *Catascopellus crassiceps* Straneo: **A-C**, left lateral aspects; and **D-E**, ventral and medial aspects. **F-J**, *Phloeoxena (Oxephloena) turrialba*, new species: **F-G**, left lateral aspects; and **H-I** ventral aspects; and **J**, medial aspect. Scale bars: **A** and **F** = 100 µm.; **B**, **D**, **E**, **G**, **I**, and **J** = 20 µm.; and **C** and **H** = 10 µm. Legend: **bl**, basal lobe; **bla**, apical lobe; **fp**, furrow peg; **les**, lateral ensiform setae; **mes**, medial ensiform setae; **ns**, nematiform seta; **S1**, stylomere 1; **S2**, stylomere 2; **sso**. subapical setose organ; **V**, valvifer.

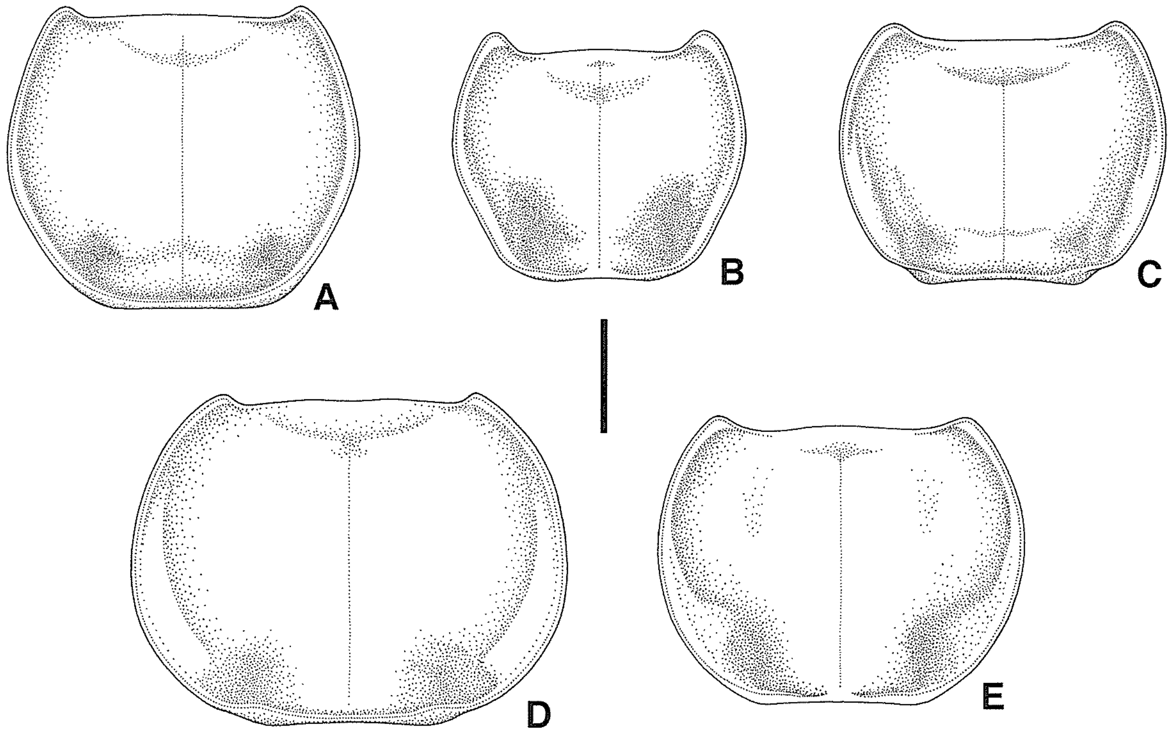

Figure 14. Line drawings of pronota, dorsal aspects of *Oreodicastes* Maindron. **A**, *O. aeacus*, new species; **B**, *O. gounellei* Maindron; **C**, *O. minos*, new species; **D**, *O. rhadamanthus* new species; and **E**, *O. subcyaneus* Chaudoir. Scale bar = 1.0 mm.

Material examined. In addition to the holotype, we have seen 2 specimens from the following localities. **BRAZIL. Rio de Janeiro**. Female, Agulhas Negras, 2300 m., 1.V.1970, Reichardt (MZSP). Male, Itatiaia, 2200 m., 6.I.1954, W. Zikan (MZSP).

Months of collection. January and May.

Oreodicastes minos, new species

Figs. 14C, 15C-D and 21

Type material. 3 specimens, as follows. HOLOTYPE male, labelled: "São Paulo/ Campos do Jordão/ 16.XII.1944/ F. Lane col" [MZSP]. ALLOTYPE female, labelled: "São Paulo/ Campos de Jordão/ 14.XII.1944/ F. Lane col" [MZSP]. PARATYPE female, labelled same as allotype [MZSP].

Type locality. Campos do Jordão, State of São Paulo, Brazil.

Specific epithet. See "Included species" in the generic treatment, above.

Recognition. In addition to features noted in the key, adults of *O. minos* are distinctive in form of the pronotum (Fig. 14C), particularly in the prominently projected anteriolateral angles. The male genitalia (Figs. 15C-D) are also distinctive. See below for details.

Description. With character states of the genus, restricted or amplified as follows. For body size and values for ratios Fw/ Hw, Hw/ Pwm, Pl/Pwm, and Pl/ El, see Table 4.

Microsculpture. Head, dorsal surface, with mesh pattern isodiametric anteriorly; posteriorly, in occipital area, pattern slightly but distinctly transverse. Elytron, dorsal surface, with microlines easily seen at 50X, mesh pattern transverse, sculpticells narrow, about 6 times longer than wide.

Luster. Elytron with dorsal surface shining, coppery-blue tinged in indirect light, but not iridescent.

Pronotum. Form as in Fig. 14C; lateral groove each side distinctly widened posteriorly; anteriolateral angles slightly projected, posteriolateral angles moderately broadly rounded.

Elytra. Elytron: basal ridge markedly sinuate, humerus projected angularly anteriorly.

Male genitalia (Figs. 15C-D). Median lobe: in dorsal aspect (Fig. 15C) apical portion short, broad, apex broadly rounded; in left lateral aspect (Fig. 15D) ventral surface of shaft with marked deflection (**x**). Internal sac rather slender in dorsal aspect, with basal bifid lobe, and projected ventrally (Figs. 15C-D).

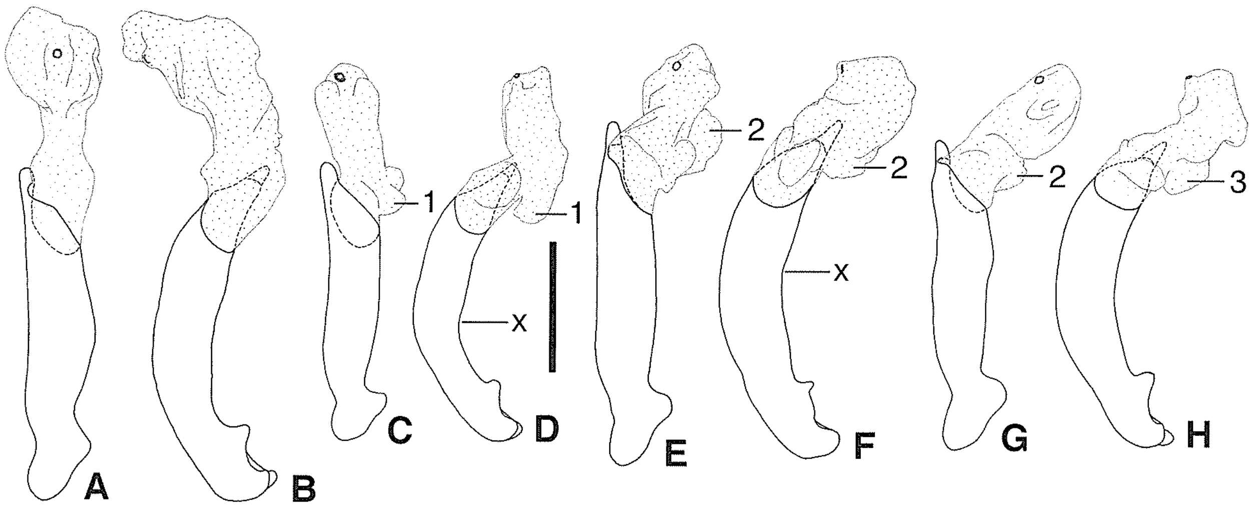

Figure 15. Line drawings of male genitalia, median lobes (internal sacs everted), of *Oreodicastes* Maindron. **A**, **C**, **G**, and **E**, dorsal aspect; **B**, **D**, **F**, and **H**, left lateral aspect. **A-B**, *O. gounellei* Maindron; **C-D**, *O. minos*, new species; **E-F**, *O. subcyaneus* (Chaudoir); and **G-H**, *O. rhadamanthus*, new species. Scale bar = 1.0 mm. Legend: **1-3**, lobes of internal sac; **x**, plane of maximum flexion on ventral surface.

Habitat. Probably Atlantic Forest, at an altitude of about 1800 m.

Geographical distribution (Fig. 21). This species is known only from the type locality.

Chorological affinities. This species and *O. aeacus* evidently are sympatric. Otherwise, *O. minos* is isolated from the known ranges of the other species of *Oreodicastes*.

Phylogenetic relationships. A member of the *O. gounellei* clade, *O. minos* is here postulated to be the adelphotaxon of the species pair *O. subcyaneus-rhadamanthus*.

Material examined. Type material only. See above, for further details.

Month of collection. December.

Oreodicastes subcyaneus (Chaudoir)

Figs. 14E, 15E-F and 21

Oxyglossus subcyaneus Chaudoir: 1843:427. TYPE MATERIAL: 1 specimen from the Oberthür-Chaudoir Collection (MNHP) associated with the following box label: "subcyaneus/ Chaud./ Bresil/ Nov. Frib./ Bescke" [handwritten]. HOLOTYPE: female, labelled: "TYPE" [red paper]; "Ex Musaeo/ Chaudoir" [red print].

Oreodicastes subcyaneus; Maindron 1906a:195. Csiki 1930:732.

Notes about type material. According to Chaudoir (1843: 427) the original description of this species was based on a single specimen. Associated with the holotype are an additional 16 specimens, without locality data: 5 males, 6 females, Chaudoir Collection; 2 males, 2 females, Mnizech Collection; and a male, "acquired from Jansen 1884".

Type locality. Nova Friburgo, State of Rio de Janeiro, Brazil. Chaudoir mentioned only "Brésil" in the original description. The specimen accepted as holotype, however, evidently was collected in the locality noted above.

Recognition. See key to species of *Oreodicastes*. The male genitalia (Figs. 15E- F) are diagnostic also (see below for details).

Description. With character states of the genus, restricted or amplified as follows. For body size and values for ratios Fw/ Hw, Hw/ Pwm, Pl/Pwm, and Pl/ El, see Table 4.

Microsculpture. Head, dorsal surface, with mesh pattern uniformly isodiametric. Elytron, dorsal surface, with microlines easily seen at 50X, mesh pattern transverse, sculpticells narrow, 2 to 6 times longer than wide.

Luster. Elytron with dorsal surface shining, with coppery-blue overtones in indirect light.

Pronotum. Form as in Fig. 14E; lateral groove each side widened posteriorly; anteriolateral angles moderately broadly, prominently projected; posteriolateral angles broadly rounded.

Elytra. Elytron: basal ridge markedly sinuate, humerus projected angularly anteriorly.

Male genitalia (Figs.15E- F). Median lobe: in dorsal aspect (Fig. 15E) apical portion short, slender, apex narrowly rounded; in left lateral aspect (Fig. 15F) ventral surface of shaft with marked deflection (**x**) medially. Internal sac short, wide, with broad lobe (Fig. 15E, **2**) dorso-medially.

Habitat. See this topic above, in treatment of *Oreodicastes*.

Geographical distribution (Fig. 21). This species is known only from the type locality.

Chorological affinities. This species is geographically isolated markedly from the other species of *Oreodicastes*.

Phylogenetic relationships. Based on similarity in pronotal form and form of the internal sac of the male genitalia, we postulate that this species is the adelphotaxon of *O. rhadamanthus*, new species.

Material examined. In addition to the holotype and 16 unlabelled specimens in the Oberthür-Chaudoir collection noted above, we have seen 9 specimens from the following localities. **BRAZIL.** Female, P. Mabille (ISNB). Male, female, O. de Baulny (ISNB). Female, Putzeys (ISNB). **Rio de Janeiro**. 3 males (MNHP). Male, female, Nova Friburgo (ISNB).

Oreodicastes rhadamanthus, new species

Figs. 14D, 15G- H and 21

Type material. Twelve specimens, as follows. HOLOTYPE male, labelled: "Brésil/ Caraça/ P. Germain/ 2e Semestre 1884" [MNHP]. ALLOTYPE female, labelled same as holotype [MNHP]. Ten PARATYPES (5 males, 5 females) each labelled same as holotype [MNHP].

Type area. Although only "Caraça" is given on the locality label, we interpret this as Serra do Caraça, a mountain in southwestern Minas Gerais, Brazil.

Specific epithet. See "Included species" in the generic treatment, above.

Recognition. In addition to features noted in the key, adults of *O. rhadamanthus* are distinguished by pronotal form (Fig. 14D): posteriolateral angles very broadly rounded, and marked constriction anteriorly, with anteriolateral angles slightly projected. The male genitalia (Figs. 15G-H) are also distinctive. See below for details.

Description. With character states of the genus, restricted or amplified as follows. For body size and values for ratios Fw/ Hw, Hw/ Pwm, Pl/Pwm, and Pl/ El, see Table 4.

Microsculpture. Head, dorsal surface, anteriorly and posteriorly transverse occipital depression, with mesh pattern isodiametric, occipital depression, pattern with mesh pattern slightly but distinctly transverse. Elytron, dorsal surface, with microlines very fine, easily overlooked at 50X; mesh pattern transverse, microlines extended across interval, without longitudinally oriented microlines.

Luster. Elytral dorsal surface markedly shining, iridescent.

Pronotum. Form as in Fig. 14D; lateral groove each side distinctly widened posteriorly; anteriolateral angles narrow and only slightly projected anteriorly; posteriolateral angles very broadly rounded.

Elytra. Elytron: basal ridge moderately sinuate, humerus moderately projected anteriorly.

Male genitalia (Figs. 15G-H). Median lobe: in dorsal aspect (Fig. 15G) apical portion short, broad, apex narrowly rounded; in left lateral aspect (Fig. 15H), ventral surface of shaft markedly curved, without abrupt deflection. Internal sac short, rather broad (Fig. 15H, **3**), with broad lobe evident in left lateral aspect.

Habitat. See this topic above, in treatment of *Oreodicastes*.

Geographical distribution (Fig. 21). This species is known from the type locality, a mountain range reaching 2000 m. altitude, more to the interior and farther north than the known localities of the other species of *Oreodicastes*.

Chorological affinities. This species is markedly isolated from the known ranges of its closest relative, *O. subcyaneus*.

Phylogenetic relationships. On the basis of similarity in pronotal form and in form of the internal sac of the male genitalia, we postulate that this species and *O. subcyaneus* are adelphotaxa.

Material examined. Type material only. See above, for details.

Genus *Stenognathus* Chaudoir

Stenognathus Chaudoir 1843:431.

Type species. *Anchomenus melanarius* Dejean 1831 (by monotypy).

Intra-generic ranking. Ball (1975a:159-162) provided a description of this genus and a taxonomic treatment at the level of subgenus. He included as subgenera, in addition to the nominotypical one, *Pristolomus* Chaudoir and *Phloeotherates* Bates. The major features for distinguishing adults of *Stenognathus (s. str.)* from *Phloeotherates* are the pectinate tarsal claws and broad pronotal base of the latter. However, these seemingly clear differences are bridged by the serrate claws characteristic of various taxa that, otherwise, appear in pronotal proportions to be members of *Stenognathus (s. str.)*. Under these circumstances, it seems best to include both of these assemblages in one subgenus.

Pristolomus seems very close to *Stenognathus (s. str.),* barring rather minor but easily observed distinguishing features. With some reluctance, we continue to recognize the former as a monobasic subgenus. In contrast, *Stenognathus onorei* new species (described below) is abundantly distinct from the other species of *Stenognathus (s. lat.),* and we do not hesitate to recognize it as a group distinctive enough to suggest a more remote relationship, and thus appropriately assigned subgeneric rank *(Prostenognathus*, new subgenus). Similarly, *Stenognathus dentifemoratus,* new species (also described below) seems clearly distinct and remotely related to the other species of *Stenognathus*, and is assigned to its own subgenus *(Gnathostenus*, new subgenus). See Table 5.

Recognition. In addition to features in the key, adults of this genus are recognized by the following features: size moderate (SBL 7- 15 mm.), body color uniformly somber (black to rufopiceous); labial mentum with lateral lobes broadly rounded apically; disc of pronotum distinctly transversely strigulose; and ventral surfaces of the thorax and at least abdominal sterna III and IV medially with setal vestiture. Males of most species have an array of setae, varied from sparse to dense, on the ventral surfaces of one or more pairs of femora.

Description. The description of *Stenognathus (s. lat.)* provided by Ball (1975a:160) is superseded by the following to accommodate *Prostenognathus* and *Gnathostenus* described below, and to provide additional characters, states of which are of use in species recognition.

With character states of Pericalina and the *Thyreopterus* genus-group, restricted or amplified and with additional features, as follows. Habitus (Fig. 18; see also Ball [1975a: 158, Figs. 21-23]). Body rather broad, deplanate or moderately convex. SBL and values for selected ratios as in Tables 6 to 11.

Color. Body uniformly somber (black to rufopiceous). Antennae, palpi and legs more or less dark (black to variously rufopiceous or brunneous).

Macrosculpture. Head dorsally with surface smooth to markedly strigulose, strigules irregular, extended in various directions; ventral surface smooth to shallowly, rather indistinctly transversely strigulose. Pronotum with disc transversely strigulose, strigules shallow to moderately deep. Middle and hind tibiae with posterior (dorsal) surfaces longitudinally strigulose to smooth.

Microsculpture. Head dorsally with microlines distinct on clypeus, mesh pattern isodiametric, sculpticells flat. Frons and vertex with microlines distinct, mesh pattern isodiametric, sculpticells flat, or microlines absent and surface completely smooth; ventral surface without microlines. Mouthparts: labrum with microlines distinct, mesh pattern isodiametric, sculpticells slightly convex; mentum with mesh pattern on lateral lobes isodiametric, or transverse, or microlines absent medially. Pronotum: mesh pattern transverse, microlines very fine, sculpticells narrow, or microlines absent. Proepisternal and proepimeral mesh pattern longitudinal, sculpticells narrow, flat; prosternal mesh pattern transverse, sculpticells narrow, flat. Pterothorax: mesh pattern of mesepisternum and mesepimeron diagonal, sculpticells long and narrow; metepisternum laterally with mesh pattern slightly transverse or slightly elongate, medially with sculpticells narrower and distinctly transverse; sternal mesh pattern transverse. Elytron, dorsal surface: mesh pattern on intervals isodiametric to transverse, sculpticells of various width, flat; in interneurs, mesh pattern isodiametric; epipleural mesh pattern longitudinal, sculpticells narrow, long and flat. Abdominal sterna: mesh pattern transverse, sculpticells narrow, flat.

Luster. Dorsal surfaces generally shiny to subiridescent; pterothoracic sclerites, especially pleura of mesothorax, subiridescent to iridescent; abdominal sterna with ventral surfaces subiridescent.

Chaetotaxy. With standard complement of fixed setae for Pericalina, as follows. Head capsule, 1 pair clypeal, 2 pairs supraorbital, 1 pair suborbital; pronotum with 2 pairs of setae, laterally. Elytron: 1 parascutellar seta; 3 discal setae in interval 3; umbilical series either virtually continuous, with adjacent setigerous punctures evenly spaced, or punctures in 3 parts, anterior and posterior series each with 5 or 6 setae, medial with 1 seta. Legs: fore coxa asetose; tarsomere 5 with several setae on

Table 5. Checklist of subgenera, species groups, and species of *Stenognathus* Chaudoir.

Subgenus *Prostenognathus*, **new subgenus**
S. onorei, **new species.**

Subgenus *Gnathostenus*, **new subgenus**
S. dentifemoratus, **new species**

Subgenus *Stenognathus (sensu stricto)*
S. stricticollis species group
S. batesi Chaudoir
S. platypterus Chaudoir
S. stricticollis (Maindron)
S. luctuosus (Maindron)

S. procerus species group
S. procerus (Putzeys)

S. nigropiceus species group
S. chaudoiri Ball
S. nigropiceus (Bates)
S. gagatinus (Dejean)
S. plaumanni, **new species**
S. jauja, **new species**
S. robustus (Bates)

S. melanarius species group
S. quadricollis Chaudoir
S. longipennis Chaudoir
S. crassus Chaudoir
S. crenulatus Chaudoir
S. melanarius (Dejean)

Subgenus *Pristolomus* Chaudoir
S. dentifer (Chaudoir)

Nomen dubium
S. cayennensis (Buquet)

each ventrolateral margin; other articles with setation various, as indicated in species descriptions. Abdominal sterna IV-VI each with 1 pair of ambulatory setae; VII with 4 setae in both sexes.

Vestiture. Dorsal surface glabrous, except fixed setae noted above. Ventral surface more densely setose in males than in females. Thorax with prosternum preapically and intercoxal process apically sparsely setose; mestasternum setose generally, or in triangular pattern, apex toward middle coxae and bare area anteriad antecoxal piece; antecoxal piece glabrous or partially or completely setose. Abdominal sterna ventrally variously setose or glabrous.
Male fore tarsus ventrally with adhesive vestiture of biseriate squamo-setae on apical part of tarsomere 1 and on tarsomeres 2 and 3.

Head. Dorsal surface with frontal impressions approximately linear, moderately deep; gena (between eye and gnathal sinus) narrower than antennomere 1. Eyes moderately to markedly convex, more or less bulged. Antenna with antennomeres 1, 3, and 4 subequal, each distinctly longer than antennomere 2, and slightly longer than 5-11.

Mouthparts. Labrum, mandibles, maxillae and labium average for *Thyreopterus* genus-group. (for details, see: labrum, Figs. 5A-B; mandibles, Figs. 6A-V); maxilla, Figs. 10A-B; and labium, see Ball [1975a:161, Fig. 29]).

Prothorax. Moderately to markedly narrower than elytra. Pronotum (Figs. 16A-I) moderately to markedly transverse; narrowed posteriorly markedly to slightly. Anterior margin distinctly concave; lateral margins slightly sinuate posteriorly or not; posterior margin straight medially, sloped anteriolaterally; anteriolateral angles rounded, moderately prominent; posteriolateral angles obtuse, narrowly rounded to rectangular and distinctly angulate. Surface disc more or less convex, median longitudinal impression shallow; anterior transverse impression shallow to indistinct; lateral grooves narrow to moderately broad anteriorly, widened slightly to markedly posteriorly; posteriolateral impressions basin-like, each continuous or not laterally, with adjacent lateral groove. Proepipleuron broad, sloped dorsad, lateral margins thus distinctly elevated.

Pterothorax. Metepisternum lateral margin distinctly longer than width at anterior margin, metasternum relatively long; or metepisternum with lateral and anterior margins subequal, metasternum short.

Elytra. Elongate, deplanate, without sloped apical declivity. Elytron: humerus broadly rounded to subangulate, lateral margin smooth or serrate basally, more or less rounded and widened preapically; preapical margin slightly to distinctly sinuate, apex distinctly angulate to oblique-subtruncate. Interneurs shallow to moderately deep, smooth or finely punctate; parascutellar interneur separate from interneur 1. Intervals nearly flat to distinctly, broadly convex.

Hind wings. Developed fully with oblong and wedge cells, or represented by short stubs.

Legs. Middle and hind tibia with posterior surface rounded or more or less distinctly longitudinally canaliculate. Tarsal claws (Figs. 17A-F) serrate or pectinate, pectens shorter or longer; or smooth.

Abdominal sterna. Suture between sterna III and IV medially very shallow to absent, more distinct laterally; sternum VII of males with posterior margin shallowly notched medially.

Male genitalia (Figs. 19A-F, 20B-C, 22A-O, 25A-O, 28A-O and 30A-D). Median lobe left pleuropic; basal bulb small, projected ventrally or aligned with shaft, basal opening narrow; shaft long and of various diameter, irregularly tubular; apical portion short to very short, in dorso-ventral aspect acute to narrowly obtuse. Internal sac with little armature, variously lobed. Left paramere much larger than right paramere, apical margin principally subtruncate with small projection, or more or less broadly obtuse to subtruncate.

Female genitalia. Ovipositor (cf. Figs. 13A-E) and internal genitalia (cf. Fig. 51) average for *Thyreopterus* genus-group.

Habitat. Most species are residents of tropical lowland forest, between sea level and 1500 m. However, at least one species evidently lives in dry semi-deciduous tropical forest, and one lives at higher altitude, evidently in cloud forest. Adults are active at night, most species being associated with fungi growing on logs. By day, the log-fungus associated beetles rest under loose bark on logs.

Geographical distribution (Figs. 21, 23, 24, 26, 27, 29, and 31). The Neotropical genus *Stenognathus (s. lat.)* ranges from the state of Veracruz in eastern México southward to northern Argentina, primarily in cis-Andean South America, and from approximately near sea level to more than 2200 m., on the eastern and western slopes of the Andes, in Ecuador.

Included taxa. As noted above, *Stenognathus (s. lat.)* contains 4 subgenera, and 20 species, treated below. The identity of 1 species, *S. cayennensis* Buquet, has not been determined, and the name is regarded as a *nomen dubium*.

Key to the subgenera, species groups and species of *Stenognathus (s. lat.)* Chaudoir, based on character states of adults

1 Pterothorax with metepisternum approximately quadrate. Dorsal surface of head and elytra with microsculptural mesh pattern isodiametric (*Prostenognathus*, new subgenus) .... *S. onorei*, new species, p. 40

1' Pterothorax with metepisternum elongate, lateral margin distinctly longer than width at base. Dorsal surface of head with microsculptural mesh pattern isodiametric, or microlines absent; elytra with mesh pattern isodiametric or more or less transverse 2

2(1') Head with dorsal surface rugulose, microsculptural mesh pattern isodiametric. Elytron with lateral margin basally serrulate, microsculptural mesh pattern transverse (*Pristolomus* Chaudoir) .... *S. dentifer* (Chaudoir), p. 74

2' Head with dorsal surface smooth, i.e., without macrosculptural strigulae, microsculptural mesh pattern isodiametric, or microlines absent. Elytron with lateral margin basally smooth; microsculptural mesh pattern various 3

3(2') Pronotum (Fig. 16B) narrow, ratio Pl/Pwm = 0.909. Elytra relatively short, ratio Pl/El = 0.419. Metathoracic wing shorter than length of elytron. Male with fore femur dentate ventrally near base (*Gnathostenus,* new subgenus) .... *S. dentifemoratus*, new species, p. 44

3' Pronotum wider, ratio Pl/Pwm = 0.636-0.855. Elytra longer, ratio Pl/El = 0.257-0.361. Metathoracic wing longer than length of elytron. Male with fore femur not dentate ventrally near base (*Stenognathus* (*sensu stricto*) Chaudoir) 4

4(3') Tarsal claws serrate, denticulate or pectinate .. 5

4' Tarsal claws smooth, *melanarius* group 15

5(4) Tarsal claws serrate (Figs. 17A-B), *stricticollis* group, in part 6

5' Tarsal claws pectinate (Figs. 17C-F) 7

6(5) Pronotum with base less constricted, ratio Pwb/Pwm = 0.745-0.846. Male with fore femur densely setose ventrally .... *S. platypterus* Chaudoir, p. 54

6' Pronotum (Fig. 16c) with base more constricted, ratio Pwb/Pwm = 0.691-0.768. Male with fore femur moderately setose ventrally .... *S. batesi* Chaudoir, p. 51

7(5') Pronotum narrower, ratio Pl/Pwm = 0.720-0.855 and with base more constricted, ratio Pwb/Pwm = 0.780-0.844, *stricticollis* group, in part 8

7' Pronotum (Fig. 16E) wider, ratio Pl/Pwm = 0.636-0.739 and with base less constricted, ratio Pwb/Pwm = 0.848-0.938, *nigropiceus* group 10

8(7) Size smaller, SBL = 7.32-9.96 mm. Male with fore femur moderately densely setose ventrally .... *S. stricticollis* (Maindron), p. 56

8' Size larger, SBL = 10.38-14.00 mm. Male with fore femur asetose ventrally 9

9(8') Pronotum narrower, ratio Hw/Pwm = 0.741-0.833; disc moderately convex. Male with middle femur densely setose ventrally .... *S. luctuosus* (Maindron), p. 57

9' Pronotum (Fig. 16D) wider, ratio Hw/Pwm = 0.703-0.720; disc markedly convex. Male with middle femur asetose ventrally .... *S. procerus* (Putzeys), p. 58

10(7') Geographical range Middle America 11

10' Geographical range South America 12

11(10) Pronotum with lateral explanation wide in anterior half; lateral margin nearly straight to hind angle; base less constricted, ratio Pwb/Pwm = 0.867-0.938 .... *S. chaudoiri* Ball, p. 60

11' Pronotum (Fig. 16G) with lateral explanation narrow in anterior half; lateral margin distinctly sinuate before hind angle; base more constricted, ratio Pwb/Pwm = 0.848 .... *S. robustus* (Bates), p. 65

12 (10') Elytron with dorsal surface subiridescent, microlines fine, close together, only transversely ori-

ented lines visible. Male with middle femur densely setose ventrally .... *S. jauja*, new species, p. 64

12' Elytron with dorsal surface shining, microlines coarser, transversely oriented lines evident, longitudinal microlines visible or not. Male with middle femur asetose ventrally. (Three species, separable clearly on form of male genitalia) 13

13(12') Median lobe (Figs. 25G-H) with preapical swelling; ventral surface with coarse microsculpture proximad apical opening .... *S. gagatinus* (Dejean), p. 62

13' Median lobe (Figs. 25D-E or Figs. 25M-N) without preapical swelling; ventral surface shining, without coarse microsculpture 14

14(13') Median lobe (Fig. 25E) in left lateral aspect curved basally .... *S. nigropiceus* (Bates), p. 61

14' Median lobe straight in left lateral aspect, basal bulb not projected ventrad (Fig. 25K) .... *S. plaumanni*, new species, p. 63

15(4') Elytron with interneurs punctate .... *S. crenulatus* Chaudoir, p. 71

15' Elytron with interneurs impunctate 16

16(15') Geographical range Middle America .... *S. quadricollis* Chaudoir, p. 67

16' Geographical range South America 17

17(16') Specimen from western Colombia .... *S. longipennis* Chaudoir, p. 69

17' Specimen from Brazil, Paraguay or central Peru 18

18 (17') Size larger, SBL = 13.4-15.5 mm .... *S. crassus* Chaudoir, p. 70

18' Size smaller, SBL = 10.3-13.00 mm .... *S. melanarius* (Dejean), p. 72

Subgenus *Prostenognathus*, new subgenus

Type species. *Stenognathus onorei*, new species (here designated).

Subgeneric name. The subgeneric name is a combination of 2 Latin words, *pro*, meaning before (implying primitive), and the generic name, *Stenognathus*, alluding to our hypothesis that this species represents the ancestral stock of this genus.

Recognition. In addition to the features in the key, members of this subgenus are recognized by larger size (SBL more than 10.5 mm.), metathorax short, (metepimeron approximately quadrate) and disc of elytron with isodiametric microsculpture.

Description. See following description of the type species, *S. onorei,* new species.

Habitat, geographical distribution, chorological affinities, and phylogenetic relationships. For information about these topics, see the following treatment of *S. onorei.*

Included species. *Prostenognathus* is a monobasic subgenus; the type species is described below.

Stenognathus (Prostenognathus) onorei, new species

Figs. 1A-D, 5A-B, 6A-F, 10A-B, 18, 19A-F and 21

Type material. Thirteen specimens, as follows. HOLOTYPE male, labelled: "ECUADOR Pichincha/ w. Chiriboga: old rd./ Quito- Sto. Domingo/ under logs"; "2164-/ 2286m. 10.VI.82 #112 "; "ECUADOR EXP. 1982/ H.E. Frania coll." [USNM]. ALLOTYPE female, labelled same as holotype [USNM]. 11 additional PARATYPES, sex and label data as follows: 4 females, same as holotype [UASM]. 1 female: "ECUADOR Napo Baeza/ leaf litter, partly/ arboreal, 1700m./ March 26, 1979/ H. Frania coll. 1" [UASM]. 1 female: "ECUADOR Napo Baeza/ under log; edge/ clearing; 2103 m./ May 12, 1982 #46"; "ECUADOR EXP. 1982/ H.E. Frania &/ F.A.H. Sperling/ collectors" [UASM]. 1 male: "ECUADOR/ NAPO II.89/ COSANGA/ Legit: G. ONORE" [QCAZ]. 1 female: "ECUADOR VII.87/ NAPO/ PAPALLACTA/ Legit: G. ONORE" [CMNH]. 1 female: "ECU. Napo Pr./ 2000 m. Baeza/ 1-9. III 1979/ M. Kaulbars" [CNCI]. 1 male: "Ecuador Boli-/ var - Santiago/ VI-86/ Legit: L. Coloma" [PMCT]. 1 female: "ECUADOR/ Prov. Imbabura/ Via a Garcia Moreno/ Fecha . . 1987/ Legit D. BASTIDAS MECN" [PMCT].

Type locality. West of Chiriboga, Pichincha Province, Ecuador.

Specific epithet. A Latinized genitive eponym, based on the surname of Giovanni Onore, Pontifica Universidad Catolica del Ecuador, in recognition of his personal entomological work, and his efforts to help foreign entomologists interested in the insect fauna of Ecuador.

Recognition. For details, see recognition section for subgenus *Prostenognathus,* above.

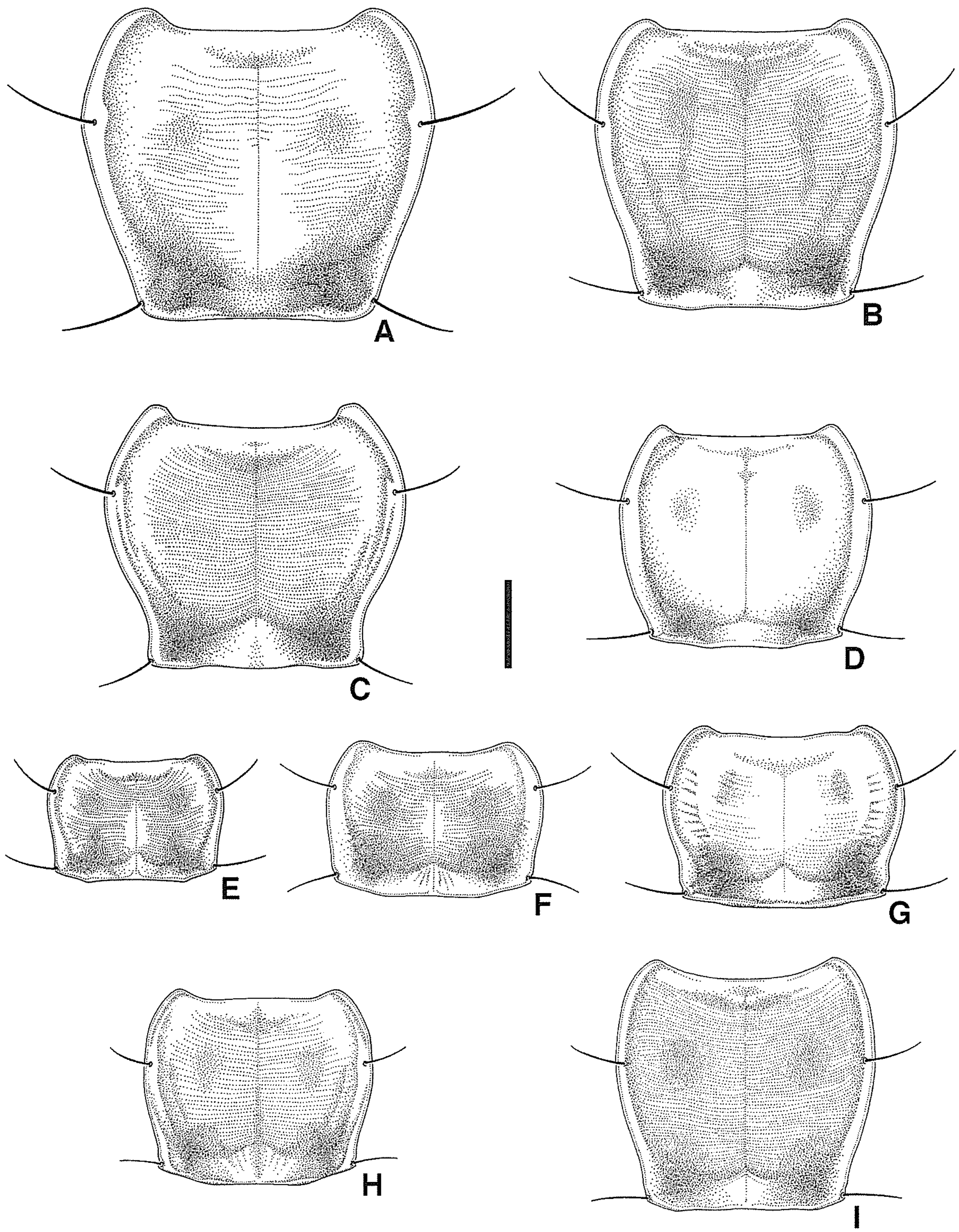

Figure 16. Line drawings of pronota, dorsal aspects of *Stenognathus (s. lat.)* Chaudoir. **A**, *S. (Prostenognathus) onorei*, new species; **B**, *S. (Gnathostenus) dentifemoratus*, new species; **C**, *S. (S.) batesi* Chaudoir; **D**, *S. (S.) procerus* (Putzeys); **E**, *S. (S.) nigropiceus* (Bates); **F**, *S. (S.) plaumanni*, new species; **G**, *S. (S.) robustus* (Bates); **H**, *S. (S.) melanarius* (Dejean); and **I**, *S. (Pristolomus) dentifer* (Chaudoir). Scale bar = 1.0 mm.

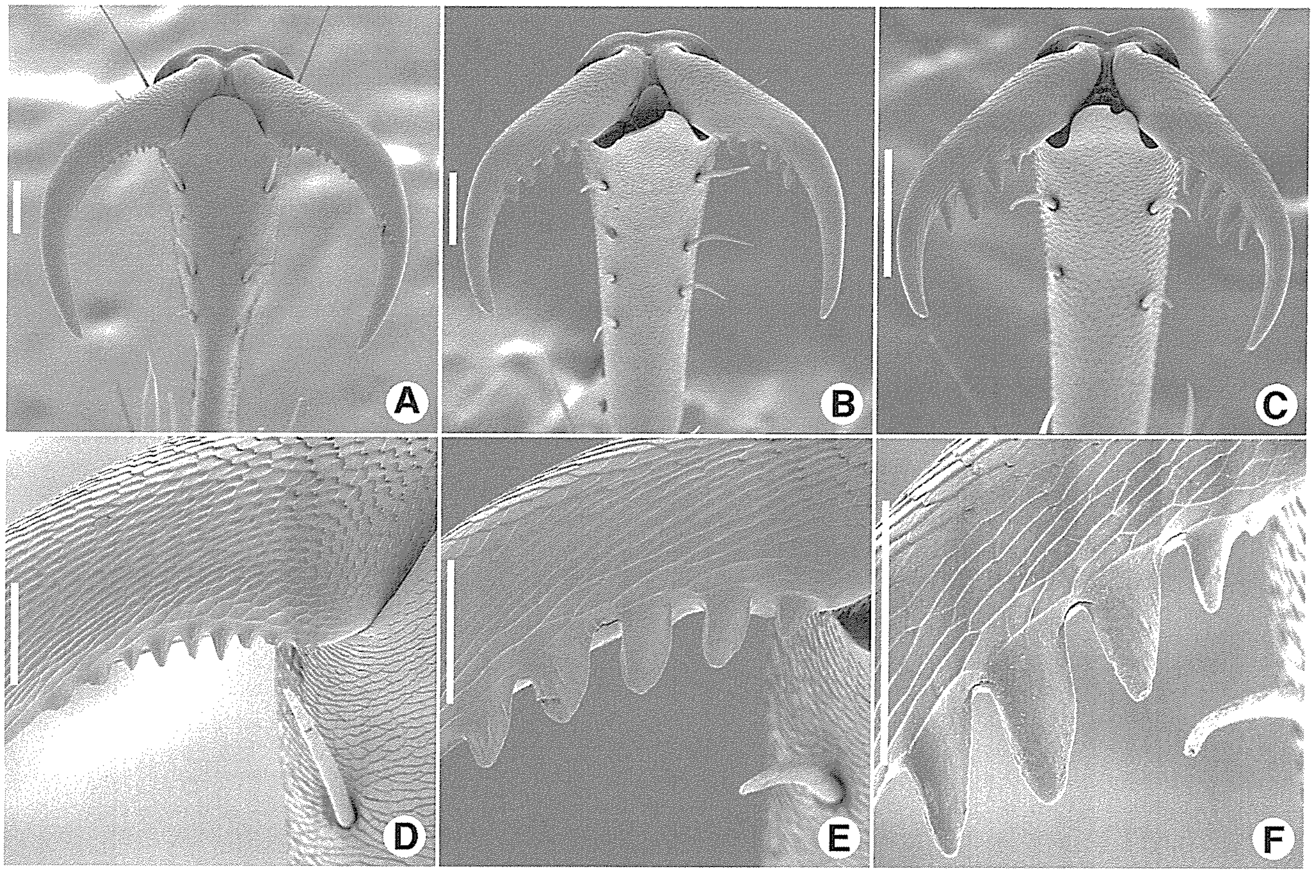

Figure 17. SEM photographs of tarsal claws, terminal aspect, of species of *Stenognathus (s. str.)*. **A** and **D**, *S. (S.) batesi* Chaudoir; **B** and **E**, *S. (S.) luctuosus* (Maindron); and **C** and **F**, *S. (S.) nigropiceus* (Bates). Scale bars: **A**, **B**, and **C** = 100 µm.; **D**, **E**, and **F** = 50 µm.

Description. With character states of genus *Stenognathus*, restricted or amplified as follows. Habitus as in Fig. 18. SBL and values for selected ratios as in Tables 6 to 11.

Color. Rufo-piceous to nearly black except as follows: mouthparts infuscated rufous; antennae rufous, darkened apically; tibiae paler apically; and tarsi rufous.

Macrosculpture. Dorsal surface smooth, except for microlines. Middle and hind tibiae with posterior surface smooth, evenly rounded not strigulose or canaliculate.

Microsculpture. Dorsal surfaces of head and elytra with mesh pattern isodiametric or nearly so.

Luster. Dorsal surface shiny, elytra slightly less so than head and pronotum.

Chaetotaxy. Elytral umbilical series virtually continuous, with adjacent setae evenly spaced. Setation of legs sexually dimorphic: males with ventral surfaces of fore and middle femora densely setose; females without setae ventrally on these sclerites.

Vestiture. Sexually dimorphic, with setation of females less dense and shorter than in males: metasternum densely setose, without triangular glabrous area; abdominal sterna III and IV densely setose medially, sterna V-VII sparsely setose over most of ventral surfaces.

Head. Eyes slightly reduced.

Mouthparts. Labrum as in Figs. 5A- B. Mandibles as in Figs. 6A-F, without lateroventral groove. Left mandible: dorsally, supraterebral ridge complete in length, slightly sinuate, but not toothed (Fig. 6A); ventrally, molar tooth and occlusal extension of molar ridge (Fig. 6C); basal extension of molar ridge plus molar ridge extended anteriorly nearly to premolar ridge (Fig. 6C). Right mandible: posterior retinacular tooth flat (**prt**), retinacular ridge prominent, slightly concave (Fig. 6B, **rr**). Maxillae (Figs. 10A-B) and labium average for *Thyreopterus* genus-group.

Prothorax. Pronotum (Figs. 16A and 18) with disc moderately convex, lateral margins very slightly sinuate to straight anteriad posteriolateral angles, these narrowly rounded. Lateral groove each side separated from adjacent posteriolateral impression by slight, narrow convexity.

Pterothorax. Metepisternum subquadrate, lateral margin slightly longer than anterior margin; metasternum shorter than length of middle coxal cavity.

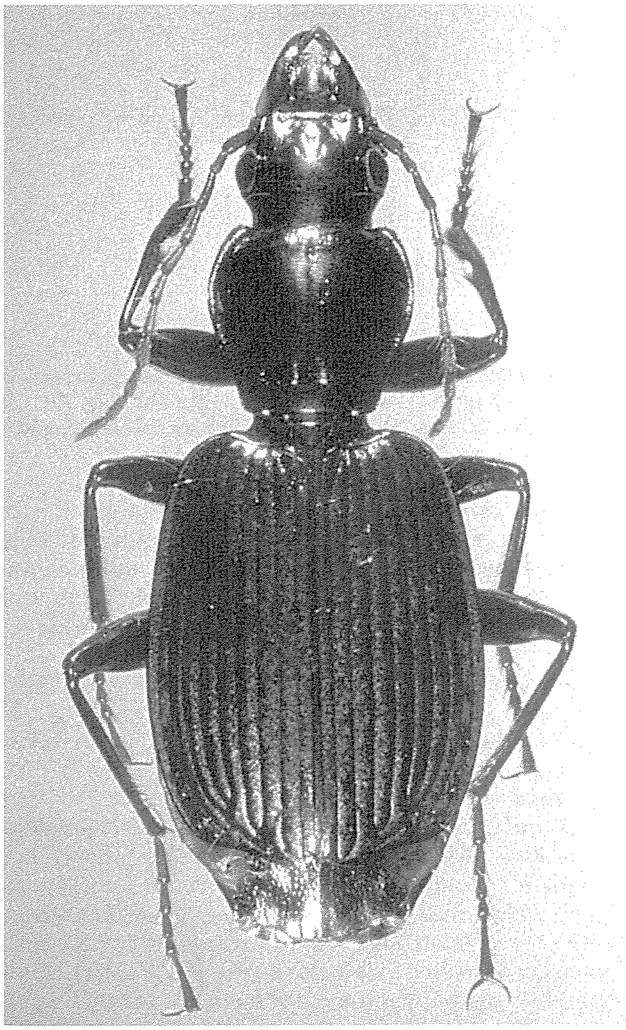

Figure 18. Photograph illustrating habitus, dorsal aspect, of *Stenognathus (Prostenognathus) onorei*, new species. Female paratype, SBL = 11.52 mm, Pichincha, Ecuador [UASM].

Elytra. Elytron: humerus narrowed, projected anteriad slightly, subangulate; preapical margin very slightly sinuate, subtruncate; apex broadly rounded. Intervals slightly convex; interneurs narrow, impressed from base to apex; impunctate.

Hind wings. Each hind wing very short, much shorter than half length of elytron.

Legs. Tarsal claws serrate basally.

Abdominal sterna. Sternum VII broadly sinuate medially in both sexes, not narrowly notched in males.

Male genitalia (Figs. 19A-F). Apical portion of median lobe short, apex broadly rounded in dorsal aspect. Left paramere with apex broadly rounded or obtusely pointed. Internal sac with 2 preapical lobes; gonopore at tip of sac.

Variation. In form and size, specimens of this species are quite constant. The median lobe of the male genitalia, however, exhibits distinct variation in form (Figs. 19A-F), but not sufficient to warrant taxonomic recognition of the various types.

Habitat. This species lives in tropical montane forest at altitudes from 1700 to 2286 m. Evidently adults live on the ground, in leaf litter.

Geographical distribution (Fig. 21). This species is found on both the Amazonian and Pacific sides of the Andes in the northern half of Ecuador.

Chorological affinities. The range of this species is probably isolated altitudinally from the ranges of *Stenognathus (s. str.)*, and *Pristolomus*. These groups occur near *Prostenognathus*, geographically, but mostly at lower altitudes.

Phylogenetic relationships. This species is the only known member of the subgenus *Prostenognathus*, which is postulated to be ancestral to the other 3 subgenera.

Material examined. Type specimens only, as indicated above.

Months of collection. March-June.

Gnathostenus, new subgenus

Type species. *Stenognathus dentifemoratus*, new species (here designated).

Subgeneric name. The subgeneric name is an anagram, based on the generic name, *Stenognathus*.

Recognition. In addition to the features in the key, members of this subgenus are recognized by larger size (SBL more than 10.5 mm.) and left mandible with a supraterebral tooth (Fig. 6G, **stt**).

Description. See description of the type species, *S. dentifemoratus*, new species.

Habitat, geographical distribution, chorological affinities, and phylogenetic relationships. For information about these topics, see the following treatment of *S. dentifemoratus*.

Included species. *Gnathostenus* is a monobasic subgenus; the type species is described below.

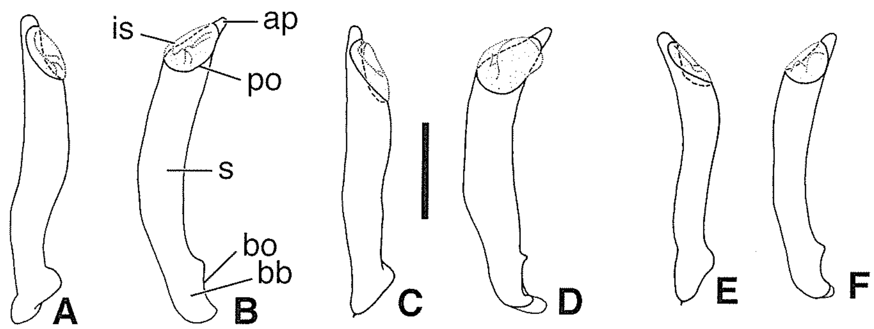

Figure 19. Line drawings of male genitalia, median lobe, of *Stenognathus (Prostenognathus) onorei*, new species, from various Ecuador localities— **A**, **C**, and **E**, dorsal aspect, **B**, **D**, and **F**, left lateral aspect: **A-B**, Napo; **C-D**, Pichincha and **E-F**, Bolivar. Scale bar = 1.0 mm. Legend: **ap**, apical portion; **bb**, basal bulb; **bo**, basal orifice; **is**, internal sac; **po**, preapical orifice; and **s**, shaft.

Stenognathus (Gnathostenus) dentifemoratus, new species

Figs. 6G-N, 16B, 20A-B, and 21

Type material. One specimen, HOLOTYPE male, labelled: "St. platypterus/ Chd." [handwritten on green paper]; "Coll. R. I. Sc. N. B./ Colombie" [purple card]/"Col./ 1.XII.65" [handwritten on green paper glued to above purple card]/ "Stenognathus" [handwritten on white paper glued to above purple card]/ "nov.spec." [handwritten on white paper glued to above purple card] [ISNB].

Type area. Colombia.

Specific epithet. A Latin adjective, nominative case, based on 2 nouns, dens, meaning tooth, and femur, in reference to the toothed fore femora (Fig. 20A) of the holotype.

Recognition. For details, see recognition section for subgenus *Gnathostenus*, above.

Description. With character states of genus *Stenognathus*, restricted or amplified as follows. Habitus similar to that of *S. onorei* (cf. Fig. 18). SBL and values for selected ratios as in Tables 6 to 11.

Color. Black except as follows: antennae, mouthparts, and legs rufopiceous.

Macrosculpture. Dorsal surface of head and elytra smooth, except for microlines; pronotum with surface finely, transversely rugulose. Middle and hind tibiae with posterior surface smooth, evenly rounded not strigulose or canaliculate.

Microsculpture. Dorsal surface of head with mesh pattern isodiametric or nearly so, microlines very fine, sculpticells small. Elytron with mesh pattern transverse, sculpticells flat, 1.5-2 X longer than wide.

Luster. Dorsal surface uniformly shiny.

Chaetotaxy. Elytral umbilical series virtually continuous, without wide gaps between adjacent setae; medial 4 setae more widely spaced than anterior and posterior groups. Fore femur asetose; middle femur with several longitudinal rows of setae; hind femur with one row of fine setae, anterioventrally.

Vestiture. Metasternum densely setose, without triangular glabrous area; abdominal sterna III -VI densely setose medially, sterna III-VII sparsely setose over most of ventral surfaces.

Head. Eyes slightly reduced.

Mouthparts. Labrum as in Figs. 5A-B. Mandibles as in Figs. 6G-N, without lateroventral groove. Left mandible: dorsally, supraterebral ridge complete in length and toothed (Fig. 6G, **stt**); ventrally, without molar tooth or occlusal extension of molar ridge (Fig. 6K); basal extension of molar ridge short (Fig. 6K, **bemr**). Right mandible: posterior retinacular tooth flat (Fig. 6H, **prt**), retinacular ridge prominent, slightly concave (Fig. 6H, **rr**). Maxillae and labium average for *Thyreopterus* genus-group.

Prothorax. Pronotum (Fig. 16B) with disc moderately convex, lateral margins distinctly sinuate anteriad posteriolateral angles, these narrowly rounded. Lateral groove each side continuous with adjacent posteriolateral impression.

Pterothorax. Metepisternum longer than wide, with lateral margin distinctly longer than width at anterior margin; metasternum and middle coxal cavity subequal in length.

Elytra. Elytron: humerus slightly narrowed, projected anteriad slightly, subangulate; preapical margin slightly sinuate, apex distinctly angulate. Intervals slightly convex; interneurs narrow, impressed from base to apex, impunctate.

Hind wings. Each hind wing short, about half length of elytron. Venation reduced: oblongum cell with posterior vein partly desclerotized; wedge cell absent.

Legs. Tarsal claws finely serrate basally.

Abdominal sterna. Sternum VII with posterior margin notched.

Table 6. Data about variation in values for SBL (in mm.) among the species of *Stenognathus* Chaudoir.

Species/ Locality	N	Males Range	Mean	N	Females Range	Mean
Stenognathus						
(Prostenognathus)						
S. onorei, n. sp.	3	10.60-11.40	11.11	10	10.52-12.84	11.89
(Gnathostenus)						
S. dentifemoratus, n. sp.	1	12.20		—		
(Stenognathus)						
S. stricticollis sp. grp.						
S. batesi Chaudoir	3	12.48-13.76	12.97	10	11.84-14.12	12.73
S. platypterus Chaudoir	8	9.31-10.88	10.31	3	9.75-11.56	10.71
S. stricticollis (Maindron)	3	7.32- 9.68	8.35	4	7.92- 9.96	9.15
S. luctuosus (Maindron)	10	10.44-13.00	11.61	10	10.38-14.00	11.64
S. procerus sp. grp.						
S. procerus (Putzeys)	1	10.44		1	10.44	
S. nigropiceus sp. grp.						
S. chaudoiri Ball	7	9.44-10.24	9.82	3	8.68-8.96	8.83
S. nigropiceus (Bates)	8	7.04- 8.76	7.87	7	7.64-8.80	8.42
S. gagatinus (Dejean)	5	8.25- 9.04	8.61	5	8.20-8.80	8.51
S. plaumanni, n. sp.	1	8.24		1	9.00	
S. jauja, n. sp.	1	9.86		-		
S. robustus (Bates)	-			1	9.28	
S. melanarius sp. grp.						
S. quadricollis Chaudoir	6	9.72-12.84	11.23	5	9.72-12.72	11.46
S. longipennis Chaudoir	1	9.20		2	11.69-12.13	11.91
S. crassus Chaudoir	1	15.52		2	13.48-14.08	13.78
S. crenulatus Chaudoir	9	10.00-11.16	10.67	6	9.84-12.52	10.63
S. melanarius (Dejean)	9	10.28-13.00	11.79	9	11.00-12.32	11.72
(Pristolomus)						
S. dentifer (Chaudoir)[1]	8	10.88-13.80	12.47	7	11.12-12.48	11.86
S. dentifer (Chaudoir)[2]	5	9.32-12.56	10.97	8	9.28-11.12	10.15

[1] Specimens from Costa Rica.
[2] Geographically compound sample, specimens from Eucador and Peru.

Male genitalia (Figs. 20B-D). Apical portion of median lobe short, broadly rounded in dorsal aspect. Left paramere broadly rounded or obtusely pointed. Internal sac slender, without armature, with apical lobe, with gonopore at tip.

Habitat. Unknown. Because of the reduced wings of the only known specimen and its general proportions, we infer that this species, like *S. onorei*, lives in tropical montane forest in the Andes.

Geographical distribution (Fig. 21). This species is known only from the type area.

Chorological affinities. The general area where this species occurs is occupied also by species of most species groups of subgenus *Stenognathus*, and by *S. dentifer* (subgenus *Pristolomus*). However, we suspect that *S. dentifemoratus* lives in forests that occur at higher altitude than are occupied by species of the other subgenera.

Phylogenetic relationships. Because of shared overall similarity in external features, including the probably synapotypic feature of transverse elytral microsculpture, we postulate relationship with the subgenera *Stenognathus* and *Pristolomus*. Further, because of its reduced hind wings, we postulate that *Gnathostenus* is an old lineage, near the base of *Stenognathus* and *Pristolomus*.

Material examined. Holotype only.

Table 7. Data about variation in values for ratio Hw/Fw among the species of *Stenognathus* Chaudoir.

Species/Locality	Males N	Males Range	Males Mean	Females N	Females Range	Females Mean
Stenognathus						
(Prostenognathus)						
S. onorei, n. sp.	3	1.381-1.499	1.431	10	1.391-1.510	1.497
(Gnathostenus)						
S. dentifemoratus, n. sp.	1	1.499		—		
(Stenognathus)						
S. stricticollis sp. grp.						
S. batesi Chaudoir	3	1.548-1.642	1.602	10	1.548-1.626	1.577
S. platypterus Chaudoir	8	1.721-1.848	1.782	3	1.538-1.653	1.602
S. stricticollis (Maindron)	3	1.695-1.751	1.718	4	1.567-1.678	1.616
S. luctuosus (Maindron)	10	1.606-1.808	0.601	10	1.590-1.760	1.642
S. procerus sp. grp.						
S. procerus (Putzeys)	1	1.529		1	1.565	
S. nigropiceus sp. grp.						
S. chaudoiri Ball	7	1.689-1.792	1.718	3	1.642-1.656	1.647
S. nigropiceus (Bates)	8	1.703-1.835	1.764	7	1.792-1.883	1.757
S. gagatinus (Dejean)	5	1.613-1.764	1.675	5	1.550-1.715	1.629
S. plaumanni, n. sp.	1	1.730		1	1.700	
S. jauja, n. sp.	1	1.616		-		
S. robustus (Bates)	-			1	1.727	
S. melanarius sp. grp.						
S. quadricollis Chaudoir	6	1.684-1.773	1.727	5	1.580-1.658	1.634
S. longipennis Chaudoir	1	1.757		2	1.639-1.681	1.658
S. crassus Chaudoir	1	1.605		2	1.577-1.608	1.592
S. crenulatus Chaudoir	9	1.678-1.718	1.701	6	1.595-1.686	1.658
S. melanarius (Dejean)	9	1.538-1.773	1.667	9	1.499-1.751	1.672
(Pristolomus)						
S. dentifer (Chaudoir)[1]	8	1.650-1.686	1.672	7	1.600-1.701	1.637
S. dentifer (Chaudoir)[2]	5	1.634-1.686	1.672	8	1.647-1.715	1.670

[1] Specimens from Costa Rica.
[2] Geographically compound sample, specimens from Eucador and Peru.

Month of collection. December.

Subgenus *Stenognathus (sensu stricto)*

Stenognathus Chaudoir 1843:431. Chaudoir 1869a:115. Ball 1975a:161-162.
Phloeotherates Bates 1869:71, 79. Maindron 1906a:196-198. Maindron 1906b:251. Ball 1975a:162. **NEW SYNONYMY.**
Ferus Chaudoir 1869a:119. Ball 1975a:162.

Type species. For *Stenognathus: Anchomenus melanarius* Dejean 1831:718 (by monotypy). For *Phloeotherates*: *Phloeotherates nigropiceus* Bates 1869:80 (designated by Ball 1975:162). For *Ferus*: *Ferus quadricollis* Chaudoir 1869a:119 (by monotypy). The name *Ferus quadricollis,* being a junior subjective homonym, was replaced by *Stenognathus chaudoiri* Ball (1975a:162).

Notes about synonymy. See Ball (1975a:162) and above, under "intra-generic ranking".

Recognition. See the key to subgenera and species of genus *Stenognathus*.

Description. With character states of genus *Stenognathus*, restricted or amplified, as follows. Habitus. Body rather broad, deplanate, or moderately convex. SBL and values for selected ratios as in Tables 6 to 11.

Table 8. Data about variation in values for ratio Hw/Pwm among the species of *Stenognathus* Chaudoir.

Species/ Locality	Males N	Males Range	Males Mean	Females N	Females Range	Females Mean
Stenognathus						
(Prostenognathus)						
S. onorei, n. sp.	3	0.685-0.707	0.695	10	0.697-0.770	0.730
(Gnathostenus)						
S. dentifemoratus, n. sp.	1	0.750		—		
(Stenognathus)						
S. stricticollis sp. grp.						
S. batesi Chaudoir	3	0.742-0.791	0.760	10	0.753-0.802	0.780
S. platypterus Chaudoir	8	0.743-0.815	0.784	3	0.784-0.850	0.809
S. stricticollis (Maindron)	3	0.788-0.831	0.805	4	0.796-0.839	0.821
S. luctuosus (Maindron)	10	0.741-0.813	0.785	10	0.755-0.833	0.800
S. procerus sp. grp.						
S. procerus (Putzeys)	1	0.703		1	0.720	
S. nigropiceus sp. grp.						
S. chaudoiri Ball	7	0.750-0.797	0.766	3	0.767-0.774	0.769
S. nigropiceus (Bates)	5	0.796				
S. gagatinus (Dejean)	5	0.781-0.842	0.813	5	0.763-0.818	0.792
S. plaumanni, n. sp.	1	0.789		1	0.797	
S. jauja, n. sp.	1	0.708		-		
S. robustus (Bates)	-			1	0.802	
S. melanarius sp. grp.						
S. quadricollis Chaudoir	6	0.792-0.852	0.825	5	0.833-0.859	0.842
S. longipennis Chaudoir	1	0.864		2	0.854-0.857	0.856
S. crassus Chaudoir	1	0.786		2	0.813-0.826	0.820
S. crenulatus Chaudoir	9	0.814-0.869	0.847	6	0.837-0.919	0.883
S. melanarius (Dejean)	9	0.704-0.833	0.777	9	0.750-0.819	0.779
(Pristolomus)						
S. dentifer (Chaudoir)[1]	8	0.849-0.870	0.863	7	0.872-0.915	0.895
S. dentifer (Chaudoir)[2]	5	0.827-0.907	0.872	8	0.866-0.948	0.907

[1] Specimens from Costa Rica.
[2] Geographically compound sample, specimens from Eucador and Peru.

Color. As described for genus *Stenognathus*.

Macrosculpture. Head surface dorsally smooth. Middle and hind tibial posterior (dorsal) surfaces longitudinally strigulose to smooth.

Microsculpture. Head dorsally with clypeal mesh pattern isodiametric, sculpticells flat. Frons and vertex microlines distinct, mesh pattern isodiametric, sculpticells flat, or microlines absent and surface completely smooth. Elytral dorsal surface with mesh pattern on intervals isodiametric to transverse, sculpticells of various width, flat.

Luster. Dorsal surfaces generally shiny to subiridescent.

Chaetotaxy. With standard complement of fixed setae for Pericalina. Legs, setal patterns of males various. For details, see descriptions of species groups and species.

Vestiture. Ventral surface more densely setose in males than in females; or female ventral surface glabrous except for fixed setae. Thoracic metasternum setose in triangular pattern with apex toward middle coxae and bare area anteriad antecoxal piece; antecoxal piece glabrous or partially setose. Abdominal sterna III and IV ventrally more or less densely setose medially, sterna V-VII excepting fixed setae very sparsely setose, or glabrous, or III to VI densely setose medially, sparsely so laterally.

Head. Eyes moderately to markedly convex, more or less bulged.

Mouthparts. Mandibles (Figs. 6O-V) without lateroventral groove (Fig. 6Q-R). Left mandible: dorsally, supraterebral ridge complete, slightly to moderately sinuate, or incomplete in length, not toothed (Fig. 6O); ventrally, with or without molar tooth or occlusal

Table 9. Data about variation in values for ratio Pwb/Pwm among the species of *Stenognathus* Chaudoir.

Species/ Locality	N	Males Range	Mean	N	Females Range	Mean
Stenognathus						
(Prostenognathus)						
S. onorei, n. sp.	3	0.640-0.720	0.669	10	0.643-0.689	0.666
(Gnathostenus)						
S. dentifemoratus, n. sp.	1	0.716		—		
(Stenognathus)						
S. stricticollis sp. grp.						
S. batesi Chaudoir	3	0.701-0.721	0.714	10	0.702-0.768	0.738
S. platypterus Chaudoir	8	0.745-0.846	0.790	3	0.750-0.771	0.762
S. stricticollis (Maindron)	3	0.808-0.831	0.822	4	0.758-0.815	0.783
S. luctuosus (Maindron)	10	0.786-0.844	0.810	10	0.780-0.830	0.802
S. procerus sp. grp.						
S. procerus (Putzeys)	1	0.770		1	0.780	
S. nigropiceus sp. grp.						
S. chaudoiri Ball	7	0.892-0.938	0.905	3	0.867-0.903	0.890
S. nigropiceus (Bates)	8	0.889-0.925	0.905	7	0.857-0.924	0.894
S. gagatinus (Dejean)	5	0.859-0.895	0.871	5	0.850-0.902	0.872
S. plaumanni, n. sp.	1	0.895		1	0.891	
S. jauja, n. sp.	1	0.966		-		
S. robustus (Bates)	-			1	0.848	
S. melanarius sp. grp.						
S. quadricollis Chaudoir	6	0.818-0.880	0.843	5	0.817-0.853	0.837
S. longipennis Chaudoir	1	0.847		12	0.813-0.837	0.825
S. crassus Chaudoir	1	0.827		2	0.824-0.849	0.837
S. crenulatus Chaudoir	9	0.754-0.806	0.772	6	0.738-0.839	0.778
S. melanarius (Dejean)	9	0.778-0.862	0.837	9	0.776-0.833	0.798
(Pristolomus)						
S. dentifer (Chaudoir)[1]	8	0.765-0.800	0.778	7	0.760-0.814	0.780
S. dentifer (Chaudoir)[2]	5	0.753-0.783	0.772	8	0.727-0.828	0.777

[1] Specimens from Costa Rica.
[2] Geographically compound sample, specimens from Eucador and Peru.

extension of molar ridge (Fig. 6S); basal extension of molar ridge long or short (Fig. 6S, **bemr**). Right mandible: posterior retinacular tooth prominent (Fig. 6P, **prt**), retinacular ridge markedly concave, not prominent (Fig. 6P, **rr**).

Prothorax. Moderately to markedly narrower than elytra. Pronotum (Figs. 16C-H) moderately to markedly transverse; narrowed posteriorly markedly to slightly. Lateral margins slightly sinuate posteriorly or not; posteriolateral angles distinctly angulate. Surface lateral grooves moderately broad anteriorly, widened slightly to markedly, posteriorly; posteriolateral impressions basin-like, each continuous with adjacent lateral groove.

Pterothorax. Metepisternum lateral margin distinctly longer than width at anterior margin.

Elytra. Elytron: humerus broadly rounded to subangulate, lateral margin smooth, more or less rounded and widened preapically; preapical margin distinctly sinuate, apex distinctly angulate to oblique-subtruncate. Interneurs shallow to moderately deep, smooth or finely punctulate. Intervals nearly flat to distinctly, broadly convex.

Hind wings. Developed fully.

Legs. Middle and hind tibial posterior surface rounded or more or less distinctly longitudinally canaliculate. Tarsal claws smooth, serrate (Figs. 17A-B), or pectinate (Figs. 17C-F).

Abdominal sterna. Sternum VII of males with posterior margin shallowly notched medially.

Male genitalia (Figs. 22A-O, 25A-O, and 28A-O). Median lobe apical portion short to very short, in dorso-ventral aspect acute to narrowly obtuse. Internal sac with

Table 10. Data about variation in values for ratio Pl/Pwm among the species of *Stenognathus* Chaudoir.

Species/ Locality	N	Males Range	Mean	N	Females Range	Mean
Stenognathus (Prostenognathus)						
S. onorei, n. sp.	3	0.835-0.910	0.874	10	0.820-0.930	0.870
(Gnathostenus)						
S.dentifemoratus, n. sp.	1	0.909		—		
(Stenognathus)						
S. stricticollis sp. grp.						
S. batesi Chaudoir	3	0.816-0.837	0.827	10	0.734-0.779	0.757
S. platypterus Chaudoir	8	0.824-0.851	0.841	3	0.750-0.771	0.762
S. stricticollis (Maindron)	3	0.755-0.831	0.791	4	0.741-0.855	0.811
S. luctuosus (Maindron)	10	0.753-0.828	0.789	10	0.723-0.786	0.745
S. procerus sp. grp.						
S. procerus (Putzeys)	1	0.838		1	0.720	
S. nigropiceus sp. grp.						
S. chaudoiri Ball	7	0.691-0.739	0.712	3	0.677-0.700	0.692
S. nigropiceus (Bates)	8	0.649-0.691	0.670	7	0.636-0.673	0.655
S. gagatinus (Dejean)	5	0.684-0.730	0.700	5	0.639-0.727	0.677
S. plaumanni, n. sp.	1	0.684		1	0.656	
S. jauja, n. sp.	1	0.674		-		
S. robustus (Bates)	-			1	0.698	
S. melanarius sp. grp.						
S. quadricollis Chaudoir	6	0.766-0.844	0.786	5	0.742-0.778	0.761
S. longipennis Chaudoir	1	0.780		2	0.729-0.735	0.732
S. crassus Chaudoir	1	0.755		2	0.714-0.721	0.718
S. crenulatus Chaudoir	9	0.729-0.803	0.761	6	0.742-0.763	0.750
S. melanarius (Dejean)	9	0.704-0.844	0.792	9	0.731-0.809	0.771
(Pristolomus)						
S. dentifer (Chaudoir)[1]	8	0.853-0.922	0.889	7	0.829-0.857	0.837
S. dentifer (Chaudoir)[2]	5	0.883-0.955	0.921	8	0.828-0.897	0.855

[1] Specimens from Costa Rica.
[2] Geographically compound sample, specimens from Eucador and Peru.

little armature, variously lobed. Left paramere apical margin principally subtruncate with small projection, or more or less broadly obtusely rounded.

Habitat. Adults of this subgenus live on logs, where they are found under bark and on fungi, in tropical lowland forest and tropical lower montane forest, from near sea level to 2000 m., in eastern Ecuador. Evidently, the beetles are nocturnal, as indicated by their capture at night, using lights to find them.

Geographical distribution (Figs. 23, 26, and 29). The range of this subgenus extends in cis-Andean South America from eastern Brazil northward to the Isthmus of Panamá, and in Middle America from Panamá northward to Veracruz, in eastern México.

Chorological affinities. The geographical range of this subgenus is co-extensive with the range of the genus *Stenognathus*, and consequently overlaps in whole or in part the ranges of all other subgenera of this group.

Included species. The subgenus *Stenognathus* includes 16 species, arrayed in 4 species groups which are treated taxonomically, below.

Stenognathus stricticollis species group

Recognition. A combination of serrate or pectinate tarsal claws, and pronotum with base more constricted and lateral margins sinuate posteriorly

Table 11. Data about variation in values for ratio Pl/El among the species of *Stenognathus* Chaudoir.

Species/ Locality	N	Males Range	Mean	N	Females Range	Mean
Stenognathus						
(Prostenognathus)						
S. onorei, n. sp.	3	0.429-0.479	0.450	10	0.382-0.457	0.429
(Gnathostenus)						
S. dentifemoratus, n. sp.	1	0.419		—		
(Stenognathus)						
S. stricticollis sp. grp.						
S. batesi Chaudoir	3	0.339-0.348	0.344	10	0.307-0.320	0.314
S. platypterus Chaudoir	8	0.293-0.361	0.346	3	0.283-0.322	0.307
S. stricticollis (Maindron)	3	0.297-0.301	0.299	4	0.279-0.317	0.301
S. luctuosus (Maindron)	10	0.292-0.312	0.299	10	0.271-0.288	0.281
S. procerus sp. grp.						
S. procerus (Putzeys)	1	0.365		1	0.321	
S. nigropiceus sp. grp.						
S. chaudoiri Ball	7	0.272-0.291	0.278	3	0.269-0.282	0.275
S. nigropiceus (Bates)	8	0.257-0.293	0.279	7	0.267-0.282	0.272
S. gagatinus (Dejean)	5	0.283-0.290	0.286	5	0.265-0.284	0.272
S. plaumanni, n. sp.	1	0.273		1	0.269	
S. jauja, n. sp.	1	0.280		-		
S. robustus (Bates)	-			1	0.308	
S. melanarius sp. grp.						
S. quadricollis Chaudoir	6	0.283-0.298	0.292	5	0.270-0.292	0.280
S. longipennis Chaudoir	1	0.295		2	0.269	
S. crassus Chaudoir	1	0.270		2	0.262-0.263	0.263
S. crenulatus Chaudoir	9	0.2630.286	0.270	6	0.269-0.285	0.274
S. melanarius (Dejean)	9	0.268-0.307	0.291	9	0.286-0.317	0.295
(Pristolomus)						
S. dentifer (Chaudoir)[1]	8	0.319-0.336	0.328	7	0.300-0.317	0.309
S. dentifer (Chaudoir)[2]	5	0.323-0.350	0.337	8	0.301-0.327	0.312

[1] Specimens from Costa Rica.
[2] Geographically compound sample, specimens from Eucador and Peru.

distinguish adults of this species group from those of the *S. melanarius* and *S. nigropiceus* groups. The shorter pronotal lateral margins more sinuate and middle and hind tibial posterior surfaces strigulose, distinguish adults of this species group from those of the *S. procerus* group. Males are further distinguished by the form of the median lobe and left paramere of the genitalia (Figs. 22A-L; cf. Figs. 22M-O).

Description. With character states of subgenus *Stenognathus*, restricted or amplified as indicated in the "Recognition" section above and as follows. Body rather broad, deplanate, or moderately convex. SBL and values for selected ratios as in Tables 6 to 11.

Macrosculpture. Head surface dorsally smooth. Middle and hind tibial posterior (dorsal) surfaces longitudinally strigulose.

Microsculpture. Frons and vertex microlines absent and surface completely smooth. Elytron, dorsal surface: mesh pattern on intervals transverse.

Luster. Dorsal surfaces generally shiny, not subiridescent.

Chaetotaxy. Elytral umbilical series continuous, or in 3 parts, anterior and posterior series each with 5 or 6 setae, medial with 1 seta. Legs of males ventrally: middle femur more or less densely setose, fore and hind femora sparsely setose to glabrous; trochanter sparsely to densely setose.

Vestiture. Ventral surface more densely setose in males than in females; or females with ventral surface glabrous except for fixed setae. Thoracic mestasternum

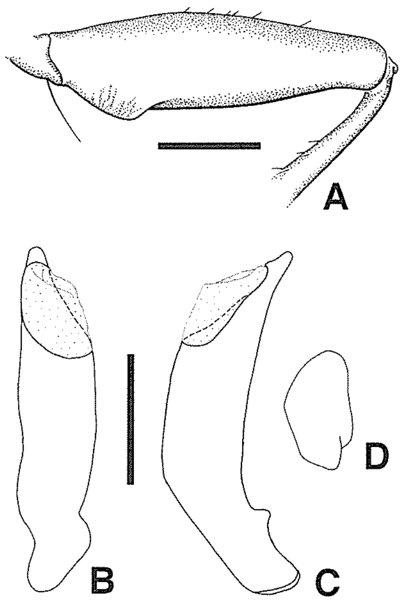

Figure 20. Line drawings of left fore leg and male genitalia of *Stenognathus (Gnathostenus) dentifemoratus*, new species. **A**, left fore leg, trochanter, femur, and basal portion of tibia, anterior aspect. **B-D**, male genitalia, **B**, median lobe, dorsal aspect; **C**, same, left lateral aspect; and **D**, left paramere, ventral aspect. Scale bars = 1.0 mm.

setose in triangular pattern with apex toward middle coxae and bare area anteriad antecoxal piece; antecoxal piece setose. Abdominal sterna various, setae rather short and sparse to longer and very dense medially on sterna III to VI or VII, or dense only on sterna III and IV.

Head. Eyes markedly convex, more or less bulged.

Mouthparts. Left mandible: dorsally, supraterebral ridge complete in length, slightly to moderately sinuate, and not toothed; ventrally molar tooth and occlusal extension of molar ridge; basal extension of molar ridge long.

Prothorax. Moderately to markedly narrower than elytra. Pronotum moderately to markedly transverse; narrowed posteriorly markedly or moderately. Lateral margins slightly to markedly sinuate posteriorly; posteriolateral angles distinctly angulate. Surface lateral grooves moderately broad anteriorly, widened slightly to markedly, posteriorly; posteriolateral impressions basin-like, each continuous with adjacent lateral groove.

Elytra. Elytron: humerus broadly rounded; preapical margin distinctly sinuate, apex distinctly angulate to oblique-subtruncate; interneurs moderately deep, smooth; intervals distinctly, broadly convex.

Hind wings. Developed fully, with oblongum and wedge cells.

Legs. Middle and hind tibial posterior surface rounded or flattened, not canaliculate. Tarsal claws (Figs. 17A-D) serrate, or pectinate.

Male genitalia (Figs. 22A-C to 22J-L). Median lobe long and slender, curved ventrad relatively slightly; membranous portion less than half length of shaft. Internal sac with little armature, variously lobed. Left paramere apical margin obtusely rounded.

Geographical distribution (Figs. 23-24). The range of this species group is nearly co-extensive with the range of the subgenus *Stenognathus,* extending in cis-Andean South America from eastern Brazil northward to the Isthmus of Panamá, and in Middle America from Panamá northward to Veracruz, in eastern México.

Chorological affinities. The range of the *S. stricticollis* species group is overlapped broadly by the ranges of the *S. melanarius* and *S. nigropiceus* species groups.

Included species. The *S. stricticollis* species group includes the 4 following species.

Stenognathus (s. str.) batesi Chaudoir
Figs. 16C, 17A-B, 22A-C and 23

Stenognathus batesi Chaudoir 1877:198. TYPE MATERIAL: one authentic Chaudoir specimen from the Oberthür-Chaudoir Collection (MNHP) associated with the following box label: "Batesi/ Chaud/ Nicaragua/ Chontales/ Bates" [handwritten]. HOLOTYPE male, labelled: "Chontales/ Nicaragua" [handwritten];"TYPE" [red paper]; "Ex Musaeo/ Chaudoir" [red print].

Type material. Chaudoir (1877:198) based his description of this species on a single male, received from Bates. This specimen, noted above, would seem to be the holotype, though it was labelled as a lectotype by Ball, in 1972. 2 additional specimens from the H. W. Bates Collection, associated with the holotype, bear paratype labels. However, they must have been received at a later date, when Oberthür purchased the Bates collection, and thus cannot have type status. An additional specimen, from the Babault-Maindron Collection also accompanies those noted above. All of these specimens are labelled "Chontales, Nicaragua".

Type locality. Chontales, Departamento Chontales, Nicaragua.

Recognition. A combination of large size (SBL more than 11.0 mm.), cordate pronotum, and elytral apex distinctly angulate distinguishes specimens of this species from those of its closest relatives.

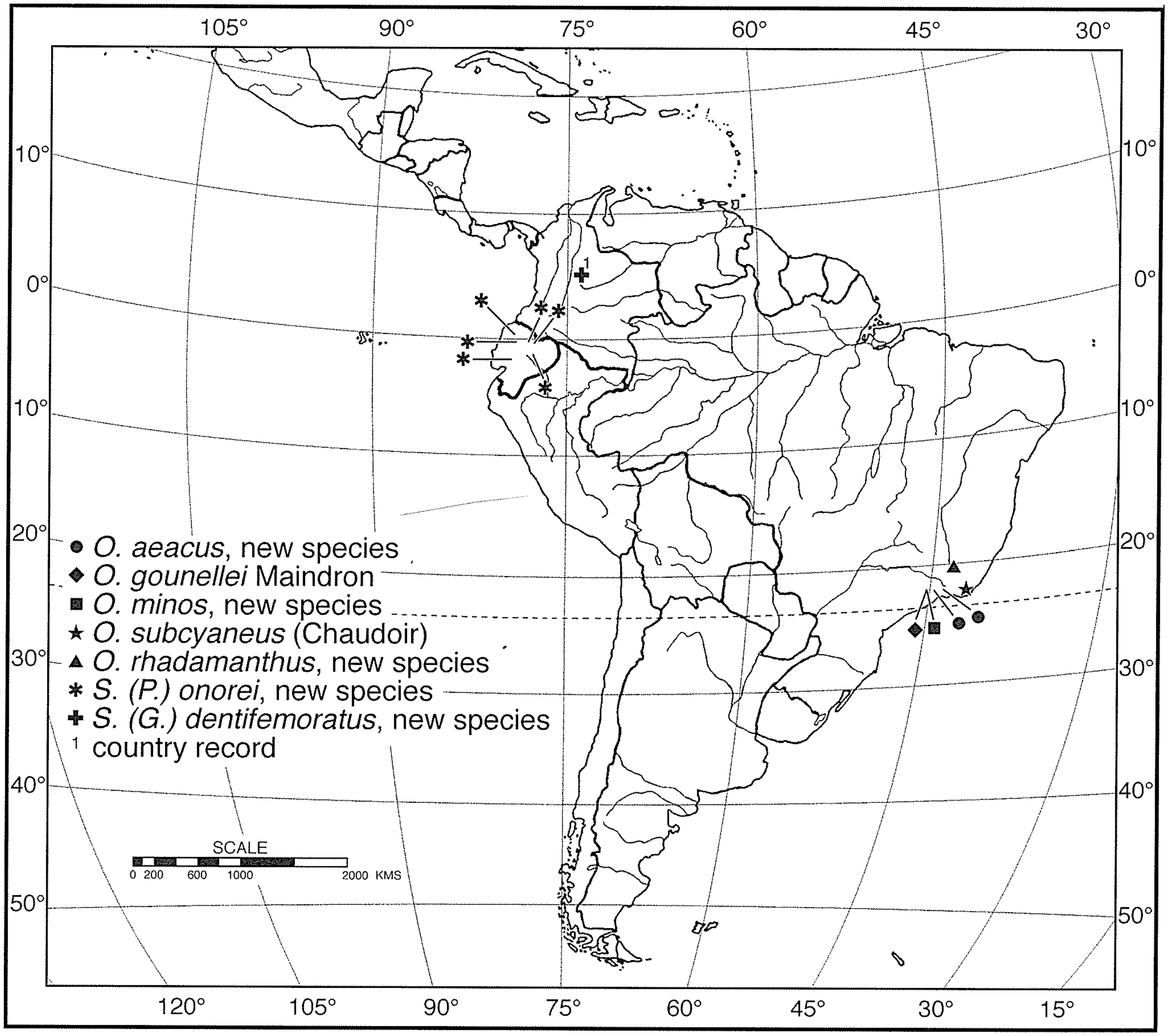

Figure 21. Map of South America showing positions of known localities for the species of *Oreodicastes, Stenognathus (Prostenognathus) onorei*, new species and *S. (Gnathostenus) dentifemoratus*, new species.

Description. With character states of *S. stricticollis* species group, restricted or amplified as follows. Body moderately convex. SBL and values for selected ratios as in Tables 6 to 11.

Chaetotaxy. Elytral umbilical series continuous. Legs of male: fore and middle femur ventrally densely setose, hind femur glabrous ventrally; hind trochanter ventrally sparsely setose.

Vestiture. Ventral surface setose in males; or females with ventral surface glabrous except for fixed setae. Abdominal sternal setae rather longer and very dense medially on sterna III to VI.

Mouthparts. Left mandible: supraterebral ridge slightly sinuate (cf. Fig. 6A)

Prothorax. Moderately narrower than elytra. Pronotum: subcordate (Fig. 16C), moderately transverse, narrowed posteriorly markedly; lateral margins markedly sinuate posteriorly; lateral grooves moderately broad anteriorly, not widened posteriorly.

Elytra. Elytral apex distinctly angulate.

Legs. Tarsal claws (Figs. 17A-B) finely serrate.

Male genitalia (Figs. 22A-C). Median lobe: in dorsal aspect (Fig. 22A) apical portion short, parallel-sided, apex broadly rounded; in left lateral aspect (Fig. 22B) cylindrical, without bulges or restrictions, basal bulb curved ventrad in relation to shaft. Left paramere (Fig. 22C) narrowed apically, apex moderately broadly rounded. Internal sac with pineapple-like sclerite; otherwise simple.

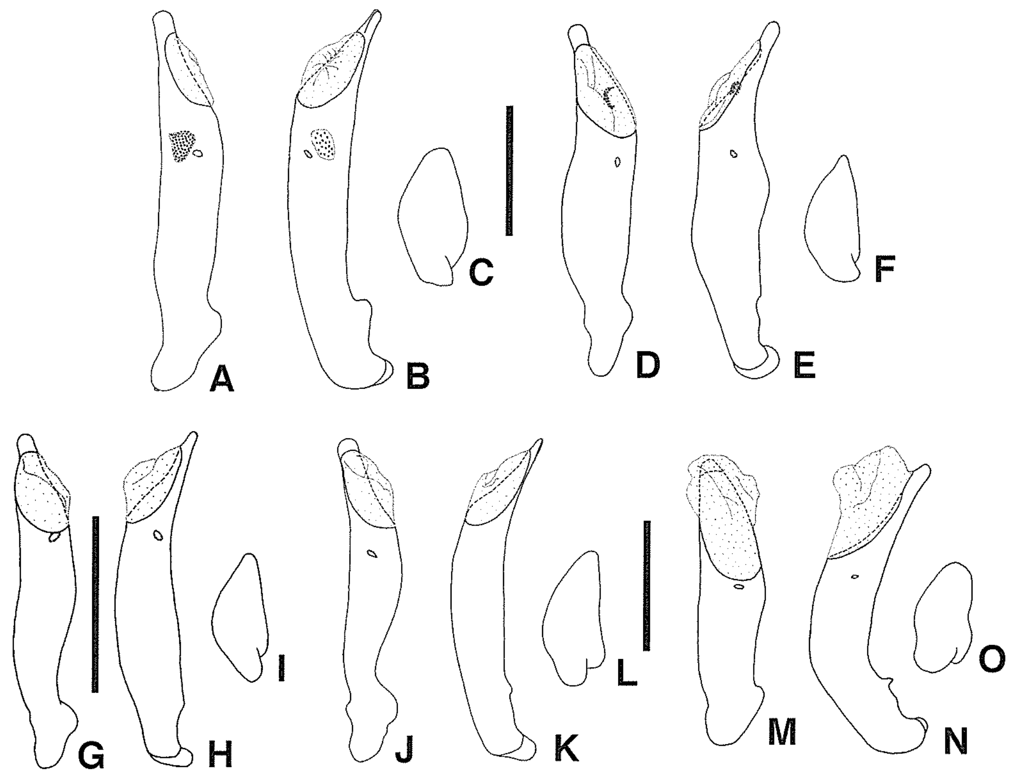

Figure 22. Line drawings of male genitalia of *Stenognathus (s. str.) stricticollis* and *procerus* species groups. **A**, **D**, **G**, **J**, and **M**, median lobe, dorsal aspect; **B**, **E**, **H**, **K**, and **N**, median lobe, left lateral aspect; **C**, **F**, **I**, **L**, and **O**, left paramere, ventral aspect. **A-L**, *S. (s. str.) stricticollis* species group: **A-C**, *S. batesi* Chaudoir; **D-F**, *S. platypterus* Chaudoir; **G-I**, *S. stricticollis* (Maindron); and **J-L**, *S. luctuosus* (Maindron). **M-O**, *S. (s. str.) procerus* species group, *S. procerus* (Putzeys). Scale bars = 1.0 mm.

Habitat. Based on data associated with the specimens, this species is an inhabitant of tropical lowland and tropical lower montane forest, at altitudes between at least 400 and 1800 m., living in association with trees (under bark, or running on twigs and branches). Association with fungi of the wood-inhabiting family Xylariaceae is indicated.

Geographical distribution (Fig. 23). Distribution records are concentrated in Lower Middle America (northward to Costa Rica) and Ecuador, mostly in the upper reaches of the Amazon Basin. No doubt, the species occurs also at least in intervening areas in Colombia. The range is described as Upper Amazon Basin to Lower Middle America.

Chorological affinities. The range of *S. batesi* is overlapped by the ranges of *S. platypterus* and *S. stricticollis*, which are also members of the *S. stricticollis* species group, and hence probably related to *S. batesi*.

Phylogenetic relationships. Although placed in the *S. stricticollis* species group, this species probably is not particularly close to the others, as indicated by pronotal form, large size, and form of the male median lobe.

Material examined. Twenty-four specimens from the following localities: **COSTA RICA. Alajuela**. Female, Sect. San Ramon de Dos Rios, 26.VI.1995, F.A. Quesada (CASC). **Guanacaste**. Estac. Cacao, s.e. side Volcan Cacao, 1000-1400 m., R. Blanco, C. Chavez: 2 males, 2 females, XI-XII.1989 (CASC); male, 3 females, X.1989 (CASC). Estac. Pitilla, 9 km s Santa Cecelia, 700 m.: female, VII.1988, GNP Biodiversity Survey (CASC); female, VII.1994, C. Moraga (USNM); female, II curso Parataxon, V.1990 (CASC). **Heredia**. Female, Est. El Ceibo, Braulio Carillo N.P., 400-600 m., II.1990, C. Chavez, R. Aguilar (CASC). **Puntarenas**. Male, San Vito, Las Cruces, 29.IV.1988, A. Solis (CASC). **PANAMA. Chiriqui**. Female, V. de Chiriqui, 610-914 m., Champion (BMNH). Male, Potrerillos, 18.IV-20.V.33, Van Dyke (CASC). **Darien**. Cana Biological Station, Serrania de Pirre, 7°45'18"N 77°41'6"W, 1100 m., J. S. Ashe, R. E. Brooks: female, ex treefall litter, 5.VI.1996 (SEMC); female, ex Xylariaceae, 7.VI.1996 (SEMC). **Panamá**. Female, Cerro Campana, 8°40'N 79°56'W, ca. 850 m., running on logs and branches, 3-4.VI.1972, T.L. & L.J. Erwin (USNM). **ECUADOR.**

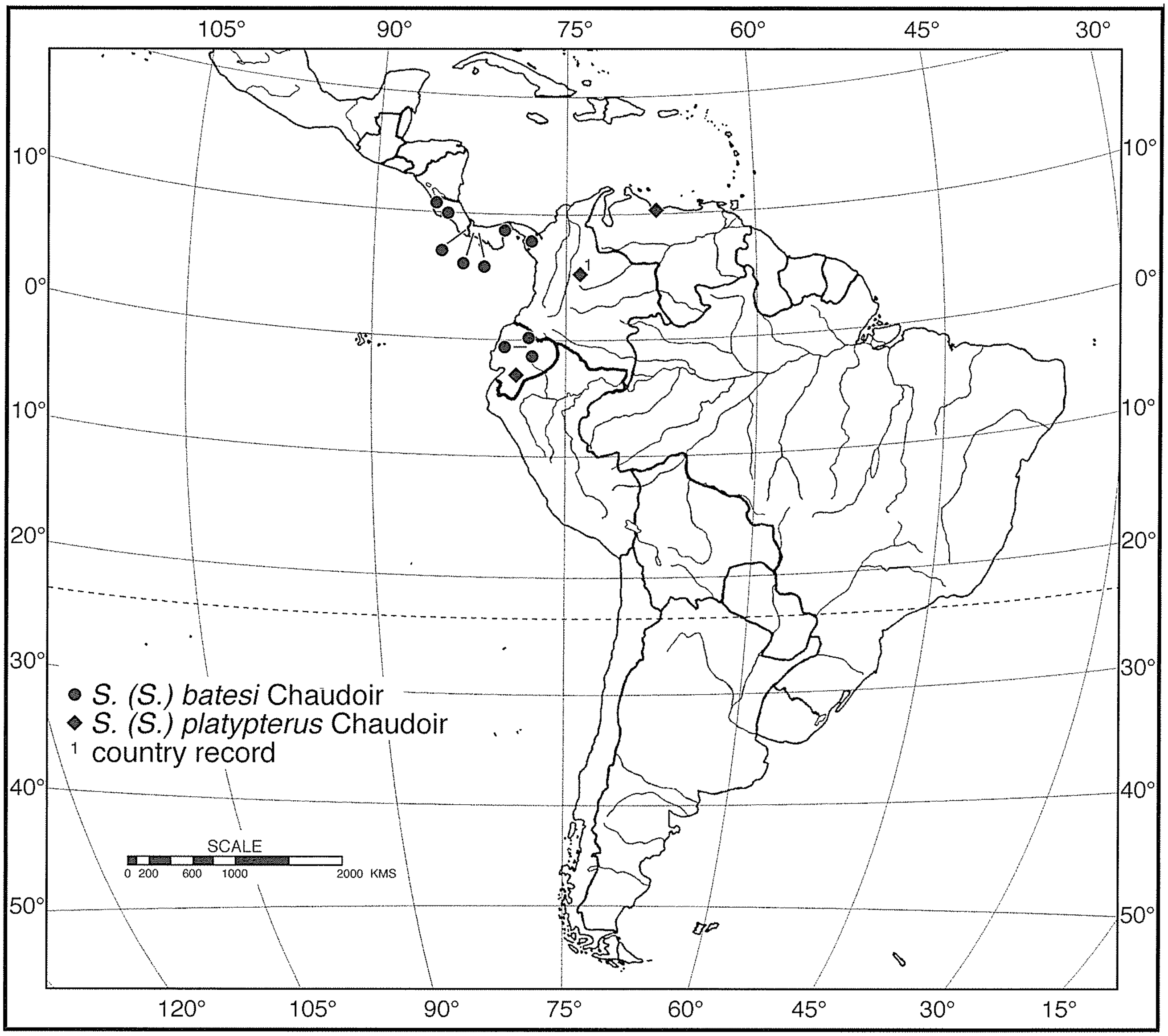

Figure 23. Map of Middle America and South America showing positions of known localities for the species of *Stenognathus (s. str.), stricticollis* species group (in part).

Cotopaxi. Male, Las Pampas vic., 00°25'11"S 78°57'30"W, 1800 m., debris pile in small stream, 2.IV.1998, K. W. Will (CUIC). Male, Las Pampas vic., 00°25'19"S 78°57'21"W, 1800 m., headlamp, 5.V.1998, K. W. Will (CUIC). **Napo**. 2 females, Tena, 750 m., *Abattis*, under bark, 9.XI.85, P. Moret (PMCT). **Pichincha**. Female, Toachi vic., 800-900 m., headlamp, 4.V.1998, K. W. Will (CUIC).

Months of collection. February, April-July, and October-December.

Stenognathus (s. str.) platypterus Chaudoir
Figs. 22D-F, and 23

Stenognathus (s. str.) platypterus Chaudoir 1869a:118. TYPE MATERIAL: 5 specimens from the Oberthür-Chaudoir Collection (MNHP) associated with the following box label: "platypterus/ Chaud/ Colombie/ Goudot coll. Laferté" [handwritten]. LECTOTYPE (here designated), male, labelled: "Ex Musaeo/ Chaudoir" [red print]; "TYPE" [red paper]. PARALECTOTYPES, 4 males, each labelled: "Ex Musaeo/ Chaudoir" [red print].

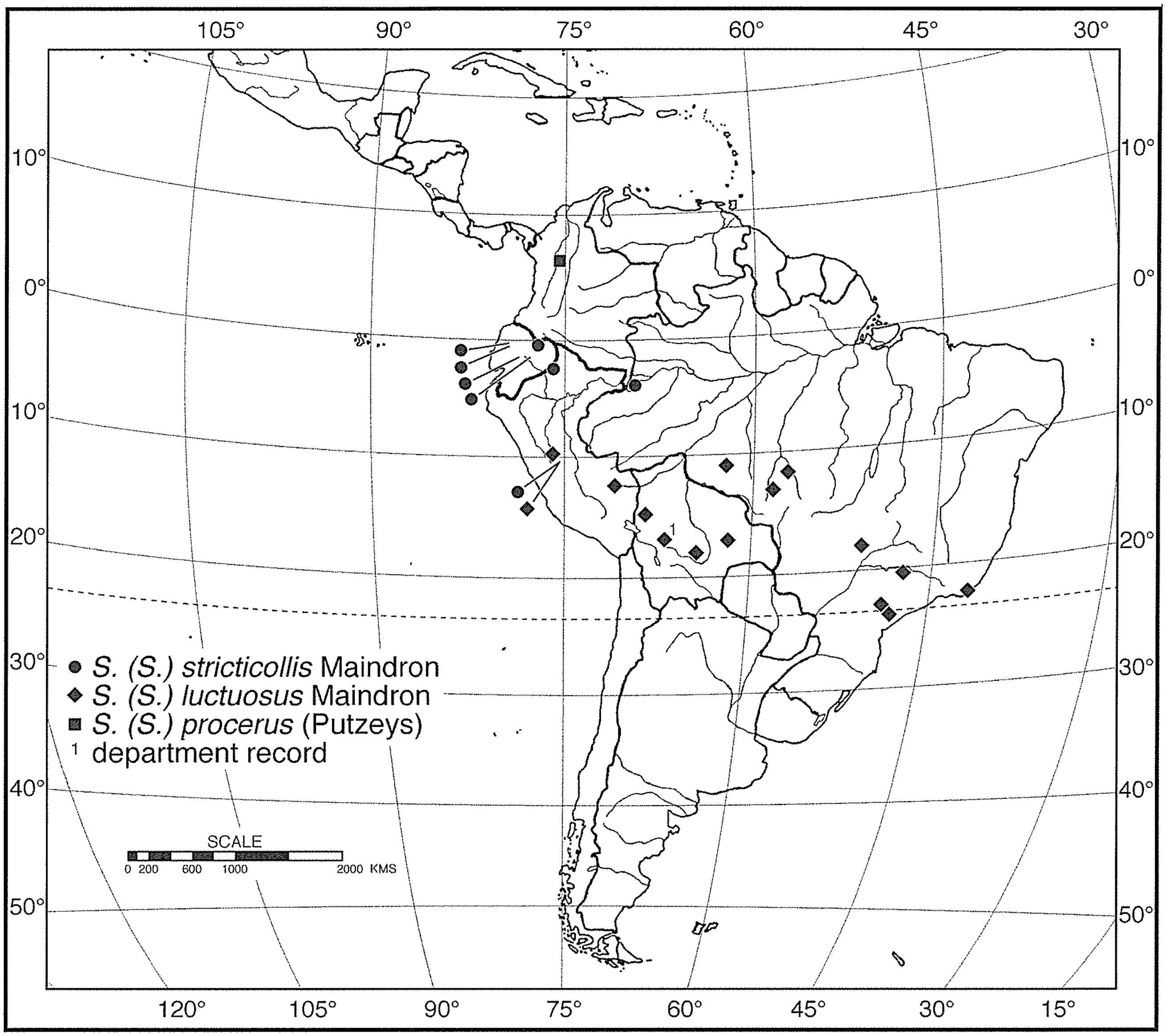

Figure 24. Map of Middle America and South America showing positions of known localities for the species of *Stenognathus (s. str.), stricticollis* species group (in part) and for the *procerus* species group.

Type material. In the original description, Chaudoir (1869a:118), reported 5 specimens, collected by "Goudot".

Type area. The type material was collected in Colombia. No further information is available.

Recognition. In addition to the serrate tarsal claws, the angulate apices of the elytra distinguish adults of this species from those of their closest relatives *(S. stricticollis* and *S. luctuosus)*. Males of this species are distinguished also by the bulged ventral surface of the median lobe of the genitalia (Fig. 22E; cf. Figs. 22H and K)

Description. With character states of the *S. stricticollis* species group, restricted or amplified as follows. Body rather broad, deplanate. SBL and values for selected ratios as in Tables 6 to 11.

Chaetotaxy. Elytral umbilical series in 3 parts, anterior and posterior series each with 5 or 6 setae, medial with 1 seta. Legs of males ventrally: fore and middle femora densely setose, or hind femur sparsely setose; hind trochanter sparsely setose (1 or 2 setae).

Vestiture. Ventral surface densely setose in males. Abdominal sternal setae long and very dense medially on sterna III to VI.

Mouthparts. Left mandible: supraterebral ridge slightly sinuate, not toothed, complete (cf. Fig. 6A).

Prothorax. Markedly narrower than elytra. Pronotum: moderately transverse, narrowed posteriorly moderately; lateral margins slightly sinuate posteriorly; lateral grooves moderately broad anteriorly, widened slightly posteriorly.

Elytra. Elytral apex distinctly angulate.

Legs. Tarsal claws very finely serrate (cf. Figs. 17A-B).

Male genitalia (Figs. 22D-F). Median lobe: in dorsal aspect (Fig. 22D) apical portion short, apex broadly rounded; in left lateral aspect (Fig. 22E) with distinct median convexity on ventral surface; basal bulb aligned with shaft, not curved ventrad. Left paramere (Fig. 22E) tapered apically, apical portion acute. Internal sac very elaborate, with 7 lobes and pineapple-like sclerite at tip of lobe toward base.

Habitat. This species lives in tropical lowland forest to tropical lower montane forest, in association with fungi, growing on logs, at altitudes of at least 1000 to 1400 m.

Geographical distribution (Fig. 23). This species is known only from northern South America, from near the Atlantic Coast to southeastern Ecuador, in the upper reaches of the Amazon drainage system.

Chorological affinities. The western part of its range is overlapped by ranges of the related species, *S. batesi* and *S. stricticollis*.

Phylogenetic relationships. The form of the basal bulb of the median lobe of the male genitalia and of the left paramere (Figs. 22E-F; cf. Figs. 22H-I, and K-L) suggest a close relationship between this species and *S. stricticollis* and *S. luctuosus*. On the other hand, the pineapple-like sclerite of the internal sac suggests a close relationship between *S. platypterus* and *S. batesi*.

Material examined. In addition to the type, we have seen 7 specimens from the following localities: **COLOMBIA**. Male (BMNH). Male (ZMAN, labelled "Grenada", but this likely refers to "New Grenada", or Colombia). **ECUADOR. Santiago-Zamora**. Female, Macas, 1052 m., H.W. Bates (MNHP). **VENEZUELA. Aragua**. Male, Rancho Grande Biol. Stn., 10°21'N 67°41'W, 1390 m., ex mushrooms on log, 26.II.1995, R.W. Brooks (SEMC). **COUNTRY?** 3 females (MNHP).

Month of collection. February.

***Stenognathus (s. str.) stricticollis* (Maindron)**
Figs. 22G-I and 24

Phloeotherates stricticollis Maindron 1906a:196. TYPE MATERIAL: one specimen, in Collection Général (MNHP). HOLOTYPE male, labelled: "PEROU/ Prov. HUALLAGA/ Rio Mixiollo 1200 m/ G. A. Baer 7-8-1900"; "TYPE" [red paper]; "Phloeotherates/ stricticollis/ Maindr." [handwritten]; "MUSEUM PARIS/ Ex Coll M. Maindron/ Coll. G. Babault 1930" [pale green paper].

Type material. In the original description of this species, Maindron (1906a:197) noted that the single specimen on which the species description was based was received from "G. Baer".

Type locality. Rio Mixiollo, province of Huallaga, Peru (Maindron 1906a:197).

Recognition. Similar in most respects to adults of *S. luctuosus*, adults of *S. stricticollis* are smaller (see Table 6); males of *S. stricticollis* have setae ventrally on the fore and middle femora, and these are lacking from males of *S. luctuosus*.

Description. With character states of the *S. stricticollis* species group, restricted or amplified as follows. Body rather broad, deplanate. SBL and values for selected ratios as in Tables 6 to 11.

Chaetotaxy. Elytral umbilical series in 3 parts, anterior and posterior series each with 5 or 6 setae, medial with 1 seta. Legs of males ventrally: fore and hind femora sparsely setose, middle femur moderately densely setose; hind trochanter sparsely setose (several setae).

Vestiture. Ventral surface more densely setose in males than in females; abdominal sternal setae rather short and sparse medially on sterna III to VII.

Mouthparts. Left mandible: supraterebral ridge moderately sinuate, not toothed, complete (cf. Fig. 6A)

Prothorax. Markedly narrower than elytra. Pronotum: markedly transverse, narrowed posteriorly moderately; lateral margins moderately to slightly sinuate posteriorly; lateral grooves moderately broad anteriorly, widened markedly posteriorly.

Elytra. Elytral apex oblique-subtruncate.

Legs. Tarsal claws pectinate.

Male genitalia (Figs. 22G- I). Median lobe: in dorsal aspect (Fig. 22G) apical portion short, parallel-sided, apex broadly rounded; in left lateral aspect (Fig. 22H), preapical portion curved ventrally, basal bulb not projected, in same plane as shaft. Left paramere (Fig. 22I) markedly narrowed apically, apex acute. Internal sac very elaborate, with 8 lobes, without pineapple-like sclerite.

Habitat. Probably tropical lowland to lower tropical montane forest, between at least 100 and 2000 m., the beetles probably being associated with fungi on logs, and adults being active nocturnally.

Geographical distribution (Fig. 24). This species is known only from the Upper Amazon Basin.

Chorological affinities. The range of this species is overlapped by the ranges of the related species *S. platypterus* and *S. batesi*, and marginally by *S. luctuosus*. Specimens of both *S. stricticollis* and *S. platypterus* have been collected at Macas, Ecuador, establishing a sympatric distribution. Similarly, specimens of both *S. stricticollis* and *S. luctuosus* have been collected at Chanchamayo, Junin Province, Peru.

Phylogenetic relationships. General similarities (including form of the male genitalia) plus the probably derived feature of blunt apices of the elytra shared with *S. luctuosus* suggest an adelphotaxon relationship of these 2 species. The principally allopatric distribution (Fig. 24) of this latter species pair enhances the impression of close relationship.

Material examined. In addition to the type noted above, we have seen 10 other specimens, as follows: **BRAZIL. Amazonas**. Male, São Paulo de Olivença, M. de Mathan (MNHP). **ECUADOR. Cotopaxi**. Male, Las Pampas vic., Otonga Res., 00°25'28"S 79°00'41"W, 2000 m., 4.IV.1998, K. W. Will (CUIC). **Napo**. Male, Yasuni Scientific Station, 00°40'36"S 76°24'02"W, 210 m., headlamp, 25.IV.1998, K. W. Will (CUIC). **Pastaza**. Male, Mera, Rio Auzu, 1400 m., 18.VII.1985, P. Moret (PMCT). **Pichincha**, Female, 2 km. e. Tandapi, 1650 m., under bark, 23.VI.1979, H. E. Frania (UASM). **Santiago-Zamora**. Female, Macas, 1052 m., Bates (MNHP). **PERU. Loreto**. Teniente Lopez, 2°35.66'S 76°06.92'W, 210-240 m., ex. *Favolus hexagonalis*, R. Leschen: female, 18.VII.1993 (SEMC); male, 23.VII.1993 (SEMC). **Junin**. Female, Chanchamayo, Thamin (MNHP). **VENEZUELA. Aragua**. Female, Rancho Grande, 1390 m., 8-11.VI.1976, A.S. Menke, D. Vincent (USNM).

Months of collection. April, June-July.

Stenognathus (s. str.) luctuosus (Maindron)
Figs. 17C-D, 22J-L, and 24

Phloeotherates luctuosus Maindron 1906a:196. TYPE MATERIAL: 5 specimens, in Collection Général (MNHP). LECTOTYPE (here designated), male, labelled: "Jatahy/ Goyaz" [green paper]; [red paper square]; "TYPE" [red paper]; "Phloeotherates/ luctuosus/ m." [handwritten]; "MUSEUM PARIS/ Coll M. Maindron/ Coll. G. Babault- 1930" [pale green paper]. PARALECTOTYPES, 4 females, 3 labelled same as lectotype. One labelled: "Brésil. Jatahy/ Prov. de Goyaz/ Donicker March 3, 1903"; [red paper square]; "luctuosus" [handwritten]; "PARATYPE"; "MUSEUM PARIS/ Coll. M. Maindron/ Coll. G. Babault - 1930".

Notes about type material. In the original description of this species, Maindron (1906a:196) noted that the species was based on several specimens, received from "M. H. Donicker".

Type locality. Jataí, Province of Goyaz, Brazil (Maindron 1906a:196).

Recognition. See this topic above, for *S. stricticollis*.

Description. With character states of the *S. stricticollis* species group, restricted or amplified as follows. Body rather broad, deplanate. SBL and values for selected ratios as in Tables 6 to 11.

Chaetotaxy. Elytral umbilical series in 3 parts, anterior and posterior series each with 5 or 6 setae, medial with 1 seta. Legs of males ventrally: fore and hind femur glabrous, middle femur densely setose; hind trochanter densely setose.

Vestiture. Ventral surface more densely setose in males than in females. Abdominal sterna V to VII with setae rather short and sparse, and more dense on sterna III and IV.

Mouthparts. Left mandible: with supraterebral ridge slightly sinuate, not toothed, complete (cf. Fig. 6A).

Prothorax. Markedly narrower than elytra. Pronotum: markedly transverse, narrowed posteriorly moderately; lateral margins slightly sinuate posteriorly; lateral grooves moderately broad anteriorly, widened markedly posteriorly.

Elytra. Elytral apex distinctly oblique-subtruncate.

Legs. Tarsal claws (Figs. 17C-D) pectinate.

Male genitalia (Figs. 22J-L). Median lobe: in dorsal aspect (Fig. 22J) apical portion very short, broad, parallel sided, apex very broadly rounded; in left lateral aspect (Fig. 22K), curved ventrad, basal bulb aligned with shaft, not projected ventrad. Left paramere (Fig. 22L) narrowed apically, apex obtusely angled. Internal sac very elaborate, with 6 lobes; without pineapple-like sclerite.

Habitat. The altitudinal range of *S. luctuosus* extends from near sea level in eastern Brazil to 300 m. or so to 200-500 m. in the central part of the continent and westward. Unlike most species of *Stenognathus*, *S. luctuosus* probably lives in dry forests that extend across South America to the south of the Amazon Basin.

Geographical distribution (Fig. 24). This species ranges from eastern Brazil westward, south of the Amazon Basin, to the lower slopes of the Andes, in the Upper Amazon Basin.

Chorological affinities. See this topic for *S. stricticollis*, above.

Phylogenetic relationships. See this topic for *S. stricticollis*, above.

Material examined. In addition to the types noted above, we have seen 33 specimens, as follows: **BOLIVIA. Beni**. Female, Rio Beni, La Paz Reyes, 1891, Balzon (BMNH). **Cochabamba**. 2 males, Capore, Martinez (ISNB). **La Paz**. Male, female, P. Sud Yungas, Ocabaya, Martinez (ISNB). Male, Sud Yungas, Puente Villa, 1311 m, 19-24.1989, J.E. Eger (FSCA). **Santa Cruz**. Male, 2 females, Ichilo, Buenavista, Martinez (ISNB). Male, Sara, Portachuelo, I.1949, A. Martinez (MZSP). **Department?** Female, Callanga (spelling?), G. Garlepp (MNHP). **BRAZIL.** Male, Bonvouloir (BMNH). **Goias**. Rio Verde: male, female (MNHP); male, 1910, Baer (MNHP). **Mato Grosso**. Male, Pouso Alegre, 20.VI.1963, F.S. Pereira (MZSP). Female, Utiariti, Rio Papagaio, 1-12.XI.1966, Lenk, Pereira (MZSP). **Rio de Janeiro**. Male, Nova Friburgo, Putzeys (ISNB). **Rondonia**. 2 males, Ouro Preto d'Oeste, 14.V.1983, W. Groeneveld, A. Akkar (ZMAN). **São Paulo**. Female, Barueri, 6.XII.1951, V. Lenko (MZSP). Female, Batatais, X.1944, Pereira (ISNB). Male, 2 females, Guatapara, I.1945, M. Carrera (MZSP). Male, São Paulo, P. Dupuis (ISNB). **State?** Male, San Jaoa d'el Rey, C. van Voixem (ISNB). **PERU. Huanuco**. Male, Cueva de las Pavas Canyon, 8 km s Tingo Maria, 793 m, 11-17.IV.1987, J.E. Eger (FSCA). Female, Tambillo Grande Canyon, 13 km s Tingo Maria, 853 m, 26.VII.1988, J. Ch. de Vela (FSCA). Male, Monzon Valley, Tingo Maria, 2.XI.1954, E.I. Schlinger, E.S. Ross (CASC). **Junin**. Male, Chanchamayo (HNHM). **Loreto**. Female, Amazon Camp, Rio Momon, nr. Iquitos, 1-10.XII.1982, E.S. Ross (CASC). **Madre de Dios**. Male, Manu National Park, at u-v light trap, 15.VIII.1980-30.XI.1981, C.H. Janson (CASC).

Months of collection. January, May-June, August, and October-December.

Stenognathus procerus species group

Recognition. A combination of serrate tarsal claws (cf. Figs. 17A-B), posterior surfaces of tibiae smooth, not strigulose, and relatively large pronotum with base constricted and lateral margins with the posterior sinuation posteriorly very short, distinguish adults of this species group from those of the *S. stricticollis, S. nigropiceus*, and *S. melanarius* groups. The short, broad, markedly curved median lobe of the genitalia is diagnostic for males.

Description, habitat, geographical distribution, chorological affinities, and phylogenetic relationships. See these topics below for *S. procerus*.

Included species. The *S. procerus* species group includes a single species, *S. procerus* (Putzeys).

Stenognathus (s. str.) procerus (Putzeys)
Figs. 22M-O and 24.

Ferus procerus Putzeys 1878: 55. TYPE MATERIAL: 2 specimens, in Collection Général (MNHP). LECTOTYPE (here designated), male, labelled: [blue paper disc]; "Medellin" [handwritten]; "Ex Musaeo/ E. Steinheil". PARALECTOTYPE female, labelled same as lectotype, except 1 additional label: "procerus/ Putzeys" [handwritten].
Phloeotherates procerus; Maindron 1906b:251.

Notes about type material. In the original description of this species, Putzeys (1878:55) noted that the species was based on 2 specimens, received from "Mr. E. Steinheil".

Type area. Vicinity of Medellin, Departamento Antioquia, Colombia. The site of collection of the type specimens, at 1829 m. (6000', Putzeys, 1878:55), probably is close to Medellin, which is at 1524 m. altitude.

Recognition. See this topic above.

Description. With character states of the *S. procerus* species group, restricted or amplified as follows. Body moderately convex. SBL and values for selected ratios as in Tables 6 to 11.

Macrosculpture. Head surface dorsally smooth. Middle and hind tibial posterior (dorsal) surfaces longitudinally smooth.

Microsculpture. Frons and vertex microlines absent and surface completely smooth. Elytron, dorsal surface: mesh pattern on intervals transverse.

Luster. Dorsal surfaces generally shiny, not subiridescent.

Chaetotaxy. Elytral umbilical series continuous. Legs of males ventrally: fore, middle and hind femora glabrous; hind trochanter with few setae.

Vestiture. Female ventral surface glabrous except for fixed setae. Ventral surface setose in males: pterothoracic mestasternum setose in triangular pattern with apex toward middle coxae and bare area anteriad antecoxal piece; antecoxal piece setose; abdominal sterna III and IV medially more or less densely setose, sterna V-VII except fixed setae very sparsely setose or glabrous; or sterna III to VI or VII with setae rather short and sparse to longer and very dense medially.

Head. Eyes markedly convex, more or less bulged.

Mouthparts. Left mandible: supraterebral ridge slightly sinuate, not toothed, complete (cf. Fig. 6A)

Prothorax. Moderately narrower than elytra. Pronotum (Fig. 16D) moderately transverse; narrowed posteriorly moderately. Lateral margins slightly sinuate posteriorly, sinuation short; posteriolateral angles distinctly angulate. Surface lateral grooves moderately broad anteriorly, widened slightly posteriorly; posteriolateral impressions basin-like, each continuous with adjacent lateral groove.

Elytra. Elytron: humerus broadly rounded; preapical margin slightly sinuate, apex very obtusely angulate; interneurs moderately deep, smooth, impunctate; intervals distinctly, broadly convex.

Hind wings. Developed fully, with oblongum and wedge cells.

Legs. Middle and hind tibial posterior surface rounded or flattened, not canaliculate. Tarsal claws serrate.

Male genitalia (Figs. 22M-O). Median lobe short and relatively broad, membranous area more than half length of shaft; in dorsal aspect (Fig. 22M), apical portion short and broad, sides tapered toward apex, apex narrowly rounded; in left lateral aspect (Fig. 22N), basal bulb curved ventrally in relation to shaft. Left paramere (Fig. 22O) slightly narrowed toward apex, apical margin obtusely, very broadly rounded. Internal sac not studied in detail, appearing quite simple in situ.

Habitat. Probably tropical lower montane forest, at a known altitude of 1829 m.

Geographical distribution (Fig. 24). This species is known from western Colombia, only.

Chorological affinities. The geographical range of this species is probably overlapped by the ranges of most of the species groups of *Stenognathus (s. str.)*, and by the subgenera *Gnathostenus* and *Pristolomus*.

Phylogenetic relationships. Not postulated.

Material examined. Type specimens only. See above, for details.

Stenognathus nigropiceus species group

Recognition. A combination of pectinate tarsal claws (Figs. 17E-F) and pronotum (Figs. 16E-F) with base broad, hardly constricted and lateral margins very slightly sinuate or not posteriorly, distinguish adults of this species group from those of the *S. stricticollis*, *S. procerus*, and *S. melanarius* groups.

Description. With character states of subgenus *Stenognathus*, restricted or amplified as indicated in the "Recognition" section above and as follows. Body rather broad, deplanate, or moderately convex. SBL and values for selected ratios as in Tables 6 to 11.

Color. As described for genus *Stenognathus*.

Macrosculpture. Head surface dorsally smooth. Middle and hind tibial posterior (dorsal) surfaces longitudinally strigulose.

Microsculpture. Head dorsally with clypeus, frons and vertex with microlines distinct, mesh pattern isodiametric, sculpticells flat, or microlines absent from clypeus and frons, but present on vertex and occipital area, with mesh pattern isodiametric, or microlines absent and entire dorsal surface smooth. Elytron, dorsal surface: mesh pattern on intervals isodiametric to transverse, sculpticells of various length, flat.

Luster. Dorsal surfaces generally shiny to subiridescent.

Chaetotaxy. Elytral umbilical series in 3 parts, anterior and posterior groups each with 5 or 6 setae, medial with 1 seta. Legs of males ventrally: fore, middle and hind femora asetose; or fore femur sparsely setose, middle femur densely so, and hind femur asetose; or fore and middle femora sparsely setose, hind femur asetose; or fore and hind femora asetose, middle femur sparsely setose; trochanters sparsely setose, or asetose.

Vestiture. Ventral surface, except for fixed setae, asetose in females. Ventral surface setose in males: pterothorax with antecoxal piece densely setose; abdominal sterna III and IV ventrally more or less densely setose medially, sterna V-VII, excepting fixed setae, very sparsely setose, or glabrous; or III to VI or VII densely setose medially, sparsely so laterally.

Head. Eyes markedly convex, bulged.

Mouthparts. Mandibles (Figs. 6O-V). Left mandible: dorsally, supraterebral ridge complete, slightly sinuate, or incomplete in length and not toothed (Fig. 6O); ventrally, without molar tooth or occlusal extension of molar ridge (Fig. 6S); basal extension of molar ridge short (Fig. 6S, **bemr**).

Prothorax. Moderately or markedly narrower than elytra. Pronotum (Figs 16E-G): markedly transverse, narrowed posteriorly slightly; lateral margins posteriorly sinuate or not sinuate; posteriolateral angles distinctly angulate.

Elytra. Elytron: preapical margin distinctly sinuate, apex oblique-subtruncate; interneurs shallow to moderately deep, smooth; intervals nearly flat to distinctly, broadly convex.

Hind wings. Developed fully, with oblong and wedge cells.

Legs. Middle and hind tibial posterior surface rounded or more or less distinctly longitudinally canaliculate. Tarsal claws pectinate, pectens long (Fig. 17E-F).

Male genitalia (Figs. 25A-C to 25M-O). Median lobe: shaft more or less evenly cylindrical, diameter various, or widened preapically; in dorsal aspect, membranous portion half length of shaft or less; and apical portion aligned with shaft, or curved laterad slightly, short to very short, relatively narrow to broad; apex rounded narrowly or broadly; in left lateral aspect, ventral surface straight to distinctly curved, basal bulb aligned with shaft, or more or less projected ventrad. Left paramere more or less narrowed preapically, apical margin narrowly rounded to broadly subtruncate, to subtruncate with small projection, or outer margin slightly sinuate, with apex narrowly rounded.

Geographical distribution (Figs. 26-27). The range of this species group extends in cis-Andean South America from northeastern Argentina northward to the Isthmus of Panamá, and in Middle America from Panamá northward to Veracruz, in eastern México.

Chorological affinities. The range of the *S. nigropiceus* species group overlaps the ranges of the other species groups of the subgenus *Stenognathus*.

Phylogenetic relationships. Not postulated in detail. In the pectinate tarsal claws and pronotal form, adults of this species group seem to be relatively highly derived. The relatively narrow prothorax in relation to elytral width is shared with adults of the *S. melanarius* species group. Possibly, these groups are adelphotaxa.

Included species. The *S. nigropiceus* species group includes 6 species, as follows.

Stenognathus (s. str.) chaudoiri Ball
Figs. 25A-C and 26

Ferus quadricollis Chaudoir 1869a:121. TYPE MATERIAL: 5 specimens from the Oberthür-Chaudoir Collection (MNHP) associated with the following box label: "quadricollis/ Chaudoir/ Mexique/ Sallé" [handwritten]. LECTOTYPE (here designated), male, labelled: "Ex Musaeo/ Chaudoir" [red print]; "LECTO-/TYPE" [disc, ringed with purple]; "LECTOTYPE/ Ferus/ quadricollis/ Chaudoir/ det./ George E. Ball '72. PARALECTOTYPES", 3 males, 2 females, each labelled: "Ex Musaeo/ Chaudoir" [red print].

Phloeotherates quadricollis; Maindron 1906a:198.

Stenognathus (Phloeotherates) chaudoiri Ball 1975a:162.

Notes about type material. In the original description, Chaudoir (1869a:121), reported 5 specimens, collected by "Sallé".

Note about nomenclature. With the combination of *Stenognathus* and *Phloeotherates* as subgenera of the same genus, *S. quadricollis* and *P. quadricollis* became subjective homonyms of one another. For the latter species, Ball (1975) chose the specific epithet *chaudoiri*.

Type area. Chaudoir (1869a:121) noted only México as the collecting site of the type material of this species. The collector was Auguste Sallé, and since much of his field work was conducted in the State of Veracruz, it seems reasonable to restrict the type area to this State. Further arbitrary restriction at this time seems unnecessary.

Recognition. In addition to character states provided in the key to the species of *Stenognathus*, males of *S. chaudoiri* are distinctive in details of the male genitalia (Figs. 25A-C). For details, see below.

Description. With character states of the *S. nigropiceus* species group, restricted or amplified as follows. Body rather broad, deplanate. SBL and values for selected ratios as in Tables 6 to 11.

Macrosculpture. Middle and hind tibial posterior (dorsal) surfaces smooth, not longitudinally strigulose.

Microsculpture. Head dorsally without microlines, entire surface smooth. Elytron, dorsal surface: mesh pattern on intervals transverse, sculpticells ca. 6X longer than wide, flat.

Luster. Dorsal surfaces generally shiny.

Chaetotaxy. Legs of males ventrally with fore femur sparsely setose, middle femur densely so, and hind femur asetose.

Vestiture. Ventral surface setose in males: pterothorax antecoxal piece densely setose. Abdominal sterna III to VI densely setose medially, sparsely so laterally.

Mouthparts. Left mandible: supraterebral ridge slightly sinuate, not toothed, complete (cf. Fig. 6A)

Prothorax. Markedly narrower than elytra. Pronotum markedly transverse; narrowed posteriorly slightly; lateral margins posteriorly not sinuate.

Elytra. Elytron: interneurs shallow; intervals nearly flat.

Legs. Middle and hind tibia with posterior surface rounded, not longitudinally canaliculate.

Male genitalia (Figs. 25A-C). Median lobe: shaft more or less evenly cylindrical, relatively thick, not widened preapically; in dorsal aspect, (Fig. 25A) membranous portion slightly less than half length of shaft; and apical portion curved laterad slightly, very short, relatively broad; apex broadly rounded; in left lateral aspect (Fig. 25B, ventral surface distinctly curved, basal bulb projected ventrad. Left paramere (Fig. 25C) narrowed preapically, apical margin broadly rounded. Internal sac not studied in detail.

Habitat. Tropical lowland forest to tropical lower montane forest, with a known altitudinal range from about 200 m. to about 1000 m. Adults of *S. chaudoiri* rest under bark on logs, living probably in association with fungi. Nocturnal flight activity is indicated.

Geographical distribution (Fig. 26). The range of this species extends through most of tropical Middle America, from Panamá northward to eastern México, in the state of Veracruz. This species has the northernmost range recorded for the genus *Stenognathus*.

Chorological affinities. Among the species of the *S. nigropiceus* group, the range of *S. chaudoiri* overlaps only that of *S. robustus*, in Costa Rica. These 2 species may be syntopic, but this has yet to be established.

Phylogenetic relationships. Not postulated.

Material examined. In addition to the types noted above, we have seen 28 specimens, as follows: **COSTA RICA. Alajuela**. Female, Alajuela, 13.IX.1925, T. Assmann (USNM). **Guanacaste**. Female, Est. Maritza, Lado oeste del Volcan Orosi, VI.1990, R. Blanco (CASC). **State?** Male, Jesús de Barba (spelling?), 9.XI.1936, F. Nevermann (USNM). **HONDURAS. Santa Barbara**. Male, La Fe, Finca La Roca, 5.3 km. s. Peña Blanca, 14°57'N 88°02'W, 740 m., ex *Favolus*, 19.VI.1994, Brooks, Ashe (SEMC). **MEXICO.** Male, Sallé (ISNB). **Chiapas**. Male, El Chorreadero, 8 km. s.e. Chiapa de Corzo, 650 m., 11.VI.1991, J.S. Ashe (SEMC). Male, Municipio de Cintalapa, La Mina, 914 m., 14.IX.1981, D.E. & P.M. Breedlove (CASC). 2 females, 8.7 km. n. Finca Prusia, 1010 m., tropical montane forest, under bark, 3.VII.1979, J.S. Ashe, D. Shpeley, & G.E. Ball (UASM). Female, 7.9 km. n. Frontera-Comalapa, 732 m., 2.IX.1967, T.L. Erwin, R.E. Leech, & G.E. Ball (UASM). Parque Laguna Belgica, ca. 19 km. n. Ocozocuautla: 5 males, 2 females, 970 m., at light, 11.VI.1991, J. S. Ashe (SEMC); female, 14.VI.1989, H. Howden (CMNC). Female, 15 km. n. Ocozocuautla, 975 m., in bromeliads, 3-4.III.1966, D.R. Whitehead, G.E. Ball (UASM). Female, Sierra de Colmena, Arroyo Santa Maria, 16°24'18"N 91°24'16"W., 213 m., P.A. Meyer, K.E. & G.E. Ball, 1-10.VI.1972 (UASM). Male, Tuxtla Gutierrez, 23.VI.1973, G. Ekis (USNM). **Oaxaca.** Male, 3 females, 9 km. s. Valle Nacional, Rte. 175, 660 m., 25.VIII.1974, D.R. Whitehead, H.E. Frania, & G.E. Ball (UASM). **Veracruz**. Male, Cordova, Sallé (MNHP). **PANAMA. Chiriqui**. Male, Volcan de Chiriqui, 610-914 m., Champion (MNHP). Male, vicinity Boqueta, VIII.39, J.R. Slevin (CASC).

Months of collection. March, June-September, and November.

Stenognathus (s. str.) nigropiceus (Bates)

Figs. 6O-V, 16E, 25D-F, and 27

Phloeotherates nigropiceus Bates 1869:80. TYPE MATERIAL: 4 specimens, in Collection Général (MNHP). LECTOTYPE (here designated), male, labelled: "Ega" [handwritten]; "TYPE " [red paper]; "Phloeotherates/ nigropiceus/ Bates" [handwritten].

Notes about type material. Bates indicated at least a male and a female but did not state how many of each he had at the time of description of *S. nigropiceus*. Additional specimens associated with the lectotype in MNHP are 2 males and a female. They exhibit elytral microsculpture judged at the time of examination to be too coarse to be members of *S. nigropiceus*. So, they were not regarded as suitable for listing as paralectotypes. Further examination is required to determine their status.

Type locality. "Ega and the Tapajos" were noted in the original description of this species. With the lectotype of *S. nigropiceus* being labelled "Ega", this becomes type locality. It is in the state of Amazonas, Brazil, and is known now as Tefé.

Recognition. Adults of this species differ from other members of the *S. nigropiceus* species group, except *S. plaumanni*, new species, by the canaliculate middle and hind tibiae, and males with the ventral surfaces of the fore, middle, and hind femora asetose. Additionally, males are recognizable by the slender genitalic median lobe (Fig. 25D) and left paramere with a prominent apical projection (Fig. 25F).

Description. With character states of the *S. nigropiceus* species group, restricted or amplified as follows. Body rather broad, deplanate. SBL and values for selected ratios as in Tables 6 to 11.

Macrosculpture. Middle and hind tibial posterior (dorsal) surfaces smooth, not longitudinally strigulose.

Microsculpture. Head, dorsally: with microlines absent from clypeus and frons, but present on vertex and occipital area, with mesh pattern isodiametric, sculpticells flat. Elytron, dorsal surface: mesh pattern on intervals isodiametric to transverse (sculpticells 2-4X longer than wide, flat).

Luster. Dorsal surfaces generally shiny.

Chaetotaxy. Legs of males ventrally: fore, middle, and hind femora asetose.

Vestiture. Ventral surface in males: pterothorax with antecoxal piece asetose; abdominal sterna III –VII, except fixed setae, very sparsely setose, setae very short.

Mouthparts. Left mandible: supraterebral ridge incomplete, without tooth (cf. Fig. 6O).

Prothorax. Markedly narrower than elytra. Pronotum (Fig. 16E) markedly transverse; posteriorly, slightly constricted, lateral margins slightly sinuate.

Elytra. Elytron: interneurs moderately deep; intervals distinctly, broadly convex.

Legs. Middle and hind tibial posterior surface distinctly longitudinally canaliculate.

Male genitalia (Figs. 25D-F). Median lobe: shaft more or less evenly cylindrical, thin, not widened preapically; in dorsal aspect, (Fig. 25D) membranous portion much less than half length of shaft; apical portion aligned with shaft, very short, relatively narrow to broad; apex narrowly rounded; in left lateral aspect (Fig. 25E), ventral surface straight, basal bulb aligned with shaft. Left paramere (Fig. 25F) more or less narrowed preapically, apical margin subtruncate with small projection, apex narrowly rounded. Internal sac elaborate, with 4 lobes.

Habitat. Tropical lowland forest and tropical lower montane forest at altitudes between at least 80 m. and 600 m. Like other members of this genus, adults seem to be associated with fungi growing on logs (Bates 1869:80).

Geographical distribution (Fig. 27). Forming the southern extremity of the geographical range of the genus *Stenognathus*, the range of this species extends in cis-Andean South America from northeastern Argentina northward to the northern part of the Amazon Basin.

Chorological affinities. The extensive geographical range of *S. nigropiceus* overlaps the ranges of the other South American species of the *S. nigropiceus* species group.

Phylogenetic relationships. Based on the synapotypic feature of the short supraterebral ridge, *S. nigropiceus* probably is a member of a clade including *S. gagatinus and S. plaumanni,* new species.

Material examined. In addition to the type material noted above, we have seen 28 specimens of this species, from the following localities: **ARGENTINA. Chaco**. Female, 100 km. n.w. Resistencia, Chaco National Park, forest beating, 14-17.XII.90, S. & J. Peck, 90-114 (CMNC). **Jujuy**. Male, Mirador, Caligua Nat. Park, 600 m., forest, malaise-FIT, 18-28.XII.87, S. & J. Peck (CNCI). **Misiones**. Male, Iguazu Nat. Park, forest. gen. colln., 200 m., 23.XII.90-6.I.91, S. & J. Peck, 90-128 (CMNC). **Salta**. Female, Urendel, 31.I.1950, R. Goldbach (MNHP-Nègre). **State?** Male, Rio Salado (ISNB). 200m. **BOLIVIA. Chuquisaca.** Female, Yhancaroinza, 24.IV, G.L. Harrington (USNM). **Santa Cruz**. Male, Ichilo, Buenavista, Martinez (ISNB). **Sara.** Male and female, XII.1912- I.1913, Steinbach (CMNH). **Departamento?** Female, Cumbaruti, 22.V, Harrington (USNM). **BRAZIL. Amazonas**. Male, Santarem, Bates (MNHP). Male, Santarem, Acc.No.2966 (CMNH). Female, Tefé, 1st. tri., 1879, M. de Mathan (MNHP). **Mato Grosso**. Female, Barra do Tapirape 1.9.63, B. Malkin (CASC). Male, 3 females, Chapada: Acc.No.2966, IX-XI (CMNH). **Pernambuco**. Male, Pery-Pery (spelling?), 5.VI.1892, Gounelle (MNHP). **Santa Catarina**. Male, Nova Teutonia, 27°11'B 52°23'L, 16.VI.1939, F. Plaumann (ISNB). **State?** Male, MT Fazenda Ricardo Franco, 15.III.1961, J. & B. Bechyné (USNM). **ECUADOR Napo**. Res. Ethnica Waorani, 1 km. s. Onkone Gare Camp, 00°39'10"S 076°26'W, 220 m., insecticidal fogging of mostly bare green leaves, some with covering of lichenous or bryophic plants in terra firme forest, at trans 6 sta 4, Project MAXUS, T.L. Erwin et al: male, Lot #923, 9.X.94 (USNM); female, Lot #1714, 2.X.1996 (USNM). **PARAGUAY.** 2 females, Bohls (MNHP). **Concepcion**. Male, San Salvador, Bohls (MNHP). **Departamento?** Female, Paraguay Central, 1888, P. Germain (MNHP). **VENEZUELA. Amazonas**. Male, Cerro de la Neblina Base Camp, 0°50'N. 66°10'W, 140 m., on bark of cut timber with bracket fungi, rainforest, 1.II.1985, W.E. Steiner (USNM).

Months of collection. January-June, and September-December.

***Stenognathus (s. str.) gagatinus* (Dejean)**
Figs. 25G-I, and 27

Coptodera gagatina Dejean 1831:394. TYPE MATERIAL: one specimen associated with the following box label: "gagatinus/ Dejean/ Brésil/ Bescke coll.

Dejean" [handwritten]. HOLOTYPE male, labelled: "gagatina m./ in Brasilia"; "Coptodera"; "Lacordaire" [preceding 3 labels handwritten, on green paper]; "Ex Musaeo/ Chaudoir" [red print].
Ferus gagatinus; Chaudoir 1869a:119.
Phloeotherates gagatinus; Maindron 1906a:198.

Notes about type material. Dejean (1831:395) indicated that the description of this species was based on a single specimen, from Brazil, and presented to him by "M. Lacordaire". 3 additional specimens from the Chaudoir collection are associated with this box label, but are without claim to type status.

Type locality. According to the original description, the type specimens were collected in "Brésil". No further information is available. There is no need to restrict the locality further, at this time.

Recognition. Adults of this species are particularly similar to those of *S. nigropiceus* and *S. plaumanni*. Males are separable by having the ventral surfaces of the fore and middle femora at least sparsely setose, and by the markedly distinctive form of the male genitalia: median lobe (Figs. 25G-H) with a distinct preapical swelling, and the left paramere (Fig. 25I) with the apical margin broadly subtruncate.

Description. With character states of the *S. nigropiceus* species group, restricted or amplified as follows. Body rather broad, deplanate, or moderately convex. SBL and values for selected ratios as in Tables 6 to 11.

Macrosculpture. Middle and hind tibial posterior (dorsal) surfaces smooth, not longitudinally strigulose.

Microsculpture. Head dorsally without microlines and entire surface smooth. Elytron, dorsal surface: mesh pattern on intervals distinctly transverse, sculpticells flat, most extended width of interval.

Luster. Dorsal surfaces generally shiny.

Chaetotaxy. Legs of males ventrally: fore and middle femora sparsely setose, hind femur asetose.

Vestiture. Ventral surface setose in males: pterothorax with antecoxal piece densely setose; abdominal sterna III and IV medially densely setose, sterna V-VII, except fixed setae, very sparsely setose.

Mouthparts. Left mandible: supraterebral ridge short, incomplete, not toothed, (cf. Fig. 6O).

Prothorax. Moderately to markedly narrower than elytra. Pronotum posteriorly, slightly constricted, lateral margins slightly sinuate (cf. Fig. 16E).

Elytra. Elytron: interneurs moderately deep; intervals distinctly, broadly convex.

Legs. Middle and hind tibial posterior surface distinctly longitudinally canaliculate.

Male genitalia (Figs. 25G-I). Median lobe: shaft widened preapically; in dorsal aspect (Fig. 25G), membranous portion much less than half length of shaft; and apical portion curved laterad slightly, short, relatively narrow; apex rather broadly rounded; in left lateral aspect (Fig. 25H), ventral surface sinuate, basal bulb more or less projected ventrad. Left paramere (Fig. 25I) slightly narrowed preapically, apical margin broadly subtruncate. Internal sac elaborate, with 4 lobes, 3 basal, fourth with gonopore at tip.

Habitat. Atlantic Forest of southeastern Brazil, at altitudes between sea level and at least 800 m.

Geographical distribution (Fig. 27). This species is known only from Eastern Brazil and Paraguay, between 20° and 30° South latitude.

Chorological affinities. The geographical range of *S. gagatinus* is overlapped by that of *S. nigropiceus* and *S. plaumanni*.

Phylogenetic relationships. Not postulated in detail, but see comment above, about this topic for *S. nigropiceus*.

Material examined. In addition to the holotype, noted above, we have seen 8 specimens of this species, from the following localities: **BRAZIL. Minas Gerais**. Male, S. Caraça (Engenho), 800 m., XI.1961, Kloss, Lenko, Martins, & Silva (MZSP). **Rio de Janeiro**. Female, Nova Friburgo, Bates (MNHP). **Santa Catarina**. Nova Teutonia, ca. 300 m.-500 m., F. Plaumann: female (MNHP-Nègre); male, III.1977 (CASC); female, V.1977 (CASC); female, IV.1976 (CASC). **PARAGUAY. Departamento?** Male, Paraguay Central, 1888, P. Germain (MNHP). **COUNTRY?** Female, Bonvouloir (BMNH).

Months of collection. March-May and November.

Stenognathus (s. str.) plaumanni, new species

Figs. 16F, 25J-L and 27

Type material. 3 specimens, as follows. HOLOTYPE male, labelled: "Brasilien/ Nova Teutonia/ 27°11'B. 52°23'L/ Fritz Plaumann/ XII.28.1963 [along left margin]/ 300 500 m" [along right margin] [MZSP]. ALLOTYPE female, labelled: "Piracicaba, Sao/ Paulo, Brazil/ X-27-65; Collr. C.A./ Triplehorn" [MZSP]. PARATYPE male, labelled: [green disc]; "Mission de/ Sarayaca Riv/ Ucayale. Pampa/ Sacramento" [handwritten] [MNHP].

Type locality. Nova Teutonia, state of Santa Catarina, Brazil.

Specific epithet. The specific epithet is a Latinized eponym based on the surname of Fritz Plaumann, longtime resident of Hansa Humboldt, Santa Catarina, Brazil, whose seemingly indefatigable efforts in the field near his home contributed substantial numbers of carabids to the collections of many institutions and individuals.

Recognition. Adults of this species are markedly similar to those of *S. nigropiceus* and *S. gagatinus*. Specimens of those species, however, have the lateral margins slightly sinuate posteriorly, whereas the pronotal lateral margins of the 3 known adults of *S. plaumanni* are not at all sinuate posteriorly (Fig. 16F; cf. Fig. 16E). The male genitalia are diagnostic. Particularly to be noted are form of the apical portion of the median lobe (Fig. 25J), and form of the apical portion of the left paramere (Fig. 25L).

Description. With character states of the *S. nigropiceus* species group, restricted or amplified as follows. Body rather broad, deplanate. SBL and values for selected ratios as in Tables 6 to 11.

Macrosculpture. Middle and hind tibial posterior (dorsal) surfaces smooth, not longitudinally strigulose.

Microsculpture. Head dorsally: clypeus and frons smooth, without microlines, vertex and occipital area microlines distinct but very fine, mesh pattern isodiametric, sculpticells flat. Elytron, dorsal surface: mesh pattern on intervals slightly to markedly transverse, sculpticells 1.5-6 times longer than wide, flat.

Luster. Dorsal surfaces generally shiny.

Chaetotaxy. Legs of males ventrally: fore, middle, and hind femora asetose.

Vestiture. Ventral surface setose in males, setae short: pterothorax with antecoxal piece sparsely setose; abdominal sterna III to VII densely setose medially.

Mouthparts. Left mandible: supraterebral ridge short, incomplete, not toothed, (cf. Fig. 6O).

Prothorax. Markedly narrower than elytra. Pronotal lateral margins posteriorly not sinuate (cf. Fig. 16F).

Elytra. Elytron: interneurs moderately deep; intervals distinctly, broadly convex.

Legs. Middle and hind tibial posterior surface narrowly, shallowly, longitudinally canaliculate.

Male genitalia (Figs. 25J-L). Median lobe: shaft more or less evenly cylindrical, moderately thick, not widened preapically; in dorsal aspect (Fig. 25J), membranous portion less than half length of shaft; and apical portion curved laterad slightly, short, slightly constricted preapically, relatively narrow, apex rounded broadly; in left lateral aspect (Fig. 25K), ventral surface straight, basal bulb aligned with shaft. Left paramere (Fig. 25L) distinctly narrowed preapically, outer margin slightly sinuate, apex narrowly rounded. Internal sac simple, without lobes.

Habitat. Unknown, but probably Atlantic Forest to lowland tropical forest, at altitudes between at least 300 and 500 m.

Geographical distribution (Fig. 27). The 3 known specimens of this species indicate an extensive range in cis-Andean South America, extending in Brazil from the Atlantic Forest in the east to the upper reaches of the Amazon Basin much farther west.

Chorological affinities. The geographical range of *S. plaumanni* is overlapped by that of *S. nigropiceus* and *S. gagatinus*, and in the west, probably by the range of *S. jauja,* new species.

Phylogenetic relationships. Not postulated in detail, but see comment above, about this topic for *S. nigropiceus*.

Material examined. Type material only. For further details, see above.

Months of collection. October and December.

Stenognathus (s. str.) jauja, new species

Figs. 25M-O and 27

Type material. One specimen, HOLOTYPE male, labelled: "PERU: Jauja Prov./ Junin Dept., 840m./ Sani Beni (8km.E./ Satipo)6-9 Nov 1935/ Felix Woytkowski" [SEMC].

Type locality. Sani Beni, Junin Department, Peru.

Specific epithet. A noun in apposition, the specific epithet is the name of the province in Peru in which the type locality is located.

Recognition. See key to species of *Stenognathus*, above. Adults are very similar to those of *S. nigropiceus*. The features of the male genitalia provide conclusively diagnostic character states, particularly form of the left paramere (Fig. 25O).

Description. With character states of the *S. nigropiceus* species group, restricted or amplified as follows. Body rather broad, deplanate. SBL and values for selected ratios as in Tables 6 to 11.

Macrosculpture. Middle and hind tibiae with posterior (dorsal) surfaces longitudinally very finely strigulose.

Microsculpture. Head dorsally smooth, clypeus, frons, vertex, and occipital area without microlines. Elytron, dorsal surface: mesh pattern on intervals markedly transverse, most sculpticells extended across interval, quite narrow, flat.

Luster. Dorsal surfaces generally shiny, elytra subiridescent.

Chaetotaxy. Legs of males ventrally with fore and hind femora asetose, middle femur sparsely setose.

Vestiture. Ventral surface setose in males: pterothorax with antecoxal piece densely setose; abdominal sterna III to VII with setae rather short and sparse.

Mouthparts. Left mandible: supraterebral ridge slightly sinuate, not toothed, complete (cf. Fig. 6A)

Prothorax. Markedly narrower than elytra. Pronotal lateral margins posteriorly not sinuate (cf. Fig. 16F).

Elytra. Elytron: interneurs shallow; intervals nearly flat.

Legs. Middle and hind tibial posterior surface very narrowly, indistinctly longitudinally canaliculate.

Male genitalia (Figs. 25M-O). Median lobe: shaft more or less evenly cylindrical, moderately thick, not widened preapically; in dorsal aspect (Fig. 25M), membranous portion less than half length of shaft; apical portion aligned with shaft, short, relatively narrow; apex narrowly rounded; in left lateral aspect (Fig. 25N), ventral surface straight, basal bulb projected slightly ventrad. Left paramere (Fig. 25O) apex narrowly rounded. Internal sac not everted, not studied in detail.

Habitat. Probably tropical lower montane forest, as suggested by the altitude of the type locality (840 m.).

Geographical distribution (Fig. 27). This species is known only from the type locality, in Amazonian Peru.

Chorological affinities. The type locality of this species may be overlapped by the ranges of *S. nigropiceus* and *S. plaumanni*.

Phylogenetic relationships. Not postulated in detail. Probably this species is closely related to 1 of the 3 previously treated species: *S. nigropiceus*, *S. gagatinus,* and *S. plaumanni*.

Material examined. Holotype only. For further details, see above.

Month of collection. November.

Stenognathus (s. str.) robustus (Bates)
Figs. 16G and 27

Coptodera robusta Bates 1884:296.
Stenognathus (Phloeotherates) robustus; Shpeley and Ball 1993:129.

Type material. HOLOTYPE female, labelled: "Type/ H.T." [circular label, ringed with red]; "Costa Rica./ Van Patten."; "B.C.A. COLL. I.1./ "Coptodera/ robusta/ Bates" [handwritten]; "HOLOTYPE female/ Coptodera/ robusta Bts./ By Erwin '76" (BMNH).

Type area. Costa Rica.

Recognition. Black dorsum, pronotal form and proportions, and pectinate tarsal claws indicate that this specimen is a member of *Stenognathus,* subgenus *Stenognathus*. The shining, iridescent elytra distinguish this species from other members of *Stenognathus*. Also, the elytra are relatively narrow, and the lateral margins of the pronotum are more constricted in the posterior one-quarter, almost sinuate.

Description. With character states of the *S. nigropiceus* species group, restricted or amplified as follows. Body rather broad, moderately convex. SBL and values for selected ratios as in Tables 6 to 11.

Macrosculpture. Middle and hind tibial posterior (dorsal) surfaces smooth, not longitudinally strigulose.

Microsculpture. Head dorsally without microlines, surface smooth. Elytron, dorsal surface: mesh pattern on intervals transverse, sculpticells very narrow, flat.

Luster. Dorsal surfaces very shiny.

Chaetotaxy. Female with standard fixed setae, only. Male not seen.

Vestiture. Ventral surface of female asetose. Male not seen.

Mouthparts. Left mandible: supraterebral ridge slightly sinuate, not toothed, complete (cf. Fig. 6A).

Prothorax. Moderately narrower than elytra. Pronotum (Fig. 16G) markedly transverse; narrowed posteriorly slightly, lateral margins posteriorly sinuate.

Elytra. Interneurs deep. Intervals slightly, broadly convex.

Legs. Middle and hind tibial posterior surface rounded, not longitudinally canaliculate.

Male genitalia. Not known.

Habitat. Unknown.

Geographical distribution (Fig. 27). This species is known only from Costa Rica.

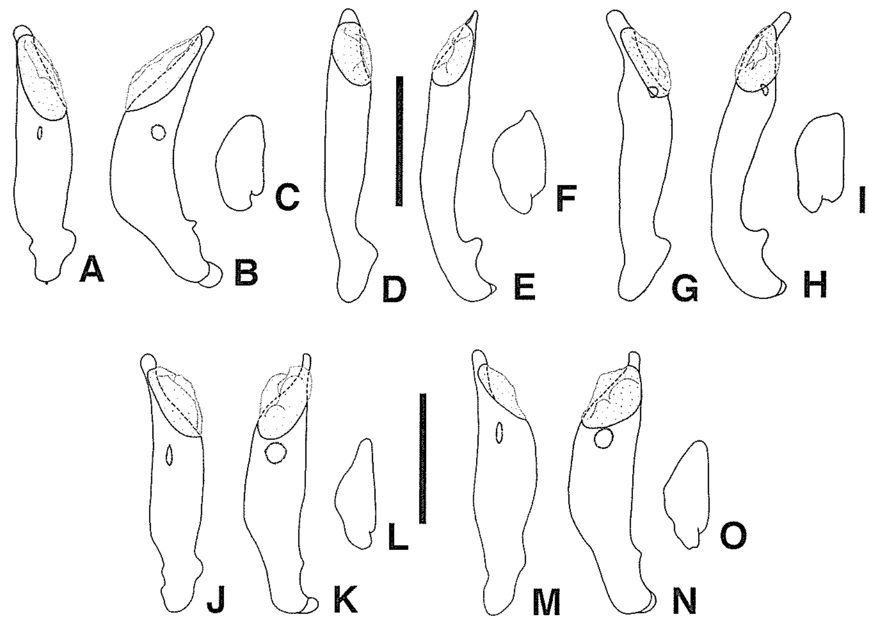

Figure 25. Line drawings of male genitalia of *Stenognathus (s. str.) nigropiceus* species group. **A**, **D**, **G**, **J**, and **M**, median lobe, dorsal aspect; **B**, **E**, **H**, **K**, and **N**, median lobe, left lateral aspect; **C**, **F**, **I**, **L**, and **O**, left paramere, ventral aspect. **A-C**, *S. chaudoiri* Ball; **D-F**, *S. nigropiceus* (Bates); **G-I**, *S. gagatinus* (Dejean); **J-L**, *S. plaumanni*, new species; and **M-O**, *S. jauja*, new species. Scale bars = 1.0 mm.

Chorological affinities. The range of this species is within the known range of *S. chaudoiri*. Possibly, these 2 species are sympatric.

Phylogenetic relationships. Not postulated.

Material examined. Holotype only. For details, see above.

Stenognathus melanarius species group

Recognition. A combination of smooth tarsal claws, middle and hind tibial dorsal surface smooth, not strigulose, and pronotum with base more constricted and lateral margins sinuate posteriorly distinguish adults of this species group from those of the other species groups of the subgenus *Stenognathus*.

Description. With character states of subgenus *Stenognathus*, restricted or amplified as indicated in the "Recognition" section above and as follows. SBL and values for selected ratios as in Tables 6 to 11.

Microsculpture. Elytral mesh pattern transverse, sculpticells relatively wide.

Luster. Dorsal surfaces shiny, not subiridescent.

Chaetotaxy. Elytral umbilical series in 3 parts, anterior and posterior groups each with 5 or 6 setae, medial with 1 seta. Legs of males ventrally: fore and hind femora sparsely setose to glabrous; middle femur densely setose; hind trochanter moderately densely setose to glabrous.

Mouthparts. Left mandible: dorsally, with supraterebral ridge complete in length, slightly sinuate, and not toothed (Fig. 6O); ventrally, with molar tooth and occlusal extension of molar ridge (Fig. 6S); basal extension of molar ridge long.

Prothorax. Pronotal lateral margins (Fig. 16H) markedly sinuate posteriorly.

Elytra. Elytron: intervals moderately to slightly convex; interneurs moderately deep to shallow, impunctate or punctate.

Legs. Middle and hind tibial posterior surface rounded, not canaliculate.

Male genitalia (Figs. 28A-C to M-O). Median lobe: cylindrical, shaft of uniform width, of various thickness, or in lateral aspect, markedly widened basally and tapered apically; in left lateral aspect, ventral surface straight or curved slightly to distinctly ventrad; basal bulb aligned with shaft, not projected ventrad; membranous area about half length of shaft; apical portion in dorsal aspect, short to very short, wide or narrow, straight in relation to shaft or curved more gradually or bent; apex in dorsal aspect rounded, broadly or narrowly and in left lateral aspect straight or bent dorsally in form of small hook. Left paramere narrowed apically, apex rounded, broadly or narrowly.

Geographical distribution (Fig. 29). The range of this species group extends from the Amazon Basin in

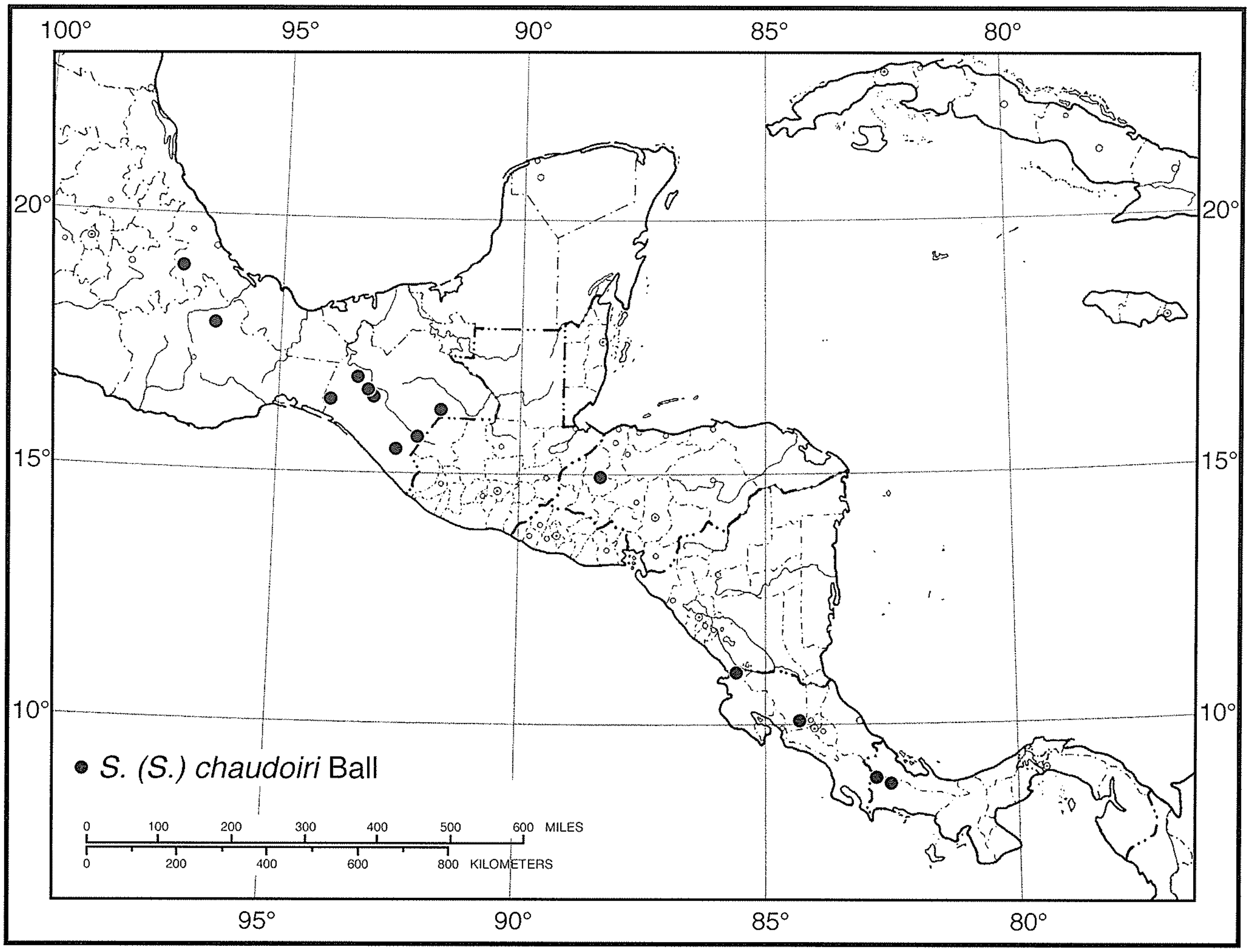

Figure 26. Map of Middle America showing positions of known localities for *Stenognathus (s. str.) chaudoiri* Ball.

cis-Andean South America northward to the Isthmus of Panamá, and northward in Middle America from Panamá to Veracruz, in eastern México.

Chorological affinities. The range of this species group is overlapped by the ranges of the *S. stricticollis, procerus,* and *nigropiceus* species groups.

Phylogenetic relationships. Not postulated in detail. If proportions of the prothorax are indicative of relationship, then this species group and the *S. nigropiceus* species group are adelphotaxa. This carries with it the further postulate that smooth tarsal claws is apotypic, as a result of loss of serration.

Included species. The *S. melanarius* species group includes 5 species, as follows.

***Stenognathus (s. str.) quadricollis* Chaudoir**
Figs. 28A-C and 29

Stenognathus quadricollis Chaudoir 1869a:117. TYPE MATERIAL: 3 specimens from the Oberthür-Chaudoir Collection (MNHP) associated with the following box label: "quadricollis/ Chaud/ Mexique/ Sallé" [handwritten]. LECTOTYPE (here designated), male, labelled: "Ex Musaeo/ Chaudoir" [red print]. PARALECTOTYPES: 2 females, each labelled same as lectotype.

Type area. According to the original description, the type specimens were collected in México, by Auguste Sallé. No further information is available, neither in the description nor on labels associated with the type specimens.

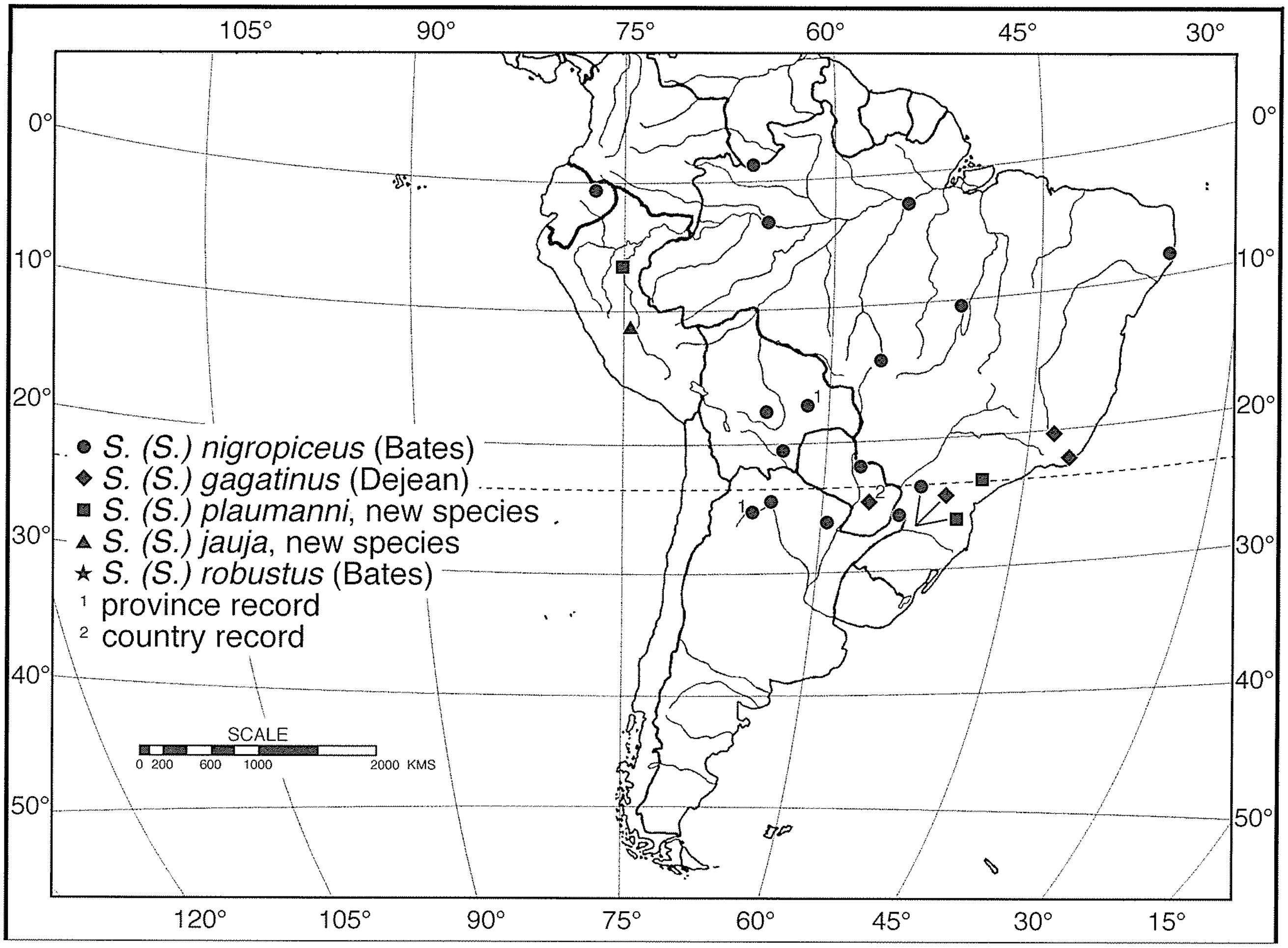

Figure 27. Map of Middle America and South America showing positions of known localities for the species of *Stenognathus (s. str.), nigropiceus* species group.

Recognition. See key to species of *Stenognathus*, above. Adults of this species might be confused with those of the South American *S. longipennis* and *S. melanarius*. Adults of *S. quadricollis* have the elytral intervals markedly convex, whereas those of *S. melanarius* are barely convex. Males are distinguishable by genitalic features (Fig. 28A-C; cf. Figs. 28D-F and M-O), and by setation of the femora: hind femur ventrally sparsely setose in *S. quadricollis,* whereas the hind femora of *S. longipennis* and *S. melanarius* are glabrous. Females of *S. quadricollis* and *S. longipennis* seem not to be distinguishable from one another.

Description. With character states of the *S. melanarius* species group, restricted or amplified as follows. SBL and values for selected ratios as in Tables 6 to 11.

Chaetotaxy. Legs of males ventrally: fore and hind femora sparsely setose to glabrous; hind trochanter sparsely setose to glabrous.

Elytra. Intervals distinctly convex, interneurs moderately deep, impunctate.

Male genitalia (Figs. 28A-C). Median lobe: cylindrical, shaft of uniform width, relatively thin; in left lateral aspect (Fig. 28B), ventral surface curved slightly; membranous area distinctly less than half length of shaft; apical portion in dorsal aspect (28A) very short, wide, straight in relation to shaft; apex in dorsal aspect rounded broadly, and in left lateral aspect, straight, not bent dorsally in form of small hook. Left paramere (28C) narrowed apically, apex rounded, broadly. Internal sac simple, without lobes.

Habitat. Tropical lowland forest to tropical lower montane forest, associated with fungi on logs, from near sea level to an altitude of at least 1400 m.

Geographical distribution (Fig. 29). The range of this species is confined to Middle America: from southern Panamá, northward to eastern México, in the state of Veracruz.

Chorological affinities. This species is isolated geographically from all other species of the *S. melanarius* species group. Probably it is narrowly allopatric with the most similar species, *S. longipennis*.

Phylogenetic relationships. Not specified, but the marked similarity of adults of *S. quadricollis* and *S. longipennis*, and their adjacent allopatric ranges suggest that they might be adelphotaxa.

Material examined. In addition to the type, noted above, we have seen 55 specimens, as follows: **COSTA RICA. Alajuela.** Male, Rio Sn Lorencito, Res. For. Sn. Ramon, 5 km. n. Col. Palmarena, 900 m., III.1990, Cusro Carabidae (CASC). **Cartago.** Female, Aserradero el Seis, Grano de Oro, Turrialba, 18-24.I.1993, P. Campos (CASC). Female, Monumento Nacional Guayabo, A.C. Amistad, 1100 m., VI.1994, G. Fonseca (CASC). **Guanacaste.** Male, Est. Cacao, 1100 m., 7-18.II.1995, F. Alvarado (CASC). Male, female, Est Cacao, s.w. side Volcan Cacao, 1000-1400 m., IX.1989, R. Blanco, C. Chavez (CASC). Est. Pitilla, 9 km. s. Santa Cecelia, 700 m.: female, XI.1989, C. Moraga, P. Rios (CASC); female, V.1989, GNP Biodiversity Survey (CASC); female, P.N. Guanacaste, V.1991, C. Moraga (CASC). **Limon.** Female, Sector Cerro Cocori, Finca de E. Rojas, 150 m., IX.1994, E. Rojas (CASC). Hamgurgfarm, Reventazon, F. Nevermann: male, 3.VI.26 (USNM); male, 29.T.37 (USNM). **Puntarenas.** Male, Est. Biol. Las Alturas Coto Brus, 1500 m., VI.1992, M. Ramirez (CASC). Est. Sirena, P.N. Corcovado, 0-100 m.: male, IV.1990, G. Fonseca (CASC); female, IV.1992, G. Rodriguez (CASC); female, VI.1990, F. Quesada (CASC). Fca. Cafrosa, Est. Las Mellizas, P.N. Amistad, 1300 m., M. Ramirez, G. Mora: female, XI.1989 (CASC); female, III.1990 (CASC). Male, Rancho Quemado, Peninsula Osa, 200 m., VII.1992, F. Quesada (CASC). Female, Wilson Botanical Garden (Las Cruces Biol. Stn.), 1200 m., ex F.I.T., 27.V.1993, J.S. & A.K. Ashe (SEMC). **San José.** Male, 15 km. s.w. San Isidro, 20.VII.1964, R.B. & G. Roberts (SEMC). **GUATEMALA. Alta Verapaz.** Female, San Cristobal Quixal, 7.V.1980, H. & L. Freude (HFRE). **Baja Verapaz.** Female, Sinanja, Champion (BMNH). **Vera Paz.** Female, Champion (MNHP). **HONDURAS. Santa Barbara.** Male, La Fe, Inst. Hondurena de Café, 30.V.1993, M.C. Thomas (FSCA). **MEXICO.** 2 males (BMNH). Male, Bonvouloir (BMNH). Male, P. Dupuis (ISNB). Female, Putzeys (ISNB). **Chiapas.** Female, Parque Laguna Belgica, 2.VI.1991, B. Ratcliffe, J. S. Ashe, & M. Jameson (SEMC). **Oaxaca.** Female, "Oaxaca", 7.VII.1963, A.B. Lau (UASM). **Veracruz.** Female, Cordoba, F. Fenyes (CASC). Male, Cordova, Sallé (BMNH). Male, Cosamaloapan, Sallé (BMNH). Female, Playa Vicente, Sallé (BMNH). **PANAMA. Canal Zone.** Male, Barro Colorado Is., running on logs and branches, 6-8.XII.1971, T.L. & L.J. Erwin (USNM). Female, Barro Colorado Is., Lutz Stream, 09°09'45"N 079°50'30"W, on trunk, 14.II.1975, T.L. Erwin, J.L. Lawrence (USNM). Male, Barro Colorado Is., 09°10'N 079°50'W, on side of very old log near trail, 29.VI.1973, T.L. & L.J. Erwin (USNM). **Chiriqui.** 2 females, Bugaba, Champion (BMNH). Male, 20 km. n. Gualaca, Finca La Suiza, 08°39'N 82°12'W, 1200 m., ex fogging fungus-laden log, 12.VI.1995, J.S. Ashe, R.E. Brooks (SEMC). Female, La Fortuna, "Cont. Divide Trail", 08°46'N 82°12'W, 1150 m., ex fungus-laden log, 9.VI.1995, J.S. Ashe, R.E. Brooks (SEMC). Male, female, Potrerillos, 25.I.35, J.W. MacSwain (CASC). Male, V. de Chiriqui, 762-1219 m., Champion (BMNH). **Colon.** Male, 2 females, Parque Nac. Soberania, Pipeline Rd. Km. 6.1, 09°07'N 79°45'W, 40 m., ex fungus-laden logs, 21.VI.1995, J.S. Ashe, R.E. Brooks (SEMC). **Darien.** Cana Biological Station, 7°45'18"N 77°41'6"W, 500-550 m., J.S. Ashe, R.E. Brooks: male, ex fungus-laden log, 6.VI.1996 (SEMC); female, ex fungus-laden log, 4.VI.1996 (SEMC); female, ex fogging fungus-laden log, 9.VI.1996 (SEMC). **Panamá.** Female, Cerro Campana, nr. Capira, 08°44'N 79°57'W, 790 m., 18.V.1995, J. & A. Ashe (SEMC). **COUNTRY?** 2 females, (MNHP).

Months of collection. January-July, September, and November-December.

Stenognathus (s. str.) longipennis Chaudoir
Figs. 28D-F and 29

Stenognathus longipennis Chaudoir 1877:197. TYPE MATERIAL: 1 specimen from the Oberthür-Chaudoir Collection (MNHP) associated with the following box label: "longipennis/ Chaudoir/ Nouv. Grenade/ Coper Steinheil" [handwritten]. HOLOTYPE male, labelled: "Ex Musaeo/ Chaudoir" [red print]; "TYPE" [red paper].

Type material. The description of this species was based on a single female, received from Eduardo Steinheil (Chaudoir 1877:197). Associated with the holotype is a female, labelled "Copér" and "Colombie/ Coll. E. Steinheil". This second specimen probably was collected at the same time as was the holotype, but was retained by Steinheil, and only later was acquired and placed beside the specimen that Chaudoir had described.

Type locality. According to the original description, the type locality must be Coper, Departamento Boyaca, Colombia.

Recognition. Adults of this species and of *S. quadricollis* and *S. melanarius* are markedly similar to one another. For details, see this topic for *S. quadricollis*, above.

Description. With character states of the *S. melanarius* species group, restricted or amplified as follows. SBL and values for selected ratios as in Tables 6 to 11.

Chaetotaxy. Legs of males ventrally: fore femur sparsely setose, hind femur glabrous; hind trochanter sparsely setose.

Elytra. Intervals distinctly convex, interneurs moderately deep, impunctate.

Male genitalia (Figs. 28D-F). Median lobe cylindrical, shaft of uniform width, relatively thin; in left lateral aspect (Fig. 28E), ventral surface almost straight, curved very slightly; membranous area about half length of shaft; apical portion in dorsal aspect (Fig. 28D) very short, wide, straight in relation to shaft; apex in dorsal aspect rounded broadly, in left lateral aspect straight. Left paramere (Fig. 28F) narrowed apically, apex rounded, broadly or narrowly. Internal sac not everted, not studied in detail.

Habitat. Probably tropical lower montane forest.

Geographical distribution (Fig. 29). This species is known from the type locality, in eastern Colombia, only.

Chorological affinities. The range of *S. longipennis* is overlapped by that of *S. crenulatus*, and is close to the range of *S. quadricollis*, to the north, in Middle America.

Phylogenetic relationships. Unknown, but possibly the adelphotaxon of *S. quadricollis*.

Material examined. In addition to the 2 specimens noted above, from the type locality, we examined 1 from the following locality.
COLOMBIA. Valle del Cauca. Male, R. Dagua, W. Rosenberg (MNHP).

Stenognathus (s. str.) crassus Chaudoir
Figs. 28G-I and 29

Stenognathus crassus Chaudoir 1869a:116. TYPE MATERIAL: 1 specimen from the Oberthür-Chaudoir Collection (MNHP) associated with the following box label: "crassus/ Chaud/ Brésil/ Coll. Laferté" [handwritten]. HOLOTYPE male, labelled: "Ex Musaeo/ Chaudoir" [red print]; "TYPE" [red paper].

Type material. Chaudoir (1869a:116) noted that the description was based on a single male from the Laferté collection.

Type area. Brazil. It is impossible to propose a more restricted type locality at this time.

Recognition. Large size distinguishes adults from most other adults of the *S. melanarius* species group (Table 6). Males are distinguished readily by genitalic features, the general form of the median lobe with hook-like apex being diagnostic.

Description. With character states of the *S. melanarius* species group, restricted or amplified as follows. SBL and values for selected ratios as in Tables 6 to 11.

Chaetotaxy. Legs of males ventrally: fore femur sparsely setose, hind femur glabrous; hind trochanter sparsely setose.

Elytra. Elytron: intervals distinctly convex; interneurs moderately deep, impunctate.

Male genitalia (Figs. 28G-I). Median lobe: in left lateral aspect (Fig. 28H), markedly widened basally and tapered apically; in left lateral aspect, ventral surface straight; membranous area more than half length of shaft; apical portion in dorsal aspect, short, narrow, curved laterally; apex in dorsal aspect (Fig. 28G) rounded narrowly and in left lateral aspect bent dorsally in form of small hook. Left paramere (Fig. 28I) narrowed apically, apex rounded narrowly. Internal sac elaborate, with 5 lobes, including 1 basal.

Habitat. Probably tropical lowland forest.

Geographical distribution (Fig. 29). This species is known in cis-Andean South America from Brazil.

Chorological affinities. Not specified.

Phylogenetic relationships. Not postulated. The very distinctive male genitalia suggest a remote position for this species in the *S. melanarius* species group.

Material examined. In addition to the holotype, noted above, we have seen a female from the Bates Collection (MNHP) labelled "Bresil", and a male

(MNHP) and 2 females (BMNH) which have no locality data. A female, from the Mnizech collection (MNHP) is labelled "Mexique", surely in error. Probably this specimen is an abnormally large one of *S. quadricollis*.

Stenognathus (s. str.) crenulatus Chaudoir
Figs. 28J-L and 29

Stenognathus crenulatus Chaudoir 1869a:116. TYPE MATERIAL: 2 specimens from the Oberthür-Chaudoir Collection (MNHP) associated with the following box label: "crenulatus/ Chaud/ Colombié/ Coll. Laferté" [handwritten]. LECTOTYPE (here designated), female, labelled: [green paper square]; "Ex Musaeo/ Chaudoir" [red print]; "TYPE" [red paper]. PARALECTOTYPE female, labelled: "Pará/ Depuyset"; "Ex Musaeo/ Chaudoir" [red print]; "PARATYPE" [red paper].

Type material. Chaudoir (1869a:116) stated that he had 2 females of this species: 1, from the Laferté Collection, collected in Colombia by "Goudot"; the other, from Pará, was purchased from "M. Depuyset". The labelling, noted above, suggests that both of those specimens served as the basis for description of *S. crenulatus*.

Type area. According to the original description, the specimen chosen as lectotype was collected in Colombia. Designation of a more restricted type locality seems unnecessary, at this time.

Recognition. The finely punctate elytral interneurs distinguish specimens of this species from all other members of the genus *Stenognathus*.

Description. With character states of the *S. melanarius* species group, restricted or amplified as follows. SBL and values for selected ratios as in Tables 6 to 11.

Chaetotaxy. Legs of males ventrally: fore and hind femora glabrous; hind trochanter sparsely setose to glabrous.

Elytra. Elytron: intervals distinctly convex; interneurs moderately deep, punctate.

Male genitalia (Figs. 28J-L). Median lobe: cylindrical, shaft relatively thick; in left lateral aspect (Fig. 28K), ventral surface straight; membranous area less than half length of shaft; apical portion in dorsal aspect (Fig. 28J) very short, narrow toward apex, straight in relation to shaft; apex in dorsal aspect rounded narrowly, and in left lateral aspect straight, not bent in form of small hook. Left paramere (Fig. 28L) narrowed apically, apex rounded narrowly. Internal sac elaborate, with dorsal lobe and several small preapical lobes.

Habitat. Tropical lowland forest to tropical lower montane forest, between altitudes of at least 200 and 1900 m. Adults live, evidently, in association with fungi on logs.

Geographical distribution (Fig. 29). The range of this species includes the Amazon Basin and French Guiana, in cis-Andean South America (probably the whole of forested South America, north of about 20°S. lat.).

Chorological affinities. The range of *S. crenulatus* overlaps the range of *S. longipennis*, and probably the range of *S. crassus*.

Phylogenetic relationships. Not postulated.

Material examined. In addition to the type material noted above, we have seen 79 specimens from the following localities: **BOLIVIA. La Paz.** Female, Tumupasa, Mulford Biological Expedition 1921-1922.XII, W. M. Mann (USNM). **Santa Cruz**. Male, female, Ichilo, Buenavista, Martinez (ISNB). **BRAZIL. Amapa**. Male, Oiapoque, 02.V.1979, W.L. Overal (USNM). **Amazonas**. Ega: 2 males, female (MNHP); 3 females, Bates (MNHP). Female, Santo Paulo d'Olivença, Hammel (MNHP). **Para**. Female, Marco de Legua (spelling?), III.1895, Gounelle (MNHP). **COLOMBIA. Cundinamarca**. Female, Canache (spelling?), 1st sem., 1900 M. de Mathan (MNHP). **Valle del Cauca.** Female, R. Dagua, W. Rosenberg (MNHP). **ECUADOR.** Male, Putzeys (ISNB). **Loja**. Male, A. Gauajon (MNHP). **Napo**. Male, Aliñuai Camp vic., 01°02'56"S 77°36'07"W, headlamp/ on rotten *Ficus* fruits, 29.IV.1998, K.W. Will (CUIC). Female, Napo, Km. 24, n. Cotundo, Baeza rd., 1097-1219 m., primary forest, in log, 2.V.1982, H.E. Frania (UASM). Male, Limoncocha, 12-14. III.1976, J.M. Campbell (MZSP). Female, Limoncocha, 100 m., ex bracket fungi on stump, 19-29.IV.1979, H.E. Frania (UASM). 2 males, 3 females, Onkone Gare Camp, 00°39'S 76°26'W, 220 m., terra firme forest, on log at night 3-11.X.1995, Erwin Exped., G.E. Ball, D. Shpeley (UASM). Female, Res. Ethnica Waorani, 1 km. s. Onkone Gare Camp, 00°39'S, 76°26'W, 220 m., terra firme forest, 10.X.1994, T.L. Erwin et al. (USNM). 2 males, Res. Ethnica Waorani, Onkone Gare Camp, 00°38'S, 76°36'W, Rio Piraña, 220 m., riparian forest, 26.I.1994, T.L. Erwin (USNM). Female, Puerto Misahuali, 01°02'03"S 77°39'49"W, 11.IX.1997, K.W. Will (CUIC). Male, female, Yasuni Scientific Station, 00°39'14"S 76°27'12"W, 210 m., headlamp/ dead trees, 21.IV.1998, K.W. Will (CUIC). Yasuni Scientific Station, 00°40'36"S 76°24'02"W, K.W. Will: 2

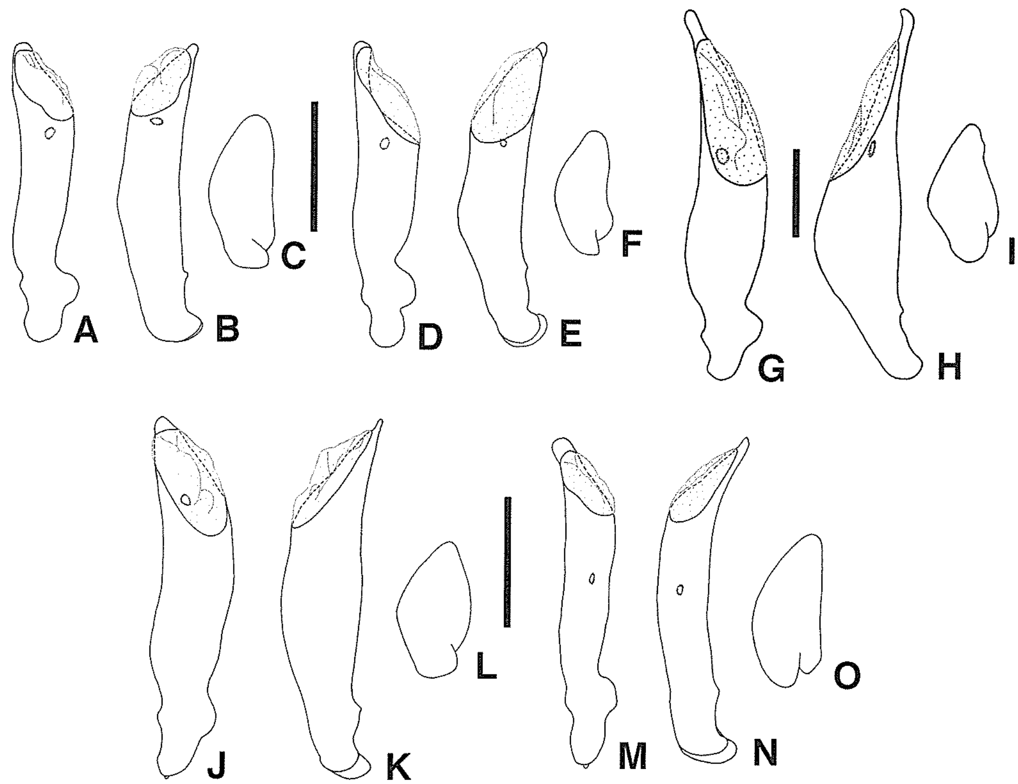

Figure 28. Line drawings of male genitalia of *Stenognathus (s. str.) melanarius* species group. **A**, **D**, **G**, **J**, and **M**, median lobe, dorsal aspect; **B**, **E**, **H**, **K**, and **N**, median lobe, left lateral aspect; **C**, **F**, **I**, **L**, and **O**, left paramere, ventral aspect. **A-C**, *S. quadricollis* Chaudoir; **D-F**, *S. longipennis* Chaudoir; **G-I**, *S. crassus* Chaudoir; **J-L**, *S. crenulatus* Chaudoir; and **M-O**, *S. melanarius* (Dejean). Scale bars = 1.0 mm.

males, 220 m., 15.IV.1998 (CUIC); male, 200 m., headlamp, 14.IV.1998 (CUIC); 2 males, female, 210 m., headlamping, 14.IV.1998 (CUIC); 2 males, female, 210 m., rotten log/ fogging/ barking, 15.IV.1998 (CUIC). **Sucumbios**. Sacha Lodge, 0°28'14"S 76°27'23"W, 270 m., ex fungus covered log, R.E. Brooks: 5 males, 5 females, 23.III.1999 (SEMC); male, 24.III.1999 (SEMC). **FRENCH GUIANA.** Female, Cayenne, Bonvouloir (BMNH). Female, Roura, 13.0 km. s.s.e., 4°38'38"N 52°17'56"W, 240 m., ex misc. collecting, 13.VI.1997, J.S. Ashe, R.E. Brooks (SEMC). Female, Saül, Mt. Galboa summit, 3°37'18"N 53°16'42"W, 610 m., ex fungus-laden logs, 6.VI.1997, J.S. Ashe, R.E. Brooks (SEMC). **PERU Cuzco**. Female, Marcapata (HNHM). **Junin**. Female, Chanchamayo, Thamin (MNHP). **Loreto**. Female, 1 km. s.w. Bocca del Rio Samiria, Vigilante Post No. 1, 130 m., under bark and on logs ini restringa for., 15.VIII.1991, T.L. Erwin (USNM). 3 males, 2 females, Rio Samiria, Cocha Shinguito, on logs, under bark, 28-29.VIII.1991, G.E. Ball, D. Shpeley (UASM). 3 males, 4 females, Cocha Shinguito, 05°08'S 74°45'W, 140 m., fallen log, at night, 29.VIII.1991, T.L. Erwin, M.G. Pogue (USNM). Female, Teniente Lopez, 2°35.66'S 76°06.92'W, 210-240 m., 23.VII.1993, R. Leschen (SEMC). **Madre de Dios**. Male, 15 km. n.e. Pto. Maldonaldo, 200 m., ex Agariceles, 1.VII.1989, J.S. Ashe, R. Leschen (SEMC). Male, 15 km. n.e. Pto. Maldonado, 200 m., ex at light, 13.VI.1989, J.S. Ashe, R. Leschen (SEMC). Rio Tambopata Res., 30 km. (air) s.w. of Puerto Maldonado, 12°50'S 69°20'W, 290 m.: male, female, 4-19.IX.1984, D.H. Kavanaugh (CASC); female, 15.X-1.XII.1984, A. Shuhler (CASC). Female, Rio Tambopata Res., 30 air km. s.w. of Puerto Maldonado, 290 m., 1-26.XI.1982, E.S. Ross (CASC). **SURINAM. Brokopondo**. Male, female, Brownsberg Natuur Pk., Mazaroni Plateau, 400-500 m., 21.VIII.1982, W.E. Steiner (USNM). **COUNTRY?** Female, Bowring (BMNH).

Months of collection. March-December.

Stenognathus (s. str.) melanarius (Dejean)
Figs. 16H, 28M-O, and 29

Anchomenus melanarius Dejean 1831:719. TYPE MATERIAL: 2 specimens from the Oberthür-Chaudoir Collection (MNHP) associated with the following box label: "melanarius/ Dej. Bresil/ (coll Dejean)". LECTOTYPE female, labelled: "Brasil"; "Anchomen"; "melanarius m./ in Brasilia"; [3 previously labels each handwritten, on green

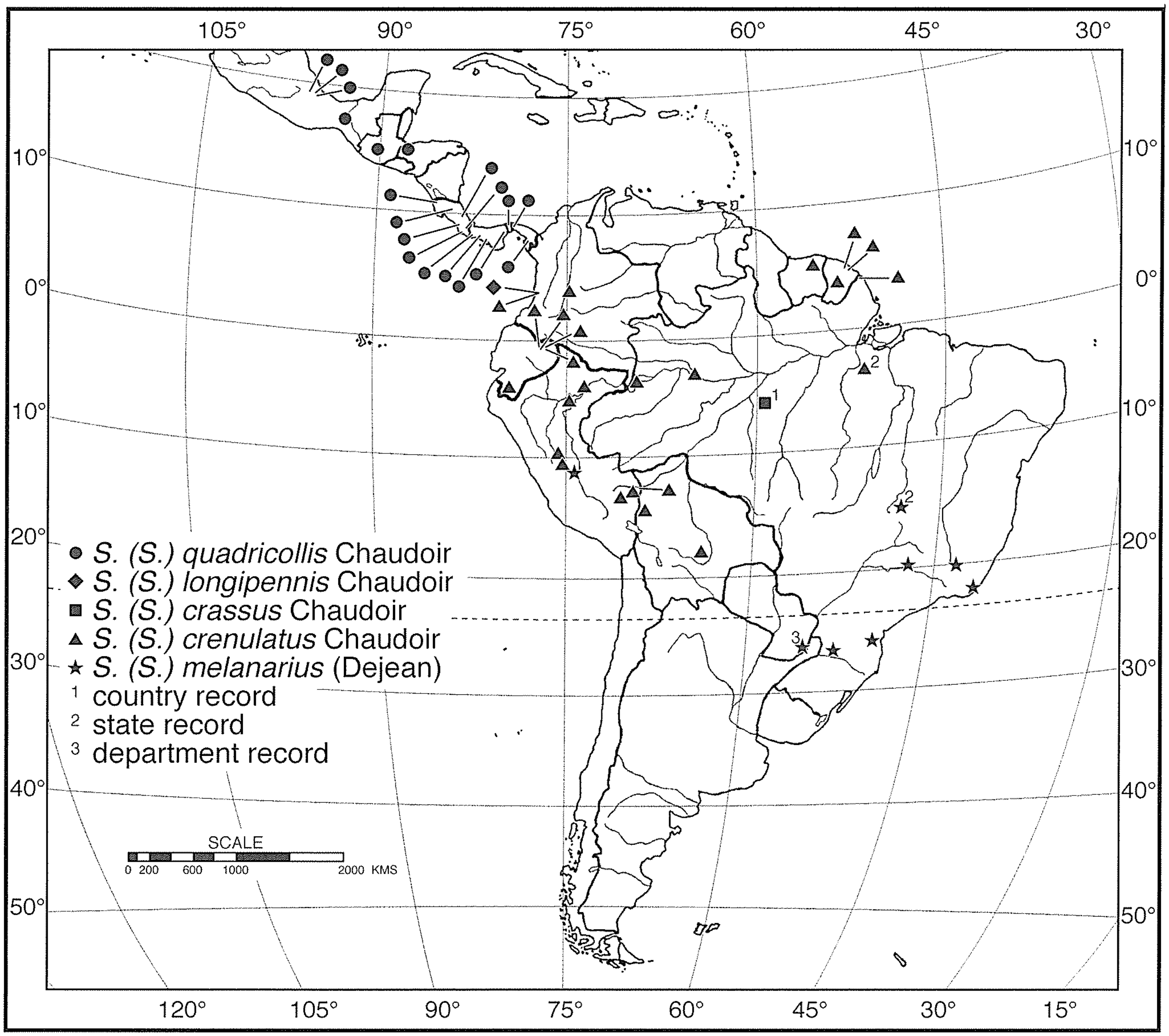

Figure 29. Map of Middle America and South America showing positions of known localities for the species of *Stenognathus (s. str.), melanarius* species group.

paper]; "Ex Musaeo/ Chaudoir "[red print]; "TYPE" [red paper]. PARALECTOTYPE, female, labelled: "Brasil" [handwritten, on green paper]; "Ex Musaeo/ Chaudoir "[red print]; "TYPE" [red paper]; "PARATYPE" [red paper].

Stenognathus melanarius; Chaudoir 1843:421. 1869a:117.

Type area. According to the original description, the type specimen was collected in Brazil. No further information is available.

Recognition. In addition to the features noted in the key to species of *Stenognathus*, members of this species are readily distinguished by geographical distribution: the only species of the *S. melanarius* group residing in eastern temperate Brazil (Fig. 29).

Description. With character states of the *S. melanarius* species group, restricted or amplified as follows. SBL and values for selected ratios as in Tables 6 to 11.

Chaetotaxy. Legs of males ventrally: fore and hind femora glabrous; hind trochanter moderately densely setose.

Prothorax. Pronotum as in Fig. 16H.

Elytra. Intervals slightly convex, interneurs shallow, impunctate.

Male genitalia (Figs. 28M-O). Median lobe: cylindrical, shaft of uniform width, relatively thin; in left lateral aspect (Fig. 28N), ventral surface curved distinctly ventrad; membranous area much less than half length of shaft; apical portion in dorsal aspect (Fig. 28M) very short, moderately wide, bent in relation to shaft; apex in dorsal aspect moderately broadly rounded, and in left lateral aspect straight, not bent dorsally in form of small hook. Left paramere (Fig. 28O) narrowed apically, apex narrowly rounded. Internal sac very elaborate, with 6 preapical lobes.

Habitat. Probably Atlantic Forest of southeastern Brazil, between at least sea level and an altitude of 300 m.

Geographical distribution (Fig. 29). The range of this species is principally in southeastern cis-Andean South America, but extends westward to Amazonian Peru. This is the southernmost species of the *S. melanarius* species group.

Chorological affinities. The range of *S. melanarius* appears to be isolated from the ranges of the other species of the *S. melanarius* species group.

Phylogenetic relationships. Not postulated.

Material examined. In addition to the type material noted above, we have seen 54 specimens from the following localities: **BRAZIL.** 2 males, 2 females (BMNH). 2 males, female (MNHP). Male, 2 females, Bonvouloir (BMNH). Female, O. de Baulny (ISNB). Female, Putzeys (ISNB). **Goias**. Female, Castelman (MNHP). **Minas Gerais**. Caraça: male, 1885, E. Gounelle (MNHP); 3 males, 7 females, 2nd sem., 1884, P. Germain (MNHP). Female, Uberabe (ISNB). **Rio de Janeiro**. Male, (MNHP). 2 males, female, Nova Friburgo II.1884, P. Germain (MNHP). **Santa Catarina**. 3 females, Mafra (MNHP). Female, Nova Teutonia, 27.Br.° 52-53.L°, 2.6.34, ca. 300 m., Plaumann (BMNH). Nova Teutonia, 27°11'B 52°23'L, F. Plaumann: female, 22.XI.1939 (ISNB); male, 10.VIII.1934 (ISNB); female, 4.IV.1934 (ISNB). Nova Teutonia: male, 18.IX.1934 (ISNB); female, 1.XI.1934 (ISNB); 2 females, 22.VIII.1934 (ISNB); female, 10.VIII.1934 (ISNB). **State?** female, South Brazil (MNHP). **PARAGUAY. Itapua**. Female, Canterra (spelling?), X.1956, F.H. Walz (PMCT). Male, Col. Frans (spelling?), 16.XII.1948 (ISNB). **PERU. Junin**. Female, Satipo, V.1944 (PMCT). **COUNTRY?** 5 males, 4 females (MNHP). Female, Bowring (BMNH).

Months of collection. February, April-June, and August-December.

Subgenus *Pristolomus* Chaudoir

Pristolomus Chaudoir 1869a:128. Ball 1975a:162.

Type species. *Pristolomus dentifer* Chaudoir 1869a:128 (by monotypy).

Ranking. See Ball (1975a:162) and above, under "intra-generic ranking".

Recognition. See the key to subgenera and species of genus *Stenognathus*.

Description. See description of the type species, below.

Included species. This monobasic subgenus includes only *Stenognathus dentifer* Chaudoir, redescribed below.

Stenognathus (Pristolomus) dentifer (Chaudoir)

Figs. 16I, 30A-D, and 31

Pristolomus dentifer Chaudoir 1869a:128. TYPE MATERIAL: 2 specimens, Oberthür-Chaudoir Collection (MNHP), associated with the following box label: "dentifer/ Chaud/ Colombia/ C. Reiche". LECTOTYPE (here designated), labelled: "Ex Musaeo/ Chaudoir" [red print]; "LECTO"; "TYPE" [red print]. PARALECTOTYPE, female, labelled same as lectotype, except "PARALECTOTYPE" label.

Notes about type material. In the original description of this species, Chaudoir (1869a:129) noted 2 specimens, from the Reiche Collection.

Type area. According to the original description, the type specimen was collected in Colombie (= Colombia). No further information is available. There is no need for further restriction, at this time.

Recognition. Same features as for subgenus *Pristolomus*. See key to subgenera of *Stenognathus*.

Description. With character states of genus *Stenognathus*, restricted or amplified, as follows. Body rather narrow, moderately convex (for habitus, see Ball 1975a:158, Fig. 22). SBL and values for selected ratios as in Tables 6 to 11.

Color. Body black. Antennae, palpi and legs more or less dark (black to variously rufopiceous or brunneous).

Macrosculpture. Head dorsally with surface of clypeus, frons and vertex markedly strigulose, strigules irregular, extended in various directions, occipital area surface relatively smooth; ventral surface smooth to shallowly, rather indistinctly transversely strigulose. Pronotal disc (Fig. 16I) transversely strigulose, strigules moderately deep. Middle and hind tibial posterior (dorsal) surfaces longitudinally strigulose.

Microsculpture. Head: dorsally, frons and vertex with microlines distinct, mesh pattern isodiametric, sculpticells flat. Elytron, dorsal surface: mesh pattern on intervals transverse.

Luster. Dorsal surfaces generally shiny.

Chaetotaxy. Elytral umbilical series with punctures in 3 parts, anterior and posterior group each with 5 or 6 setae, medial with 1 seta. Legs of males with fore, middle and hind femora, and hind trochanters densely setose ventrally; female femora asetose ventrally.

Vestiture. Ventral surface more densely setose in males than in females. Thorax with prosternum preapically and intercoxal process apically sparsely setose; metasternum densely setose in triangular pattern with apex toward middle coxae and bare area anteriad antecoxal piece; antecoxal piece setose. Abdominal sterna III and IV ventrally setose.

Head. Eyes moderately convex, more or less bulged.

Mouthparts. Left mandible: dorsally, supraterebral ridge complete in length, straight, and not toothed; ventrally, with molar tooth (blunt and broad apically) and occlusal extension of molar ridge; basal extension of molar ridge long.

Prothorax. Moderately narrower than elytra, moderately transverse. Pronotum (Fig. 16I) narrowed posteriorly moderately, lateral margins markedly sinuate posteriorly. Posteriolateral angles about rectangular. Surface with disc distinctly convex, lateral grooves relatively narrow anteriorly, widened slightly posteriorly; posteriolateral impressions basin-like, each continuous with adjacent lateral groove.

Pterothorax. Metepisternal lateral margin distinctly longer than width at anterior margin, metasternum relatively long.

Elytra. Elytron: humerus broadly rounded, lateral margin serrate basally, less rounded and widened preapically; preapical margin distinctly sinuate, preapical angle denticulate, apex distinctly angulate to oblique-subtruncate. Interneurs moderately deep, finely, crenulately punctulate; intervals distinctly, broadly convex.

Hind wings. Developed fully.

Legs. Middle and hind tibial posterior surface more or less distinctly flattened. Tarsal claws smooth.

Abdominal sterna. Sternum VII of males with posterior margin shallowly notched medially.

Male genitalia (Figs. 30A-D). Median lobe: cylindrical, slender, shaft slightly constricted medially, in lateral aspect, either straight or sinuate, markedly curved ventrally toward apical portion, and with apical portion and apex various in form. For details see under "Variation", below. Left paramere much larger than right paramere, apical margin principally subtruncate with small projection, or more or less broadly obtuse. Internal sac elaborate, with 3 lobes.

Variation. The median lobe of the male genitalia exhibits rather striking variation in form, with a Costa Rican specimen (Fig. 30A) having in right lateral aspect a comparatively broad apical portion with apex subtruncate, whereas a Peruvian specimen (Fig. 30C) has a shorter apical portion and with more or less pointed apex. Note also the different positions of the membranous portion, in left lateral aspect (Figs 30B and D). However, the median lobe of a male from Panamá fairly well bridges the gap between the 2 extremes. Variation is believed to be clinal, and thus not recognized taxonomically.

Habitat. Tropical lowland forest and tropical lower montane forest, at altitudes at least between 50 and 800 m. Adults live on logs with abundant fungi.

Geographical distribution (Fig. 31). According to Ball (1975a: 162) this monobasic subgenus is known from Colombia, only. The additional records reported below extend the range of the type species, *S. dentifer*, into Lower Central America.

Chorological affinities. The range of this species is overlapped, in part, at least, by the ranges of most species groups and various species of the subgenus *Stenognathus*. For example, specimens of this species and of *S. (S.) crenulatus* were collected on the same day and on bracket fungi at Limoncocha, Ecuador. Similarly, specimens of both species were collected 15 km. north of Puerto Maldonado, Peru, though not on the same day.

Material examined. In addition to the type material noted above, we have seen 35 specimens from the following localities: **BRAZIL. Amazonas**. Male, São Paulo de Olivença, M. de Mathan (MNHP). **COLOMBIA.** female, Steinheil (MNHP). **COSTA RICA. Alajuela**. Male, Peñas Blancas, 800-870 m., 19.V.1989, J.S. Ashe, R.E. Brooks, & R. Leschen (SEMC). **Guanacaste**. Est. Pitilla, 9 km. s. de Santa Cecilia, 700 m., C. Moraga: female, IV.1995 (CASC); female, III.1991 (CASC); female, IV.1994 (CASC). **Heredia**. Female, La Selva, 80 m., ex. misc. mushrooms, 18.V.1993, J. & A. Ashe (SEMC). Male, female, La Selva, nr. Pto. Viejo, 50 m., 19.II.1980, H. & A. Howden (UASM). **Limon**. Female, Est. Hitoy Cerere, R. Cerere, Res. Bio. Hitoy Cerere, 100 m., 13.IV.1992, G. Carballo (CASC). 2 males,

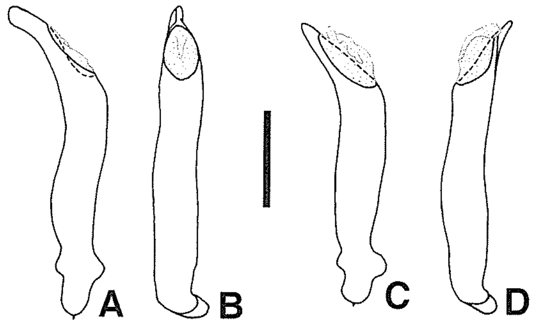

Figure 30. Line drawings of male genitalia, median lobe, of *Stenognathus (Pristolomus) dentifer* (Chaudoir), from various localities— **A** and **C**, dorsal aspect; **C** and **D**, left lateral aspect. **A-B**, Costa Rica; **C-D**, Peru. Scale bar = 1.0 mm.

Hamburgfarm 15.VIII.1925 & 4.XI.1925 (USNM). Female, Hamburgfarm, Reventazon, 25.XI.1937, F. Nevermann (USNM). **Puntarenas**. Est. Sirena, Corcovado N.P., 0-100 m., G. Fonseca: male, IV.1990 (CASC); male, II.1990 (CASC). Male, Las Cruces, VII.6.1977, E.A. Sudgen (UCDC). **ECUADOR. Napo**. 2 males, 6 females, Limoncocha, 100 m., ex. bracket fungi on stump, 19-29.IV.1979, H. Frania (UASM). **Sucumbios**. Sacha Lodge, 0°28'14"S 76°27'35"W, 270 m., ex fungus covered log, R.E. Brooks: female, 23.III.1999 (SEMC); male, female, 24.III.1999 (SEMC). **PANAMA. Canal Zone**. Female, Barro Colorado I., K.W. Cooper (MCZ). Male, Barro Colorado I., in rotten log, 25.V.1972, R.T. Allen (USNM). **Darien**. Female, Cana Biological Station, 7°45'18"N 77°41'16"W, 500-550 m., ex. fogging fungus-laden log, 4.VI.1996, J.S. Ashe & R.E. Brooks (SEMC). **PERU. Loreto**. 1.5 km. n. Teniente Lopez, 2°35.66'S 76°06.92'W, 210-240 m., R. Leschen: 2 females, ex. *Favolus hexagonalis*, 18.VII.1993 (SEMC); 2 males, ex. fogging fungus-laden log, 26.VII.1993 (SEMC). **Madre de Dios**. Male, 15 km. n.e. Puerto Maldonado, Reserva Cuzco Amazonica, 12°33'S 6903'W, 200 m., ex. fungus covered log, 24.VI.1989, R.A. Leschen (SEMC).

Months of collection. February-August, and November.

Nomen dubium
Stenognathus cayennensis (Buquet)

Anchomenus cayennensis Buquet 1835:619.
Stenognathus cayennensis Lacordaire 1854:349. Gemminger and Harold 1868:366. Csiki 1932:1352.

Type material. Not seen

Type area. Environs of Cayenne, French Guiana.

Taxonomic notes. The original description of this species, probably based on a single specimen, records the obliquely truncate apices of the elytra. In other features mentioned, this specimen fits *Stenognathus*. Further, Buquet compared the type specimen with *Anchomenus melanarius* Dejean, type species of *Stenognathus*. So, we agree with Lacordaire (1854:349) that *A. cayennensis* likely is a member of *Stenognathus*. Nonetheless, this species was not included in *Stenognathus*, either with the description of this genus (Chaudoir 1843:421) or with its treatment in the revision of the Thyreopterides (Chaudoir 1869a:115-119).

The junior author failed to find the type material of *A. cayennensis* in the Oberthür-Chaudoir collection (MNHP) among the specimens of *Stenognathus* or *Anchomenus*, or in the "Magazin" boxes. Other Buquet types of Carabidae are in this magnificent collection, so it is reasonable to expect the specimen in question to be there, too. Against this expectation must be weighed the fact that Chaudoir did not refer to *A. cayennensis* in his treatment of *Stenognathus*. Perhaps, then, he did not have, and had not seen, the Buquet specimen. Regardless, in the absence of the specimen, we are unable to attach *Stenognathus cayennensis* Buquet to a species, and accordingly we treat this name as a *nomen dubium*.

Genus *Phloeoxena* Chaudoir

Phloeoxena Chaudoir 1869:145.

Type species. *Phloeoxena picta* Chaudoir 1869, designated by Ball 1975:178.

Diagnostic features. Ball (1975a:156) did not specify apotypic features for this genus, which was recognized on the basis of a combination of character states. A comparison was made with *Ochropisus* Bates, but evidence was not found to establish close relationship. Subsequently, we discovered the lateroventral groove on the mandibles, which is putatively apotypic, and is shared by *Phloeoxena auct.* and *Ochropisus*. On the basis of this evidence and the general overall similarity in size and form of the adults of these 2 groups, we combine them in a single genus, but recognize *Ochropisus* as a subgenus. Also, we have recognized a new subgenus of *Phloeoxena (s. lat.)*. For details, see below.

Description. In addition to the features of the mandibles noted above, in order to accommodate the

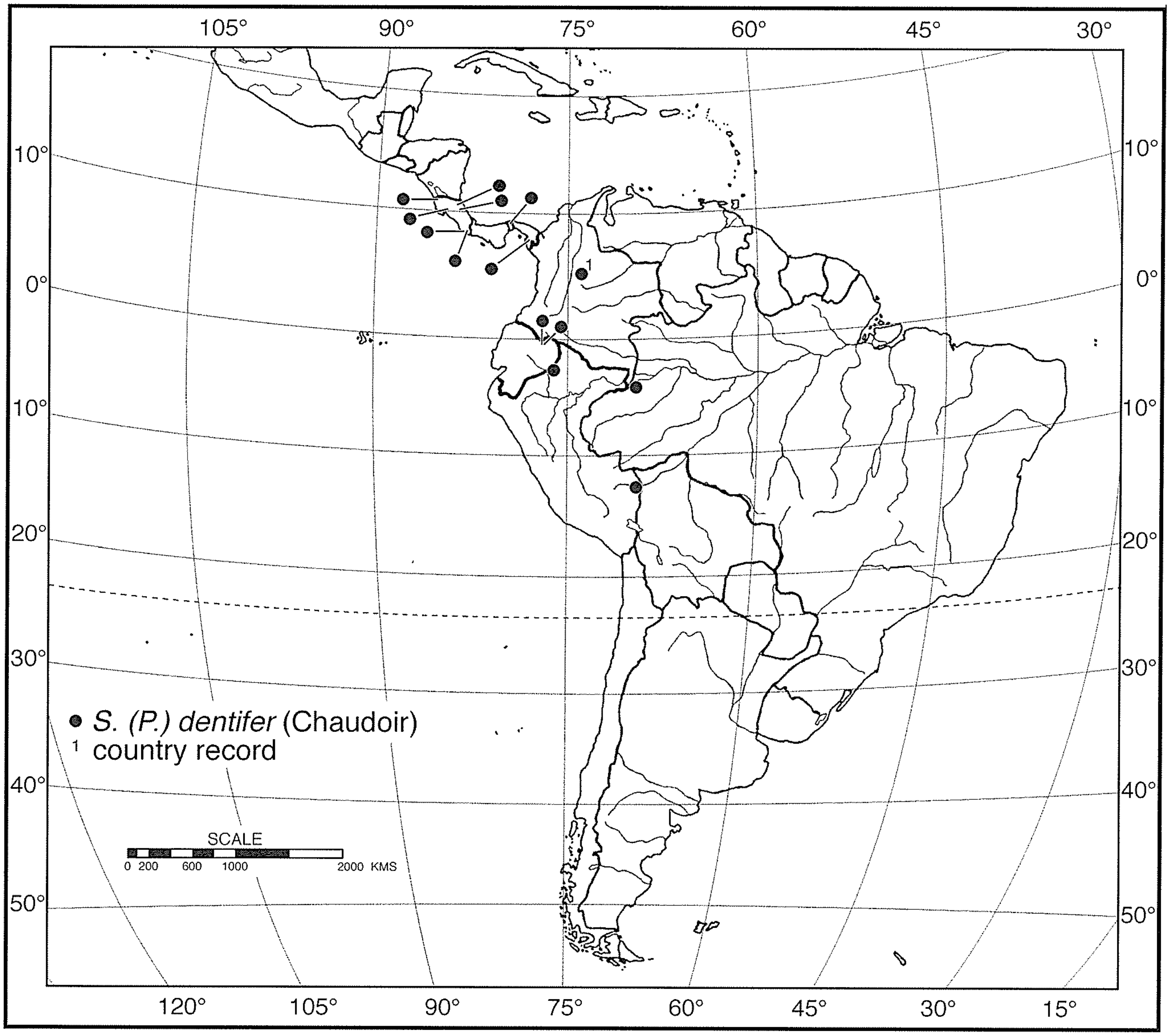

Figure 31. Map of Middle America and South America showing positions of known localities for *Stenognathus (Pristolomus) dentifer* (Chaudoir).

new and transferred subgenera treated below, the description of *Phloeoxena (s. lat.)* provided by Ball (1975a:179) must be emended by expansion, with the following details added: elytral intervals markedly convex, interneurs deep; hind tibiae with dorsal surfaces canaliculate; and male genitalia with median lobe catopic.

Included taxa. The genus *Phloeoxena* includes 5 subgenera and 32 species (Table 12), 11 of which are new, and are described below. The inclusion here of *P. biundata* Steinheil (1875b) confirms that this genus is represented on the South American continent, at least in the northwest. This species was overlooked by Ball (1975a), leading to his erroneous conclusion that *Phloeoxena* was precinctive in Middle America + the West Indies. This treatment increases the known diversity of *Phloeoxena* by about one-third.

Key to species. The following key is organized in part by subgenera, and in part by geography (West Indian species, as a group, in contrast to the mainland species). We would have preferred to use a taxonomic organization, keying subgenera first, but it is not possible to distinguish all specimens of *Phloeoxena (s. str.)* from all those of *Oenaphelox* on the basis of

Table 12. Classification of the Subgenera, species groups, species and subspecies of the genus *Phloeoxena (sensu novo)*.

Subgenus *Tacana* Ball
- *P. herculeano* Ball

Subgenus *Oxephloena*, **new subgenus**
- *P. turrialba*, **new species**

Subgenus *Ochropisus* Bates, **new combination**
- *P. davidsoni*, **new species**
- *P. concolor* (Ball)
- *P. henryi*, **new species**
- *P. nevermanni*, **new species**
- *P. turnbowi*, **new species**
- *P. bembidioides* (Bates)
- *P. caudalis* (Bates)
- *P. lamuralla*, **new species**

Subgenus *Oenaphelox* Ball
- [*P. pluto* species group
  - *P. pluto* Ball][1]
- *P. signata* species group
  - *P. totontepec*, **new species**
  - *P. brooksi*, **new species**
  - *P. ashei*, **new species**
  - *P.* newtoni Ball
  - *P. undata* Chaudoir
  - *P. geniculata* Chaudoir
  - *P. signata* (Dejean)
  - *P. viridis*, **new species**

Subgenus *Phloeoxena (sensu stricto)* Chaudoir
- *P. schwarzi* species group
  - [*P. costata* Darlington]
  - *P. dealata* Darlington
  - [*P. montana* Darlington]
  - [*P. plagiata* Darlington]
  - *P. imitatrix* Darlington
  - *P. schwarzi* Darlington
  - *P. portoricensis* Darlington
- *P. picta* species group
  - *P. megalops* Bates
    - [*P. m. megalops* Bates]
    - *P. m. erwinorum* Ball
    - [*P. m. chiriquina* Bates]
  - *P. limbicollis* Bates
  - *P. nigricollis* Ball
  - *P. picta* Chaudoir
    - *P. picta franiae* Ball
    - *P. picta unicolor* Chaudoir
    - *P. picta picta* Chaudoir
    - *P. picta apicalis* Ball
  - *P. batesi* Ball
  - *P. obscura*, **new species**
  - *P. nitida* **new species**

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[1] Square brackets indicate taxa not treated in this paper.

external features. Dissection of males is required, and since most workers prefer not to do this when making routine identifications, we elected to avoid genitalic features in the key.

Key to Subgenera, Species, and Subspecies of *Phloeoxena* Chaudoir, based on character states of adults

1 Elytron with umbilicate setigerous punctures 17 or more, in more or less continuous row; discal setigerous punctures 3 to 9. Metepisternum approximately quadrate, length of lateral margin and width at base subequal. Dorsal surface concolorous, piceous to rufobrunneous .... *P.* (*Tacana*) *herculeano* Ball, p. 81

1' Elytron with umbilicate setigerous punctures 9 to 15, their row interrupted by 1 or more gaps; discal setigerous punctures 1 to 3. Metepisternum elongate or quadrate. Color of dorsal surface various 2

2(1') Hind tibia with dorsal (outer) surface longitudinally canaliculate (one groove extended length of tibia), *P.* (*Ochropisus* Bates) 6

2' Hind tibia with dorsal surface rounded, not canaliculate 3

3(2') Elytral intervals 1-8 distinctly costate; interneurs narrow, deep; bicolored with piceous complete basal and medial fasciae .... *P.* (*Oxephloena*) *turrialba*, new species, p. 81

3' Elytron with intervals 1-8 either virtually flat, unicolored or bicolored; or if costate, interneurs broad and uniformly piceous or brunneous 4

4(3') Specimen from Greater Antillean West Indies ... 13

4' Specimen from mainland Middle or North America 5

5(4') Elytron with mesh pattern elongate, sculpticells with narrow high keels, linearly arranged 19

5' Elytron with microsculptual mesh pattern isodiametric or slightly transverse, sculpticells without high keels in parallel rows 36

6(2) Elytron unicolored 7

6' Elytron bicolored, with pale apex (some specimens without pronounced contrast) and with or without paler shoulder macula 9

7(6) Sculpticells of elytron distinctively transverse, at least 4 or more times as long as wide. Dorsal surface black. Specimen from Panamá .... *P. turnbowi*, new species, p. 90

7' Sculpticells nearly isodiametric to slightly transverse. Dorsal surface brunneous. Specimen from Costa Rica or México 8

8(7') Sculpticells of elytron nearly isodiametric. Specimen from Costa Rica .... *P. nevermanni*, new species, p. 89

8' Sculpticells slightly transverse, about 2-3 times long as wide. Specimen from México .... *P. concolor* (Ball), p. 85

9(6') Elytral interneurs impunctate .... *P. bembidioides* (Bates), p. 91

9' Elytral interneurs punctulate 10

10(9') Specimen from México or Guatemala 11

10' Specimen from Honduras, or farther south 12

11(10) Elytron with basal portion markedly pale (Fig. 21B), in sharp contrast to dark median fascia; sculpticells of elytron transverse .... *P. henryi*, new species, p. 86

11' Basal portion of elytron dark; sculpticells of elytron nearly isodiametric .... *P. davidsoni*, new species, p. 83

12(10') Interval 7 of elytron with edge rounded over, adjacent to interneur 6; transverse elytral microsculpture with fewer meshes as in Figs. 2A, B. Specimen from Costa Rica or Panamá .... *P. caudalis* (Bates), p. 91

12' Interval 7 of elytron with edge sharp adjacent to interneur 6 (Fig. 22A); transverse elytral microsculpture with more meshes as in Figs. 4D, E. Specimen from Honduras .... *P. lamuralla*, new species, p. 93

13(4) Elytra bicolored, with single large preapical red spot medially. Specimen from Cuba 14

13' Elytra unicolored, piceous to rufopiceous. Specimen from Cuba or other Greater Antillean island 15

14(13) Elytron smooth, without interneurs; discal setae 2 or 3 .... *P.* (*sensu stricto*) *imitatrix* Darlington, p. 102

14' Elytron shallowly striate; discal setae 3 .... *P.* (*sensu stricto*) *plagiata* Darlington

15(13') Elytron with intervals costate, interneurs broad; sculpticells scale-like, flat, not keeled. Specimen from Cuba .. *P.* (*sensu stricto*) *costata* Darlington

15' Elytron with intervals flat, interneurs narrow; microsculpture meshes narrow, sculpticells narrow, more or less keeled longitudinally 16

16(15') Pronotum without lateral setae. Elytron with 2 discal setae. Specimen from Cuba or Hispaniola .... *P.* (*sensu stricto*) *montana* Darlington

16' Pronotum with 2 pairs of lateral setae. Elytron with 3 discal setae 17

17(16') Metepisternum approximately quadrate, length of lateral margin and width at base subequal. Hind wings short stubs. Specimen from Cuba . ... *P.* (*sensu stricto*) *dealata* Darlington, p. 102

17' Metepisternum elongate, length of lateral margin distinctly more than width at base 18

18(17') Elytron with interneur 7 indicated posteriorly. Specimen from Hispaniola .... *P.* (*sensu stricto*) *schwarzi* Darlington, p. 103

18' Elytron smooth, interneurs not indicated. Specimen from Puerto Rico .... *P.* (*sensu stricto*) *portoricensis* Darlington, p. 103

19(05) Elytron without anterior discal seta 20

19' Elytron with anterior discal seta 21

20(19') Metepisternum approximately quadrate, length of lateral margin and width at base subequal. Hind wings short stubs .... *P.* (*sensu stricto*) *batesi* Ball (in part), p. 109

20' Metepisternum elongate, length of lateral margin distinctly more than width at base .... *P.* (*sensu stricto*) *limbicollis* Bates, p. 105

21(19') Metepisternum approximately quadrate, length of lateral margin and width at base subequal. Hind wings short stubs 22

21' Metepisternum elongate, length of lateral margin distinctly more than width at base 31

22(21) Elytra unicolored, piceous or brunneous 23

22' Elytra bicolored, fasciate 25

23 (22) Eyes more bulged (ratio Hw/Fw=1.671-1.778). Specimen from state of Chiapas, México .... *P.* (*sensu stricto*) *picta unicolor* Chaudoir (in part), p. 108

23' Eyes less bulged (ratio Hw/Fw = 1.316-1.559); specimen from locality other than above 24

24(23') Size larger, SBL 5.80-6.76 mm. Specimen from Honduras .... *P.* (*Oenaphelox*) *brooksi*, new species, p. 95

24' Size smaller, SBL 4.44-5.32 mm. Specimen from state of Oaxaca, México .... *P.* (*Oenaphelox*) *totontepec*, new species, p. 94

25(22') Elytron with only anterior fascia, represented as 4 short longitudinal pale patches .... *P.* (*sensu stricto*) *picta unicolor* Chaudoir (in part), p. 108

25' Elytron with both anterior and posterior fasciae. 26

26(25') Elytron with fascia indistinctly developed, slightly paler than disc; apex of elytron shiny. Specimen from México .... *P. (sensu stricto) obscura*, new species, p. 111

26' Elytron with both fasciae distinct, anterior fascia complete or not 27

27(26') Elytron with fasciae well developed, sharply delimited; apex of elytron dull. Specimen from Honduras ....*P. (Oenaphelox) ashei*, new species, p. 97

27' Elytron with both anterior and posterior fasciae extended to suture *P. (sensu stricto) picta* Chaudoir (in part) 28

28(27') Elytron with posterior fascia apical, anterior fascia represented by slightly indicated line of 3 pale marks; femora pale ... *P. p. apicalis* Ball, p. 108

28' Elytron with posterior fascia preapical, anterior fascia complete or nearly so, distinct 29

29(28') Elytron with shiny area at apex. Specimen from eastern México, Guatemala, or Honduras .... *P. batesi* Ball (in part), p. 109

29' Elytron without shiny area apically. Specimen from Guatemala or México 30

30(29') Head and pronotum dull; elytral vermiculations broader, parasutural spot present or absent.... .... *P. p. picta* Chaudoir, p. 108

30' Head and disc of pronotum shiny; elytral vermiculations narrower, parasutural spot absent .... *P. p. franiae* Ball, p. 107

31(21') Elytron with anterior and posterior fasciae not joined toward suture ....*P.* (*sensu stricto*) *nigricollis* Ball, p. 105

31' Elytron with anterior and posterior fasciae broadly joined toward suture; elytra together with cruciate pattern 32

32(31') Eyes less bulged, not as prominent (Hw/Fw = 1.714) .... *P.* (*sensu stricto*) *nitida*, new species, p. 110

32' Eyes bulged, very prominent (Hw/Fw = 2.00-2.34) 33

33(32') Pronotum bicolored, predominantly flavous or testaceous. Geographical range: northwestern South America .... *P.* (*sensu stricto*) *biundata* Steinheil, p. 104

33' Pronotum black. Geographical range: Middle America, Panamá to southern México, *P.* (*sensu stricto*) *megalops* Bates 34

34(33') Elytron subapically with shiny area; elytral microsculpture meshes isodiametric subapically (shiny area).......... *P. m. erwinorum* Ball, p. 103

34' Elytron without shiny area subapically; elytral microsculpture elongate subapically 35

35(34') Elytron with anterior and posterior fasciae of about equal width; anterior margin of anterior fascia markedly irregular .... *P. m. megalops* Bates

35' Anterior fascia much wider than posterior one; anterior margin of anterior fascia more or less a regular oblique line from suture to about point of interneur 6 .... *P. m. chiriquina* Bates

36(05') Metepisternum approximately quadrate, length of lateral margin and width at base subequal. Hind wings short stubs .... *P. newtoni* Ball, p. 99

36' Metepisternum elongate, length of lateral margin distinctly more than width at base 37

37(36') Pronotum flavous or predominantly flavous with dark median spot or stripe. Elytra unicolored or bicolored ....*P. signata* (Dejean), p. 100

37' Pronotum dark, same as ground color of elytra.... 38

38(37') Elytron bifasciate, fasciae not extended to suture .... *P. undata* Chaudoir, p. 100

38' Elytron unicolored 39

39(38') Dorsal surface black. Specimen from Panamá ... . *P. pluto* Ball

39' Dorsal surface brunneous, piceous, or dark green, not black 40

40(39') Dorsum shiny, with slight metallic green reflection .... *P. viridis*, new species, p. 101

40' Dorsum silky, apex of elytra silky, without metallic reflection .... *P. geniculata* Chaudoir, p. 100

Subgenus *Tacana* Ball

Figs. 7A-H, 32A-D, and 34

Phloeoxena (Tacana) Ball 1975:182.

Type species. *Phloeoxena herculeano* Ball 1975a:182 (original designation and monotypy).

Structural features. See Ball (1975), for details. Here we note the mandibles (Figs. 7A-H), details of which are recorded in Table 2, and in discussion of terms, above. Also, Figs. 32A-D illustrate the biseriate squamo-setae of the fore tarsi of males of subgenus *Tacana*.

Included species. This monobasic subgenus includes only *Phloeoxena herculeano Ball.*

Taxonomic note. This subgenus was postulated to represent the group closest to the ancestral stock of *Phloeoxena* (Ball 1975a: 233). Interestingly, adults of this subgenus have the least modified mandibles, in that the lateroventral groove is very small (**lvg**, Figs. 7E, F); thus, the lateroventral ridge is hardly interrupted.

Phloeoxena herculeano Ball

Phloeoxena herculeano Ball 1975a:182

Type locality. Volcan Tacaná, Chiapas, México.

Habitat. Tropical lower montane forest and cloud forest, at altitudes between 1700 and 3100 m.

Geographical distribution (Fig. 34). This species is known only from the Sierra Madre de Chiapas, in eastern Chiapas, México, and western Guatemala.

Material examined. In addition to material reported previously, we have seen 3 specimens, as follows: **GUATEMALA. San Marcos.** Male, Sivinal, 2620 m., cloud forest, leaf litter, under rocks, 31.XII.1976, H.E. Frania, D.L.C. Procter (UASM). **MEXICO. Chiapas.** Male, Union Juarez, n.e. slope Volcan Tacaná, Sumidero San Antonio, 1760m., tropical montane forest, leaf litter, logs, 17.XII.1975, H.E. Frania, J. Belicek (UASM). Male, Union Juarez, n.e. slope Volcan Tacaná, Pico Gallo, 1700 m., tropical montane forest, leaf litter, seepage area, 20.XII.1975, H.E. Frania, J. Belicek (UASM).

Month of collection. December.

Subgenus *Oxephloena*, new subgenus

Type species. *Phloeoxena turrialba*, new species (here designated).

Subgeneric name. This name is an anagram based on the generic name *Phloeoxena*.

Recognition. See the key and treatment of *Phloeoxena turrialba,* below.

Phylogenetic relationships. Based on its broad lateroventral mandibular grooves, narrow, deep elytral interneurs, and anopic median lobe, this subgenus is best interpreted as one lineage of a trichotomy including also the subgenera *Ochropisus and Oenaphelox + Phloeoxena (sensu stricto).*

Included species. The subgenus is monobasic, including only *P. turrialba*, new species.

Taxonomic note. The basis for recognizing this subgenus is that the characteristics of the species included form a pattern that is not accommodated within the other subgenera of *Phloeoxena.*

Phloeoxena (Oxephloena) turrialba, new species

Figs. 7I-P, 11, 13F -J, 33, 34, and 36A

Type material. One specimen, HOLOTYPE female, labelled: "Turrialba/ Costa Rica/ Heyne V."; "specimen illustrated/ by D. Hollingdale/ 1998"; "Zool. Mus./ Berlin " [MNHB].

Type locality. Turrialba, Cartago Province, Costa Rica.

Specific epithet. A Latinized noun in apposition, based on the name of the town indicated as type locality of this species.

Recognition. This is the only known species of *Phloeoxena* with lateral margins slightly angulate near insertions of mediolateral setigerous punctures, and basal and lateral elytral intervals markedly convex. The sculpticells on the head are relatively large, with microlines rather deeply impressed.

Description. Habitus as in Fig. 33. SBL 3.48 mm.

Color. Head and pronotum piceous; elytra brunneous with dark testaceous fasciae and lateral margins (Fig. 36); abdomen dark brunneous. Antennae, mouthparts and legs dark testaceous.

Microsculpture. Head and pronotum with meshes isodiametric, except slightly transverse on pronotal disc; elytral meshes nearly isodiametric, sculpticells flat.

Luster. Shiny.

Head. Eyes moderately bulged (ratio Hw/Fw = 1.818).

Mouthparts. Labrum and maxillae average for *Phloeoxena.* Mandibles as in Figs. 7I-P. Labium as in Fig. 11.

Prothorax. Pronotum with disc moderately convex; lateral margins sinuate anteriad posteriolateral angles.

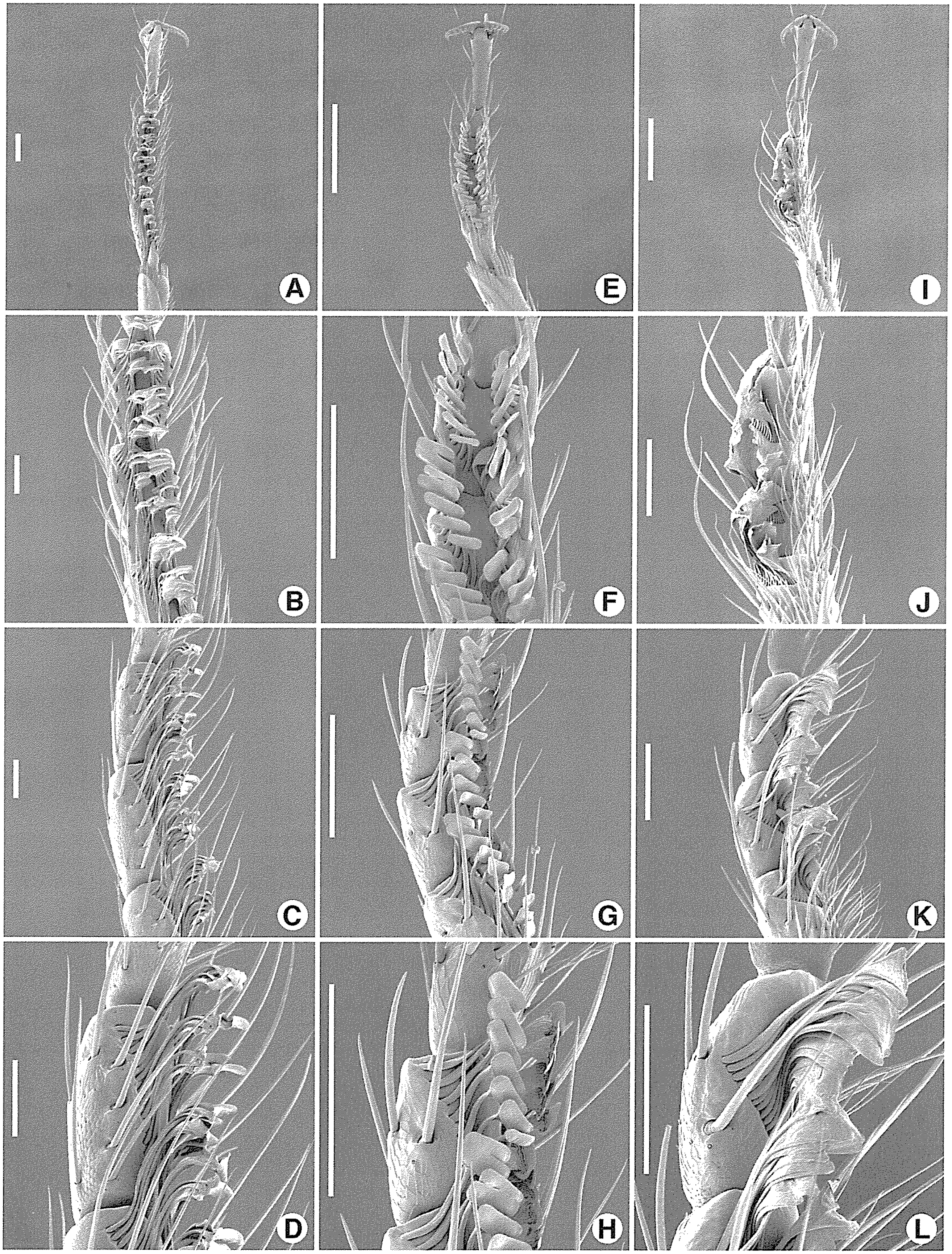
Pterothorax. Metepisternum elongate, lateral margin longer than width at base.

Elytra. Intervals 4-8 costate,1-3 flat from half-way to near apex of elytron; disc with 3 setigerous punctures in interval 3.

Hind wings. Fully developed.

Abdominal sterna. Average for genus *Phloeoxena.*

Male genitalia. Not known.


A
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I
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Ovipositor (Figs. 13F-J). Stylomere 2 with basal lobe long, narrow; subapical setose organ (Fig. 13H) with furrow narrow, furrow pegs 2, nematiform setae absent.

Habitat. Unknown.

Geographical distribution (Fig. 34). This species is known only from the type locality in east central Costa Rica.

Chorological affinities. No other species of *Phloeoxena* has been recorded from the above locality, but this species probably is sympatric with one or more of the species of the other subgenera of *Phloeoxena* that inhabit Costa Rica.

Material examined. Holotype only. For details, see above.

Subgenus *Ochropisus* Bates, new status

Ochropisus Bates 1883:176.

Type species. *Ochropisus caudalis* Bates 1883 (subsequent designation, by Ball 1975a:163).

Recognition. Adults of this subgenus are recognized readily by relatively small body size, elytra with humeri broadly rounded, intervals broad, only slightly convex or flat, and interneurs narrow, hind wings fully developed, and middle and hind tibiae with the dorsal surfaces canaliculate. Near the posterior margin of abdominal sternum VII males have 2 setae, females four. Males have biseriate adhesive vestiture on fore tarsomeres 1-3, median lobe of the genitalia catopic, preapical orifice (Fig. 39D, **po**) with the dorsoapical area submembranous (Figs. 39B-C, **dam**). We have not seen males of all species, but we assume the catopic median lobe is universal within the subgenus.

Description. For details, see Ball (1975a:163).

Included species (Table 12). Including those described below, this subgenus contains 8 species. We have not attempted a phylogenetic analysis, but the species are grouped in a sequence that might be near to natural, beginning with western Mexican *P. davidsoni*, the only species exhibiting elytra with an isodiametric mesh pattern and with the pronotal base narrow, and ending with the Lower Central American triplet *P. bembidioides*, *P. caudalis*, and *P. lamuralla*, with sharply bicolored elytra and the pronotal base broad.

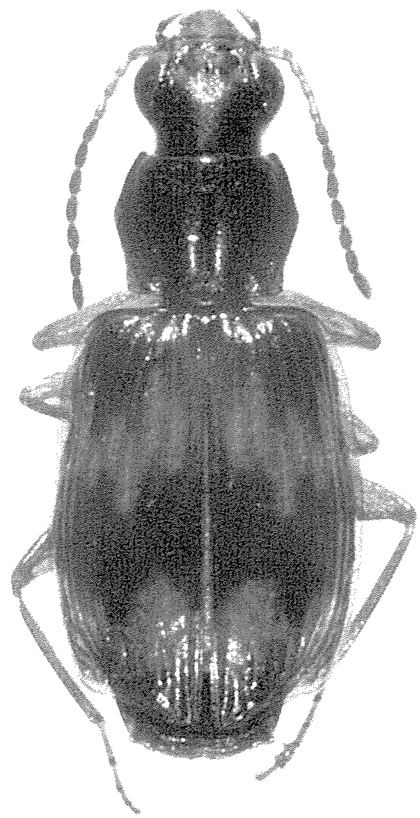

Figure 33. Photograph illustrating habitus, dorsal aspect, of *Phloeoxena (Oxephloena) turrialba*, new species. Holotype female, SBL = 3.48 mm; Turrialba, Costa Rica [ZMHB].

Phloeoxena (Ochropisus) davidsoni, new species
Fig. 40

Type material. One specimen, HOLOTYPE female, labelled: "MEXICO: Guerrero/ 15 km NW El Paraiso/ At edge of stream/ 1190 m. 9 Aug 1986/ J.Rawlins,R.Davidson" [CMNH].

Type locality. Fifteen kilometers northwest of El Paraiso, state of Guerrero, México.

Figure 32. SEM photographs of fore tarsi of males of *Phloeoxena (s. lat.)*, showing adhesive vestiture. **A**, **E**, and **I**, apex of left tibia, tarsomeres 1-5, and claws, ventral aspect; **B**, **F**, and **J**, tarsomeres 1-4, ventral aspect; **C**, **J**, and **K**, tarsomeres 2-4 (and basal part of 5), lateral aspect; **D**, **H**, and **L**, tarsomere 2 (parts of 1 and 3), lateral aspect. **A-D**, *P. (Tacana) herculeano* Ball; **E-H**, *P. (Ochropisus) caudalis* (Bates); and **I-L**, *P. (s. str.) limbicollis* Bates. Scale bars: A, E, and **I** = 200 μm.; **B-D**, **F-H**, and **J-L** = 100 μm.

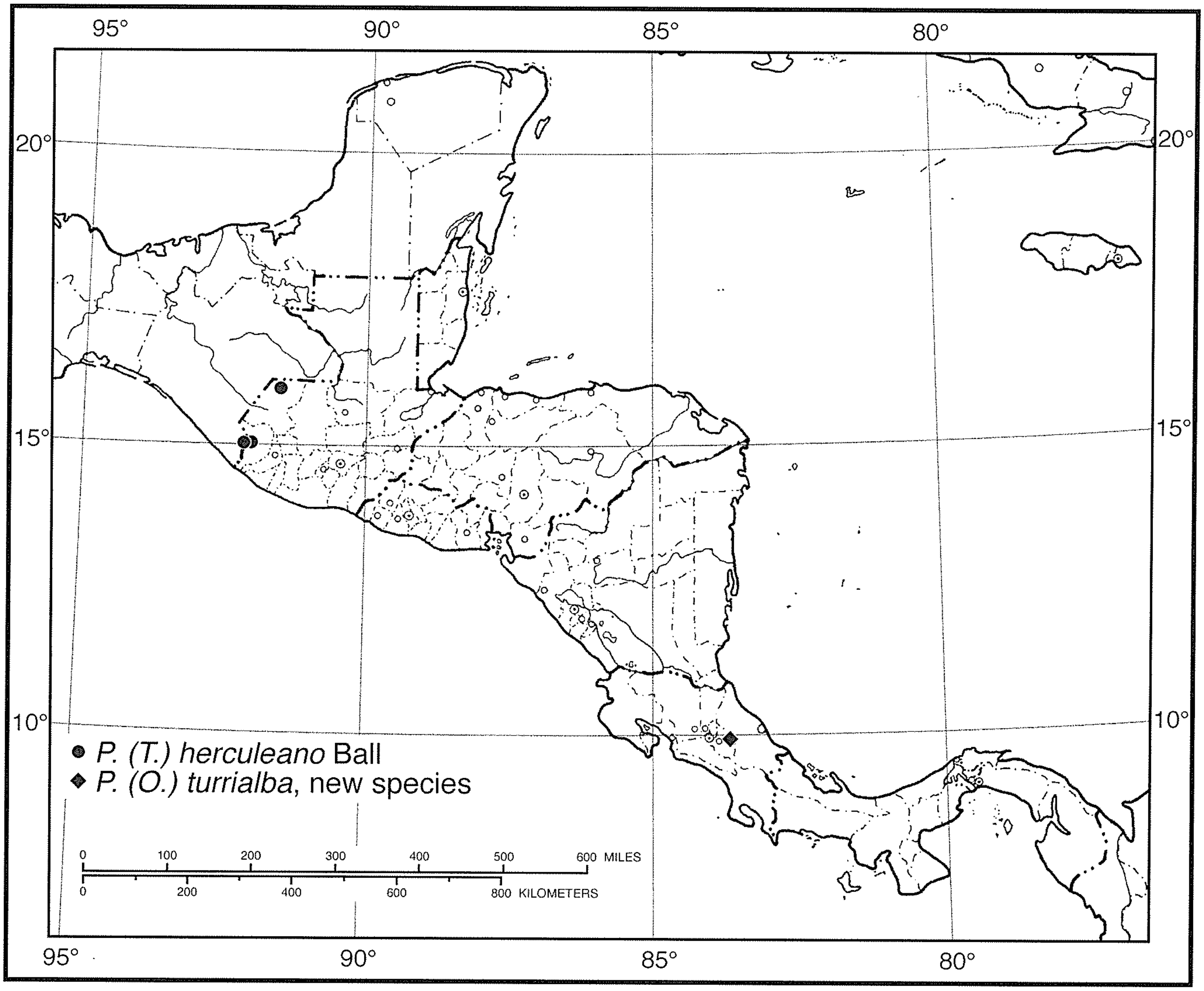

Figure 34. Map of central part of Middle America showing positions of known localities for the species of *Phloeoxena*, subgenus *Tacana* Ball, and *Oxephloena*, new subgenus.

Specific epithet. A Latinized genitive masculine eponym, based on the surname of Robert L. Davidson, Carnegie Museum of Natural History, who collected the holotype of this species.

Recognition. This is the only known species of *Ochropisus* with a nearly isodiametric mesh pattern of microsculpture on the elytra. Additionally, the pronotum is relatively narrow at base.

Description. With character states of subgenus *Ochropisus*, restricted or amplified as follows. SBL of female 3.80 mm.

Color. Head and pronotum brunneous; elytra bicolored, brunneous with median preapical testaceous spot; ventral surface brunneous, abdominal sterna paler. Antennae, mouthparts and appendages testaceous.

Microsculpture. Elytral mesh pattern nearly isodiametric.

Pronotum. Narrow (Hw/Pwm = 0.786); base relatively narrow (Pwb /Pwm = 0.857), slightly convex.

Elytra. Intervals flat, with only a few punctulae near base.

Male genitalia. Not known.

Habitat. Probably tropical lower montane forest (altitude of collection, 1190 m.).

Geographical distribution (Fig. 40). This species is known only from the type locality in southwestern México.

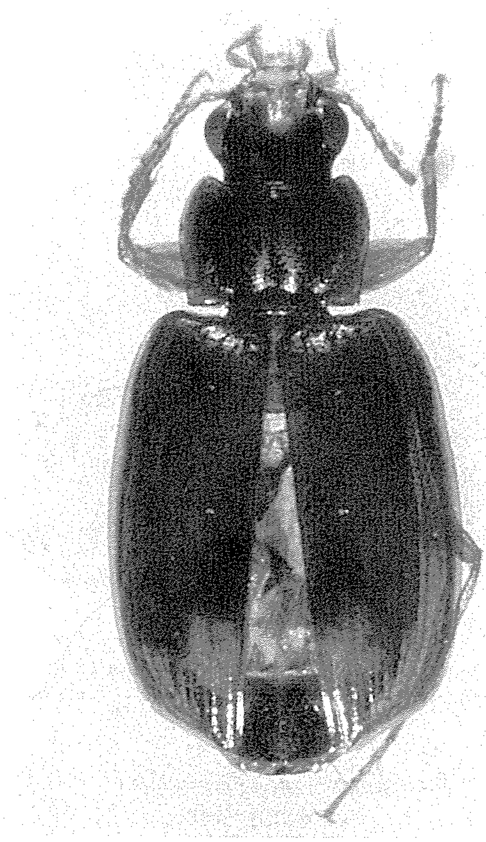

Figure 35. Photograph illustrating habitus, dorsal aspect, of *Phloeoxena (Ochropisus) caudalis* (Bates), male, SBL = 3.96 mm; Canal Zone, Panama (USNM).

Chorological affinities. The only other species of *Ochropisus* recorded from Guerrero is *O. concolor* Ball, but it occurs on the opposite (northern) side of the Sierra Madre del Sur.

Material examined. Holotype only. See above, for details.

Month of collection. August.

Phloeoxena (Ochropisus) concolor (Ball), new combination

Fig. 40

Ochropisus concolor Ball, 1975a: 165.

Type locality. Mexico, State of Morelos, Cañon de Lobos, ca. 7 km. east of Cuernavaca.

Descriptive notes. Dorsal surface unicolorous, brunneous, except paler lateral margins of pronotum and elytra. Pronotal base relatively broad (PWb/Pwm: mean 0.889, range 0.864-0.949). Male genitalia with apical portion of median lobe broad in dorso-ventral and lateral planes; apex broadly rounded (Ball 1975a:167, Figs. 39A, B).

Habitat. Oak-pine forest, at altitudes between 1200 and 1900 m.

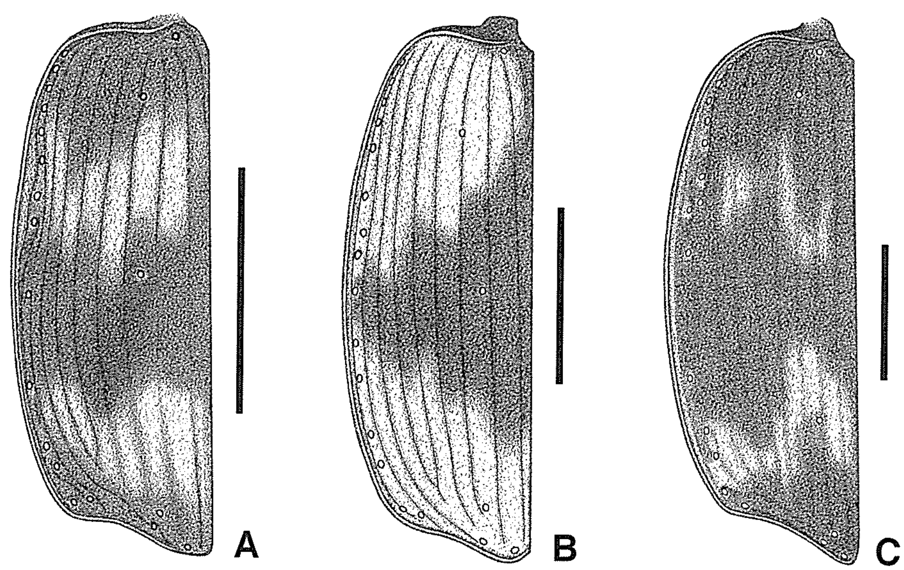

Figure 36. Line drawings of left elytron of new species of *Phloeoxena* Chaudoir. **A**, *P. (Oxephloena) turrialba*; **B**, *P. (Ochropisus) henryi*; and **C**, *P. (Oenaphelox) ashei*. Scale bars = 1 mm.

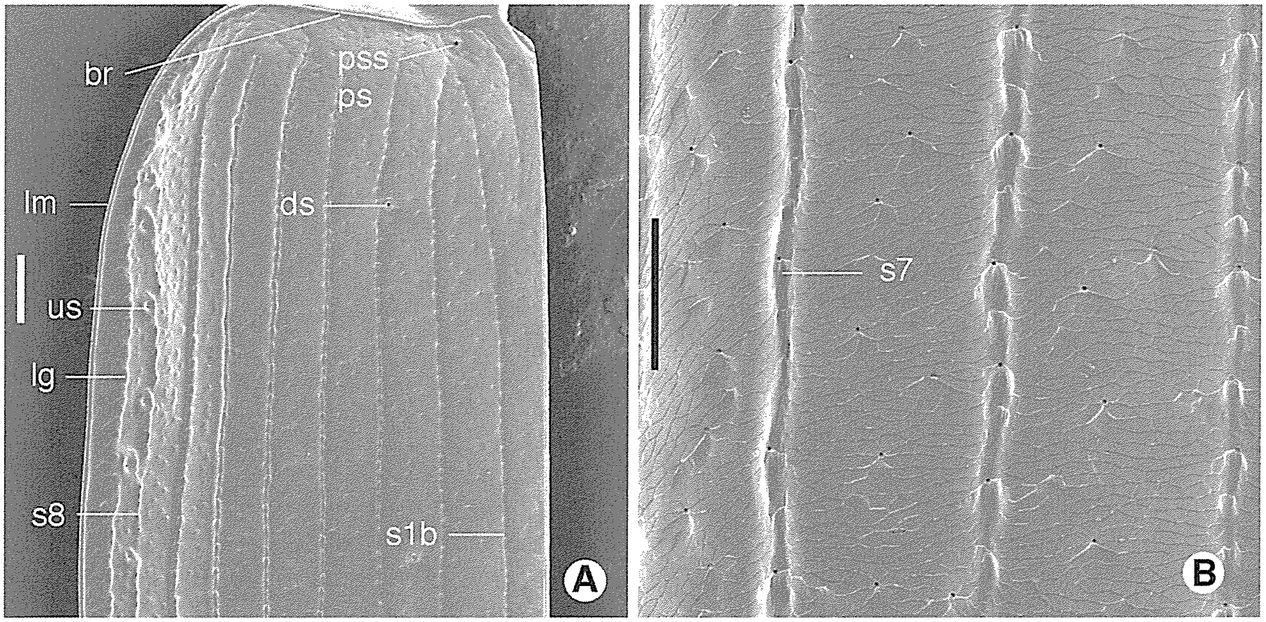

Figure 37. SEM photographs of left elytron, dorsal surface, showing form, striation, and microsculpture, of *Phloeoxena (Ochropisus) lamuralla*, new species. **A**, elytron, basal portion; **B**, macro- and microsculpture of lateral discal area. Scale bars: A = 200 µm.; B = 100 µm. Legend: **br**, basal ridge; **ds**, discal setigerous puncture; **lg**, lateral groove; **lm**, lateral margin; **ps**, parascutellar interneur; **pss**, parascutellar setigerous puncture; **s1b**, interneur 1, apical portion; **s7**, interneur 7; **s8**, interneur 8; and **us**, umbilical setigerous puncture.

Geographical distribution (Fig. 40). Previously known only from the type locality, the following records show that it is fairly widely distributed in Western México, ranging from central Sonora southward to northeastern Guerrero.

Phylogenetic relationships. This species is regarded as relatively primitive because of the broad though transverse sculpticells of the elytra. The remaining species of the subgenus *Ochropisus* have a transverse mesh pattern also, but the sculpticells are narrower.

Material examined. In addition to the type material reported previously, we have seen 5 specimens, from the following localities: **MEXICO. Colima**. Male, female, vic. El Terrero, 4.X.1992, R. H. Turnbow (RHTC). **Guerrero**. Female, 22 km. n. Taxco, 27.VII.1987, R.H. Turnbow (RHTC). **Nayarit**. Female, 33 km. s.e. Tepic, Rte. 15, 1270 m., oak-pine forest, U-V light, 20-21.VII.1993, S. McCleve, G.E. & K.E. Ball (UASM). **Sonora**. Male, Yecora, [ca. 1900 m.], 20-22.V.1961, Gibson, Howden, & Martin (CNCI).

Months of collection. May, July, and October.

Phloeoxena (Ochropisus) henryi, new species

Figs. 36B, 38A, E-F, and 40

Type material. 2 specimens, as follows. HOLOTYPE male, labelled: "MEXICO Chiapas/ Volcán Tacana/ ex bromeliads/ 5000'/ 21.XII.1976 "; "H.E. Frania/ D.L.C. Procter/ collectors" [USNM]. PARATYPE male, labelled: "MEXICO, Chiapas/ Union Juarez, n.e. slope/ Volcan Tacana, ex. small/ bromeliads, Pinus,/ ele. 1650 m., 26 DEC 1975"; "1975.MEX.EXP./ H.E. Frania,/ J. Belicek,/ COLLECTORS" [UASM].

Type locality. Northeast slope of Volcan Tacaná, state of Chiapas, México.

Specific epithet. A Latinized genitive eponym, based on the given name of Henry E. Frania, Royal Ontario Museum, in recognition of his persistence, enthusiasm, and effectiveness in collecting Neotropical Carabidae, including the only known specimens of this species.

Recognition. Adults of this species and those of *P. (O.) bembidioides* are the only known species of *Ochropisus* with bicolored elytra (Fig. 21B), with the basal and apical areas broadly pale, separated by the

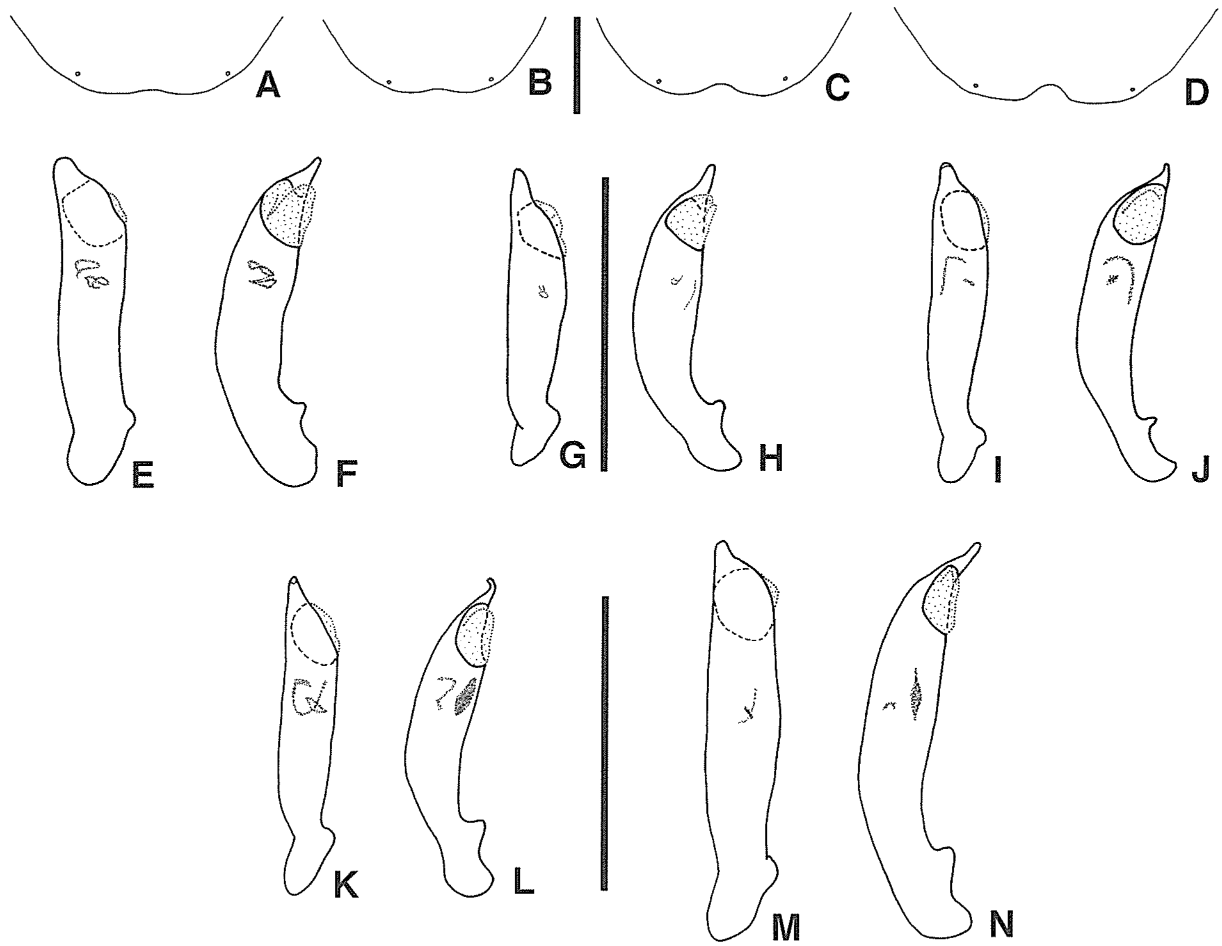

Figure 38. Line drawings of structural features of species of *Phloeoxena (Ochropisus)*. **A-D**, abdominal sternum VII, outline of posterior margin, ventral aspect, of: **A**, *P. henryi*, new species; **B**, *P. bembidioides* (Bates); **C**, *P. caudalis* (Bates); and **D**, *P. lamuralla*, new species. **E-L**, male genitalia, median lobes— **E**, **G**, **I**, **K**, and **M**, dorsal aspect, and **F**, **H**, **J**, **L**, and **N**, left lateral aspect, of, respectively: **E-F**, *P. henryi*, new species; **G-H**, *P. nevermanni*, new species; **I-J**, *P. bembidioides* (Bates); **K-L**, *P. caudalis* (Bates); and **M-N**, *P. lamuralla*, new species. Scale bars: **A-D** = 0.5 mm.; **E-N** = 1 mm.

dark medial fascia. The microsculptual mesh pattern of the pronotum of *P. henryi* is slightly but distinctly transverse, but the pattern for *P. bembidioides* is isodiametric. The pronotum of *P. henryi* is narrow, with width of base distinctly less than maximum width. The elytral intervals of *P. henryi* are flat, while those of *P. bembidioides* are slightly but distinctly convex. For males, the apical portion of the median lobe (Fig. 38E) in dorsal aspect is broad for *P. henryi*, with apical margin broadly rounded; for *P. bembidioides*, the apical portion (Fig. 38IJ) is narrower, and the apical margin is narrowly rounded.

Description. With character states of subgenus *Ochropisus,* restricted or amplified as follows. Average SBL of males 4.30 mm. (4.08-4.52).

Color. Head and pronotum brunneous; lateral margin of pronotum testaceous; elytron (Fig. 36B) bicolored, base and apex testaceous, central area brunneous; ventral surface brunneous except elytral epipleuron testaceous and abdominal sterna diffusely paler medially. Antennae, mouthparts and appendages testaceous.

Luster. Moderately shiny.

Microsculpture. Pronotal mesh pattern slightly but distinctly transverse. Elytral mesh pattern transverse, sculpticells narrow.

Pronotum. Narrow (Hw/Pwm = 0.781-0.821), base relatively narrow (Pwb /Pwm = 0.825-0.857); disc slightly convex.

Elytra. Intervals flat, sparsely punctulate in basal 0.5.

Hind wings. Fully developed.

Abdominal sterna. Sternum VII (Fig. 38A) of male shallowly emarginate medially at apex; with 1 pair of preapical setae.

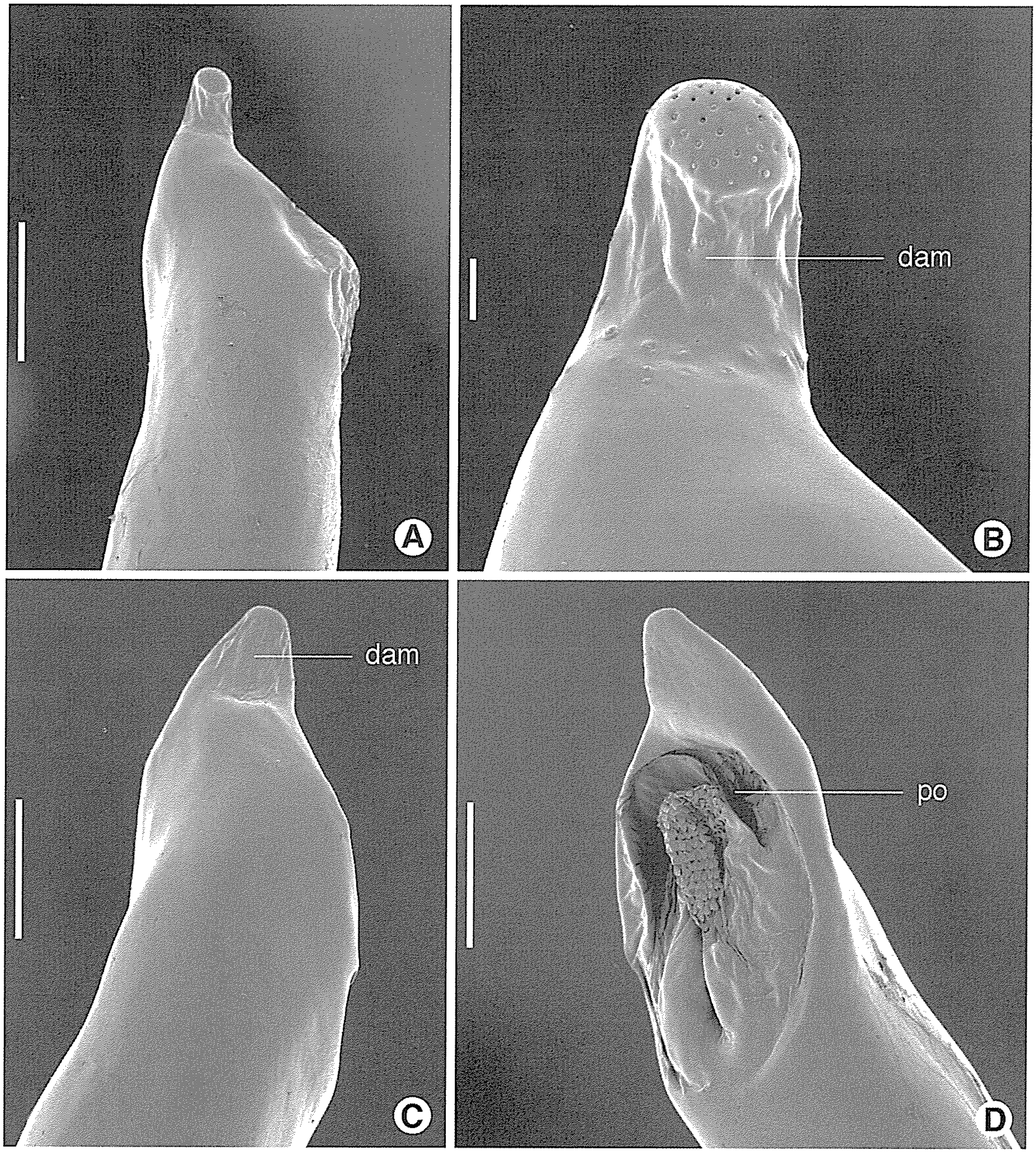

Figure 39. SEM photographs of male genitalia, median lobes, apical portion of species of *Phloeoxena (Ochropisus* Bates). **A-B**, respectively, dorsal aspect, apical 1/3 and apical portion of median lobe, of *P. caudalis* (Bates). **C-D**, median lobe, apical 1/3, dorsal and ventral aspects, respectively, of *P. lamuralla*, new species. Scale bars: **A**, **C**, and **D** = 100 μm.; **B** = 10 μm. Legend: **dam**, dorsal apical membranous area; **po**, preapical orifice of median lobe.

Male genitalia (Figs. 38E, F). Median lobe with apical portion moderately long, broadly trianguloid in dorsal aspect, narrower in left lateral aspect.

Habitat. Probably tropical lower montane forest (altitude of collections, 1524 and 1650 m.). The type specimens were in bromeliads, one of these on *Pinus*.

Geographical distribution (Fig. 40). This species is known from the type locality in southern México, only.

Chorological affinities. No other species of *Ochropisus* is recorded from the above locality, nor from adjacent areas in Chiapas. So the species is isolated from all of its putatively potential relatives.

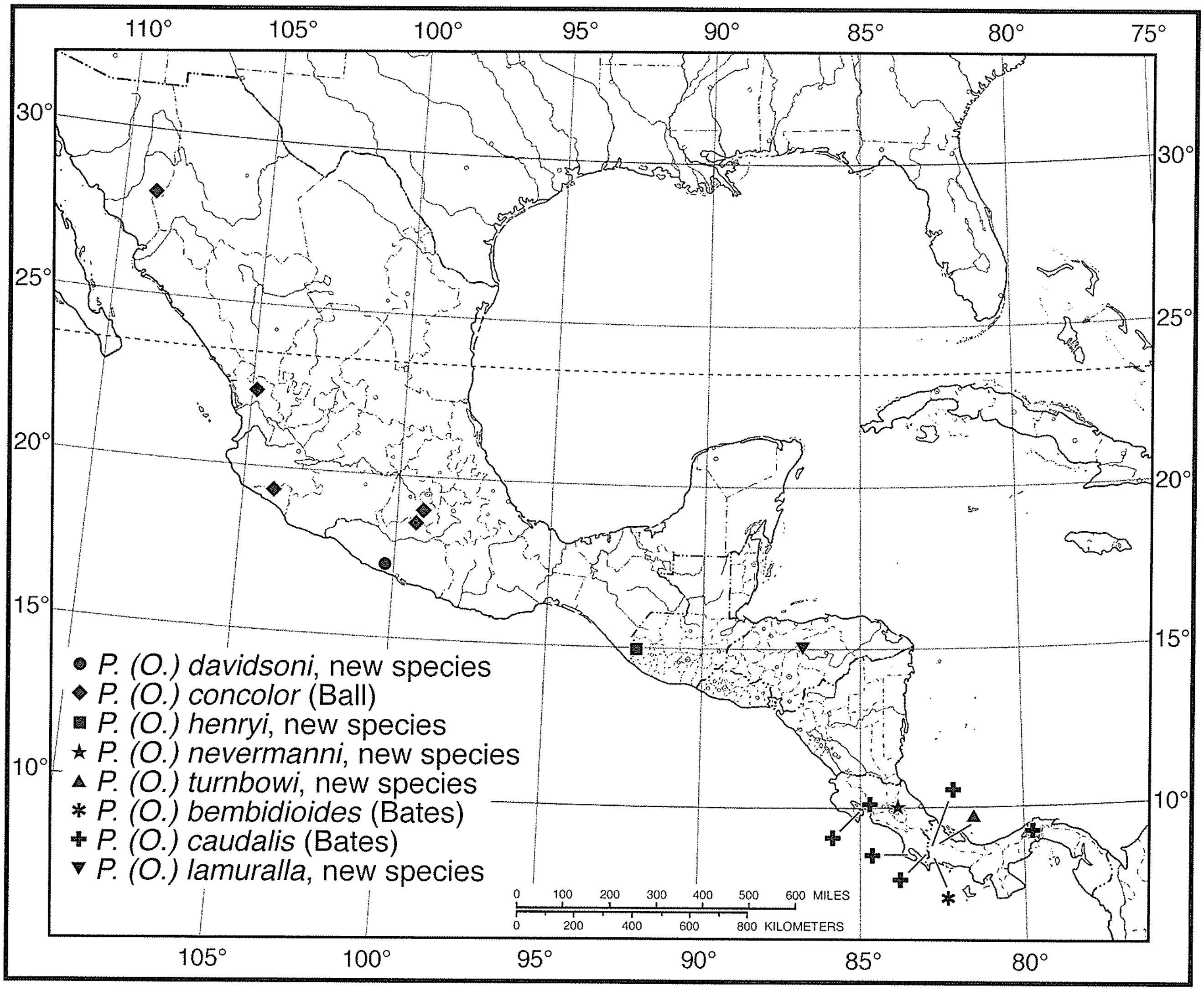

Figure 40. Map of southern U.S.A., Middle America and northernmost South America showing positions of known localities for species of *Phloeoxena (Ochropisus* Bates).

Phylogenetic relationships. Not specified, other than to note that the apical portion of the genitalic median lobe of males of *P. henryi* seems similar to that of *P. concolor*. The seemingly apotypic color pattern of the elytra is similar to that of *P. bembidioides,* but details of the male genitalia do not indicate close relationship. Thus, the similarity in color pattern probably is the result of convergence.

Material examined. Type specimens only. For other details, see above.

Month of collection. December.

***Phloeoxena (Ochropisus) nevermanni,* new species**

Figs. 38G-H and 40

Type material. One specimen, HOLOTYPE male, labelled: "COSTA RICA/ F NEVERMANN/ 23 II 25"; "WESTABHANG/ VULKA IRAZU/ 1500-2000 M;/ Gen.n.sp.,.bei/ Ochropisus Bts./ van Emden det. 1934"; "M +wing"; "ADP/ 07972" [USNM].

Type locality. Western slopes of Volcan Irazu, Costa Rica.

Specific epithet. A Latinized genitive masculine eponym, based on the surname of W. H. F.

Nevermann, who collected the holotype of this species, as well as many other valuable Costa Rican beetles.

Recognition. This species is readily separated from other *Ochropisus* species by the following combination of character states: dorsum brunneous, sculpticells of elytron mostly transverse, though some nearly isodiametric, pronotum relatively narrow, with width of base distinctly less than maximum width, and from a locality in Costa Rica.

Description. SBL of male 3.88 mm.

Color. Head dark brunneous; pronotum and elytra brunneous; ventral surface brunneous, elytral epipleuron paler. Antennae and legs dark testaceous; mouthparts dark testaceous, terminal palpomeres darkened.

Luster. Moderately shiny.

Microsculpture. Elytron with mesh pattern predominantly transverse, relatively wide, some sculpticells approximately isodiametric.

Pronotum. Narrow (Hw/Pwm = 0.815); base relatively narrow (Pwb /Pwm = 0.853); disc slightly convex.

Male genitalia (Figs. 38G-H). Apical portion of median lobe moderately long, approximately trianguloid in dorsal aspect and triangular in left lateral aspect.

Habitat. Probably tropical lower montane forest (site of collection at an altitude between 1500 and 2000 m.).

Geographical distribution (Fig. 40). This species is known only from the type locality in central Costa Rica.

Chorological affinities. No other species of the subgenus *Ochropisus* are recorded from the above locality, though *P. (O). caudalis* is known from Costa Rica. Thus, the ranges of these 2 species may overlap, but both may not occur in the same localities.

Phylogenetic relationships. Not specified. However, if the form of the apical portion of the genitalic median lobe is indicative of relationships, *P. nevermanni* probably is a member of the *bembidioides+caudalis+lamuralla* species complex.

Material examined. Holotype only. For further details, see above.

Month of collection. February.

Phloeoxena (Ochropisus) turnbowi, new species

Fig. 40.

Type material. 2 specimens, as follows. HOLOTYPE female, labelled: "PANAMA: Chiriqui/ Continental Divide Trail/ 3 July 1997/ R. Turnbow" [USNM]. PARATYPE female, labelled: "PANAMA: Chiriqui/ continental divide trail/ 17 May 1996/ R. Turnbow" [RHTC].

Type locality. Near the trailhead of the Continental Divide Trail, Chiriqui Province, Panamá.

Specific epithet. A Latinized genitive eponym, based on the surname of Robert H. Turnbow, Fort Rucker, Alabama, who collected not only the type specimen, but many other interesting carabids that he sent to us for study and determination.

Recognition. This is the only known species of *Ochropisus* with the dorsal surface uniformly piceous in color, except lateral margins of pronotum and elytra paler.

Description. With character states of subgenus *Ochropisus*, restricted or amplified as follows. SBL of female 4.00 mm.

Color. Dorsal surface piceous, lateral margin of pronotum and elytra slightly paler; ventrally piceous except sterna paler medially. Antennae, mouthparts and legs brunneo-testaceous.

Luster. Shiny.

Microsculpture. Elytron: mesh pattern transverse, sculpticells narrow.

Pronotum. Moderately broad (Hw/Pwm = 0.742); base relatively broad (Pwb /Pwm = 0.897-0.947); disc slightly convex.

Elytra. Intervals flat, sparsely punctulate in basal 0.4.

Abdominal sterna. Sternum VII of female with 2 pairs of preapical setae.

Male genitalia. Not known.

Habitat. Probably tropical lower montane forest (site of collection at an altitude of about 1000 m.).

Geographical distribution (Fig. 40). This species is known only from the type locality in northwestern Panamá.

Chorological affinities. No other species of subgenus *Ochropisus* are recorded from the above locality. However, it is not far from localities inhabited by *P. caudalis* and *P. bembidioides*. So, the ranges of these 3 species likely overlap.

Phylogenetic relationships. Not specified, for lack of convincing evidence. However, chorological considerations, dark dorsal color, and elytral microsculpture lead one to imagine that *P. turnbowi* is related to the *bembidioides-caudalis-lamuralla* complex, treated below.

Material examined. Type material, only. For further details, see above.

Months of collection. May and July.

Phloeoxena (Ochropisus) bembidioides (Bates), new combination

Figs. 38B, I-J and 40

Ochropisus bembidioides Bates 1883:176. Ball 1975a:165.

Type material. LECTOTYPE male, labelled: "Type/ H.T. " [circular label, ringed with red]"; " Bugaba, 800-1500 ft./ Champion; B. C. A. Col. I. 1./ Ochropisus/ caudalis,/ Bates"; "Ochropisus/ bembidioides/ Bates [handwritten]"; "LECTOTYPE [red print]/ Ochropisus/ bembidioides Bts" [handwritten]/ By [red print] Erwin 76" [handwritten]; (BMNH).

We have not seen additional type specimens of this species.

Type locality. Panamá, Chiriqui Province, Bugaba.

Recognition. The bicolored elytra, with basal area markedly paler than the dark medial area distinguishes this species from the other members of *Ochropisus,* except *P. henryi*. To distinguish between specimens of *P. bembidioides* and *P. henryi*, see the recognition section, above, for the latter species.

Description. With character states of subgenus *Ochropisus,* restricted or amplified as follows. SBL 3.55 mm.

Color. Dorsal surface of head and disc of pronotum brunneous, lateral margins of pronotum testaceous; elytra bicolored, with piceous central diamond-shaped fascia; ventrally piceous except sterna paler medially. Antennae, mouthparts and legs brunneo-testaceous.

Microsculpture. Elytron: mesh pattern transverse, sculpticells narrow.

Luster. Shiny.

Pronotum. Moderately broad (Hw/Pwm = 0.788); base relatively broad (Pwb/Pwm = 0.879); disc slightly convex.

Elytra. Intervals flat, sparsely punctulate in basal 0.4.

Abdominal sterna. Sternum VII of male with apical margin (Fig. 38B) shallowly emarginate.

Male genitalia (Figs. 38I, J). Median lobe: in lateral aspect apical portion short, narrowly trianguloid, more broadly so in dorso-ventral plane; apex with very small hook projected dorsally.

Habitat. Probably tropical lowland forest, at altitudes between 240 and 460 m.

Geographical distribution (Fig. 40). This species is known only from the type locality in northwestern Panamá.

Chorological affinities. This species, *P. caudalis*, and *P. turnbowi* are known from Chiriqui Province, in Panamá. Thus, their ranges likely overlap, though they are not necessarily sympatric.

Phylogenetic relationships. The Lower Central American species *P. bembidioides, P. caudalis*, and *P. lamuralla* are similar chorologically, in having bicolored elytra, and males with a fairly narrow apical portion of the median lobe. Thus, they may be closely related. In geographical distribution and form of the apical portion of the median lobe, *P. nevermanni* is also similar to these species, but not in color.

Material examined. Lectotype, only. For details, see above.

Phloeoxena (Ochropisus) caudalis (Bates), new combination

Figs. 2A-C, 35, 38C, K-L, 39A-B, and 40

Ochropisus caudalis Bates 1883:176. Ball 1975a:165.

Type material. LECTOTYPE male, labelled: "Type/ H.T." [circular label, ringed with red]; "V. de Chiriqui/ 25-4000 ft./ Champion; B. C. A. Col. I. 1./ Ochropisus/ caudalis,/ Bates.; "Ochropisus/ caudalis/ Bates" [handwritten]; "LECTOTYPE [red print]/ Ochropisus/ caudalis Bts [handwritten]/ By [red print] Erwin 76" [handwritten] (BMNH). PARALECTOTYPES: 7, 2 males, 5 females, labelled same as type, excluding the handwritten determination label and the lectotype designation (BMNH).

Type locality. Panamá, Chiriqui Province, Volcan de Chiriqui.

Recognition. Adults of this Costa Rican-Panamanian species are most like those of the Honduran *P. lamuralla*, differing in smaller size and in geographical range. The male genitalia are also distinctive: the median lobe of *P. caudalis* (Fig. 38K) has the apical portion relatively straight in relation to the median portion, and the apex is bent dorsad, whereas in *P. lamuralla* (Fig. 38M) the apical portion is curved ventrad, and the apex is not bent.

Description. With character states of subgenus *Ochropisus,* restricted or amplified as follows. Habitus as in Fig. 35. SBL: males, 3.74-4.29 mm.; females, 3.64-4.4.2 mm.

Color. Dorsal surface with head and pronotal disc dark brunneous, lateral margins of pronotum paler; elytra bi- or tri-colored, apical portion more or less extensively testaceous, basal area, including humeri, as dark as discal area, or rufo-brunneous, discal area brunneous to piceous, and lateral margins slightly paler; ventrally piceous except sterna paler medially. Antennae, mouthparts and legs brunneo-testaceous.

Microsculpture. Elytron (Fig. 2A-C): mesh pattern transverse, sculpticells narrow.

Luster. Dorsal surface shiny, elytra subiridescent.

Pronotum. Moderately broad (Hw/Pwm: males = 0.710-0.812; females = 0.682-0.833); base relatively broad (Pwb /Pwm: males = 0.892-0.946; females = 0.875-0.946); disc slightly convex.

Elytra. Intervals flat, sparsely punctulate in basal 0.4.

Abdominal sterna. Sternum VII of male with apical margin (Fig. 38C) shallowly emarginate.

Male genitalia. (Figs. 38K-L, 39A-B). Median lobe: in lateral aspect with apical portion moderately long in dorso-ventral and lateral planes; apex bent dorsally, in lateral aspect.

Geographical variation. In the type series (Volcan de Chiriqui), the basal one-third of the elytra is about rufo-brunneous, whereas farther east, and at lower altitude, the Canal Zone sample has the basal and medial portions uniformly dark brunneous or piceous. The apical pale fascia extends the entire width of the elytra in the type series, but in the Canal Zone sample, the pale mark is medial, extended laterally only to about intervals 3 or 4. Overall, then, the Canal Zone specimens have a darker dorsal surface than have the Chiriqui specimens.

Five female specimens of *P. caudalis* from Costa Rica have the sculpticells of the elytra less transverse than observed in the Panamanian specimens. The basal area of the elytra varies in color from uniformly dark to bicolored with a pale humeral macula on each elytron to fasciate, with the basal one-third distinctly paler than the medial dark area. The extent of the pale apical fascia varies from complete across the width of the elytra to restriction to intervals 1-6.

Specimens from the Canal Zone are slightly smaller (SBL, mean: males and females [n, 10] = 3.92 mm.) than specimens from Chiriqui (SBL, mean: males [n, 3] = 4.14 mm.; females [n, 5] = 4.08 mm.).

In the ratio Hw/Pwm, males of the 2 samples do not differ, with a mean of 0.754. For females, the mean for the Chiriqui sample is 0.777 and for the Canal Zone sample, 0.771. Ranges overlap extensively, that of the Canal Zone sample being within the range of the Chiriqui sample. In the ratio Pwb /Pwm, the Canal Zone and Chiriqui samples barely differ in mean value, and the ranges overlap very extensively.

All of this variation seems too slight to be useful taxonomically.

Habitat. Probably tropical lowland forest, to tropical montane forest, the known altitudinal range of *P. caudalis* extending from less than 100 m. to between 760 and 1220 m.

Geographical distribution (Fig. 40). This species is known from several localities in Panamá and from Costa Rica, as far north as Puntarenas Province.

Chorological affinities. The range of this species probably overlaps the ranges of *P. turnbowi* and *P. bembidioides* in Panamá, and the range of *P. nevermanni* in Costa Rica.

Phylogenetic relationships. See comments about this topic under *P. bembidioides*, above.

Material examined. In addition to the type specimens noted above, we have seen 34 specimens from the following localities: **COSTA RICA. Puntarenas**. Parque Nacional Corcovado, Estación Sirena, A.C. Osa, 1-100 m., 270500, 508300 (INBC): female, VI.1983, G. Fonseca; 2 females, XI.1992, G. Fonseca. Female, Monte Verde, 1400 m., ex inside webbing cone of hepialid bore holes, 24.V.1989, J.S. Ashe, R.E. Brooks, & R. Leschen (SEMC). Female, 2.0 km. e. Monteverde, on divide rd, 600 m., 10°18' N 84°48' W, 06.VI.1973, T.L. & L.J. Erwin (USNM). Female, Wilson Botanical Garden (Las Cruces Biol. Stn.), nr. San Vito, 1200 m., ex very fresh tree fall, 26.V.1993, J.S. & A.K. Ashe (SEMC). Female, Res. Biol. Cerara, Estación Quebrada Bonita, LN 194500, 469850, X.1989, R. Zuniga (INBC). **PANAMA. Canal Zone.** Male, Barro Colorado I., light traps, nivel III, 19.VI.1978, H. Wolda (USNM). 13 males, 15 females, 8 km. n.w. Gamboa, 09°10'00" N 079°45'00" W, canopy fogging expt. in *Luehea seemani*, pyrethrin fog, 23-24.X.1975 to 26.VII.1976, Montgomery, Lubini (USNM). Female, 5 km. n.w. Gamboa, 100 m. alt., freshly fallen tree branch, 23.VIII.1973, T.L. & L.J. Erwin (USNM). **Chiriqui**. Female, Pr. Las Lagunas, 22.V.1973, G. Ekis (USNM).

Months of collection. May-August and October-November.

Phloeoxena (Ochropisus) lamuralla, new species

Figs. 2D-F, 37A-B, 38D, M-N, 39C-D, and 40

Type material. 8 specimens, as follows. HOLOTYPE male, labelled: "HONDURAS: Olancho/ P. N. La Muralla/ 1 June 1995/ R. Turnbow" [USNM]. ALLOTYPE female, labelled same as holotype [USNM]. 6 additional PARATYPES, sex and label data as follows: 1 female, same as holotype [UASM]. 1 male, same as holotype, except "24 May 1995 "[RHTC]. 1 male, same as holotype, except "25 May 1995" [RHTC]. 1 male and 1 female, same as holotype, except "26 May 1995" [UASM]. 1 female, same as holotype, except "31 May 1995" [UASM].

Type locality. Parque Nacional La Muralla, Olancho Department, Honduras.

Specific epithet. A noun in apposition, based on the name of the national park in which the type series was collected.

Recognition. This species is readily separated from the other *Ochropisus* species by the following combination of color, structural, and chorological features: elytra bicolored; large size; and from a locality in Honduras.

Description. With character states of subgenus *Ochropisus* restricted or amplified as follows. Average SBL of males 5.20 mm. (5.16-5.28 mm.) and females 4.96 mm. (4.60-5.24 mm.).

Color. Head and pronotum dark brunneous, lateral margins of pronotum paler; elytron bicolored, dark brunneous to piceous, with hardly paler humeral region, and testaceous lateral margin and apex; ventral surface rufo-brunneous to dark brunneous. Antennae, mouthparts and legs testaceous to slightly darker; tibiae and tarsi darker than femora.

Luster. Shiny.

Microsculpture. Elytron (Figs. 2D, F): mesh pattern transverse, sculpticells narrow.

Pronotum. Moderately broad (Hw/Pwm = 0.703-0.757); base relatively broad (Pwb/Pwm 0.884-0.911); disc slightly convex.

Elytra. Intervals nearly flat, punctulate in basal 0.5; interval 7 in basal 0.5 with sharp edge adjacent to interneur 6 (Figs. 37A-B).

Abdominal sterna. Sternum VII (Fig. 38D) of male with deep median notch at apex.

Male genitalia (Figs. 38M- N and 39C-D). Median lobe: apical portion moderately long, trianguloid in dorsal aspect, finely tapered in left lateral aspect; slightly deflected dorsally, but not as much as in *O. bembidioides* (Fig. 38H) and *O. caudalis* (Fig. 38J). Internal sac basally (Fig. 39D) with exposed microtrichal field.

Habitat. Unknown.

Geographical distribution (Fig. 40). This species is known only from the type locality in north central Honduras.

Chorological affinities. This species seems to be isolated geographically, for no other species of *Ochropisus* are recorded from Honduras.

Phylogenetic relationships. See comments about this topic under *P. bembidioides*, above.

Material examined. Type specimens only. For further details, see above.

Months of collection. May and June.

Subgenus *Oenaphelox* Ball

Phloeoxena (Oenaphelox) Ball 1975a:205.

Type species. *Phloeoxena signata* Dejean (designated by Ball 1975a:205).

Recognition. Adults of this subgenus are recognized by the following combination of structural features. Mandible lateroventral groove distinct, readily seen (cf. Figs. 7M, N, **lvg**); elytra with interneurs broad and shallow, intervals narrow and slightly convex or flat; hind femur with dorsal surface evenly rounded, not canaliculate; males with adhesive vestiture of fore tarsomeres 1-3 uniseriate squamo-setae; median lobe of male genitalia anopic or pleuropic-left, and internal sac with 2 sclerites or 1 to 9 large spines (Figs. 41A-H).

Elytral microsculptural sculpticells are flat dorsally (cf. Figs. 1B-C) or keeled (Figs. 3B-D).

Included species (Table 12). The 9 species of *Oenaphelox* are arrayed in 2 species groups, the monospecific *pluto* group and the *signata group*.

Phloeoxena signata species group

Characterized primarily by the males possessing an internal sac armed with one to several large spines, adults of most species otherwise are not distinguishable from adults of subgenus *Phloeoxena*. Of the 4 new species described here, *P. viridis* is most similar to the species pair *P. ashei- signata*, and is placed accordingly. 3 new species, *P. ashei, P. brooksi,* and *P. totontepec,* share a combination of: overall brunneous to piceous color of the dorsal surface; pronotum with surface mostly shiny, microsculptural mesh pattern of the disc clearly transverse; elytra with sculpticells keeled, microsculptural mesh pattern elongate over much of the surface and the surface uniformly rather dull; metathorax reduced (metepisternum about quadrate), brachypterous; eyes smaller and flatter than in other known taxa (shown by the relatively low values for the ratio Hw/Pl, means 0.818-0.900), and elytra rather short (shown by the relatively high values for the ratio Pl/El, means 0.360-0.388). In these last 2 features, these taxa are beyond, or at the extremes exhibited by the previously described species of *Oenaphelox* (Ball 1975a: 192-213, Tables 5, 10 and 14 [Hw/Pl], and Tables 7, 12 and 17 [Pl/El]), and are markedly similar to subgenus *Tacana* (Ball 1975a: 227-228, Table 20 and Fig. 116). Although males of these 3 species differ markedly in form of the genetalic median lobe, they seem to form a readily recognizable species assemblage. This similarity is postulated to represent convergence, associated with life in higher altitude forests, resulting in reduction in eye size and loss of flight wings.

Phloeoxena (Oenaphelox) totontepec, new species

Figs. 3A-D, 41A-B, and 42

Type material. 9 specimens, as follows. HOLOTYPE male, labelled: "MEX. OAXACA 16.6 km./ s. Totontepec cloud/ forest 2540m./ in litter 79-35/ June 16, 1979"; "MEXICAN EXP. 1979/ J.S.Ashe, G.E.Ball/ & D.Shpeley/ collectors" [USNM]. ALLOTYPE female, labelled same as holotype [USNM]. 7 additional PARATYPES, sex and label data as follows: 2 males and 2 females same as holotype [UASM]. 2 males and 1 female: "MEX. OAXACA 10.4 km./ s. Totontepec cloud/ forest; tree ferns/ in litter 2480m./ June 17, 1979 79-38"; "MEXICAN EXP. 1979 J.S.Ashe, G.E.Ball/ & D. Shpeley/ collectors" [UASM].

Type locality. 16.6 kilometers south of Totontepec, state of Oaxaca, México.

Specific epithet. A noun in apposition, based on the name of the type locality of this species.

Recognition. This species is readily separated from the other unicolorous *Phloeoxena* species by the following combination of structural features: metepisternum quadrate; apex of elytra dull; eyes slightly reduced (ratio Hw/Fw = 1.316-1.559); and small size (SBL = 4.44-5.32 mm).

Description. With character states of subgenus *Oenaphelox,* restricted or amplified as follows. Average SBL of males 4.88 mm. (4.68-5.28) and females 4.73 mm. (4.44-5.32).

Color. Dorsal surface mostly rufo-brunneous to dark brunneous, head slightly paler. Ventral surface rufo-brunneous to brunneous laterally, paler medially. Antennae and mouthparts rufo-testaceous to brunneous; legs mostly brunneous, tibiae slightly darker.

Microsculpture. Head dorsallly with mesh pattern isodiametric; pronotum laterally with mesh pattern isodiametric, disc with mesh pattern transverse (sculpticells about twice as long as wide); elytral mesh pattern elongate over most of surface, nearly isodiametric at apex, sculpticells on disc keeled (Figs. 3B-D).

Luster. Head and pronotum moderately shiny, elytra sericeous.

Head. Eyes slightly reduced (ratio Hw/Fw = 1.316-1.559), head thus relatively narrow: average Hw/Pl of males 0.822 (0.775-0.842), and females 0.889 (0.857-0.919).

Prothorax. Pronotum with disc moderately convex; lateral margins distinctly sinuate anteriad posteriolateral angles.

Pterothorax. Metepisternum quadrate, width of base and length of lateral margin subequal.

Elytra. Relatively short, average Pl/El of males 0.416 (0.391-0.430), and females 0.388 (0.380-0.398). Elytron with lateral margin (Fig. 3A) markedly curved, humerus broadly rounded, much narrowed. Intervals nearly flat; interneurs shallowly impressed; disc with 3 setigerous punctures.

Hind wings. Brachypterous.

Abdominal sterna. Average for *Phloeoxena* species.

Male genitalia (Figs. 41A-B). Median lobe with apical portion short, relatively wide, broadly rounded in

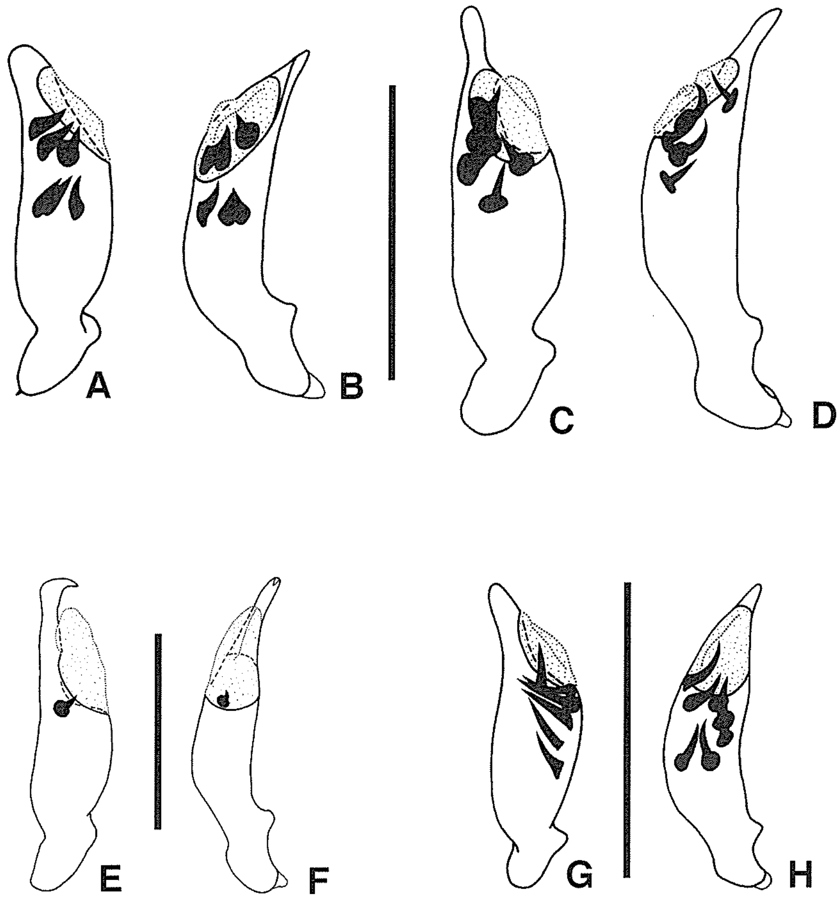

Figure 41. Line drawings of male genitalia of new species of *Phloeoxena (Oenaphelox* Ball). **A**, **C**, **E**, **G**, and **B**, **D**, **F**, **H**, dorsal and left lateral aspects of median lobe respectively, of: **A-B**, *P. totontepec*; **C-D**, *P. brooksi*; **E-F**, *P. ashei*; and **G-H**, *P. viridis*. Scale bars = 1 mm.

dorsal aspect; membranous portion mostly left lateral, thus pleuropic-left; internal sac with 2 groups of 3 thick spines each.

Habitat. Probably cloud forest, at altitudes between at least 2480 and 2540 m. Adults live on the ground, in leaf litter.

Geographical distribution (Fig. 42). This species is known from the type locality in the southern part of the Sierra Madre de Oaxaca, México, only.

Chorological affinities. No other species of *Oenaphelox* has been recorded from the above locality. However, this locality is within the general range of one other species of *Oenaphelox*, *P. signata*, and may be within the range of *P. undata* (recorded from Oaxaca, but without a more specific locality).

Phylogenetic relationships. As noted above, *P. totontepec* is similar in several apotypic features to *P. brooksi* and to *P. ashei*. In its male genitalic features, this species is more similar to *P. undata*. If *P. totontepec* forms a clade with *P. ashei* and *P. brooksi*, it is the adelphotaxon of the latter 2 taxa.

Material examined. Type specimens only. For further details, see above.

Month of collection. June.

Phloeoxena (Oenaphelox) brooksi, new species

Figs. 41C-D and 42

Type material. 5 specimens, as follows. HOLOTYPE male, labelled: "HONDURAS: Ocotepe-/ que, 24 km E Ocotepeque/ El Guisayote, 14 VI 1994/ 2170m, 14°25'N,89°04'W/ J.Ashe,R.Brooks #098/ ex: pyrethrum fogging/ of fungusy log" [SEMC]. ALLOTYPE female, labelled same as holotype except:

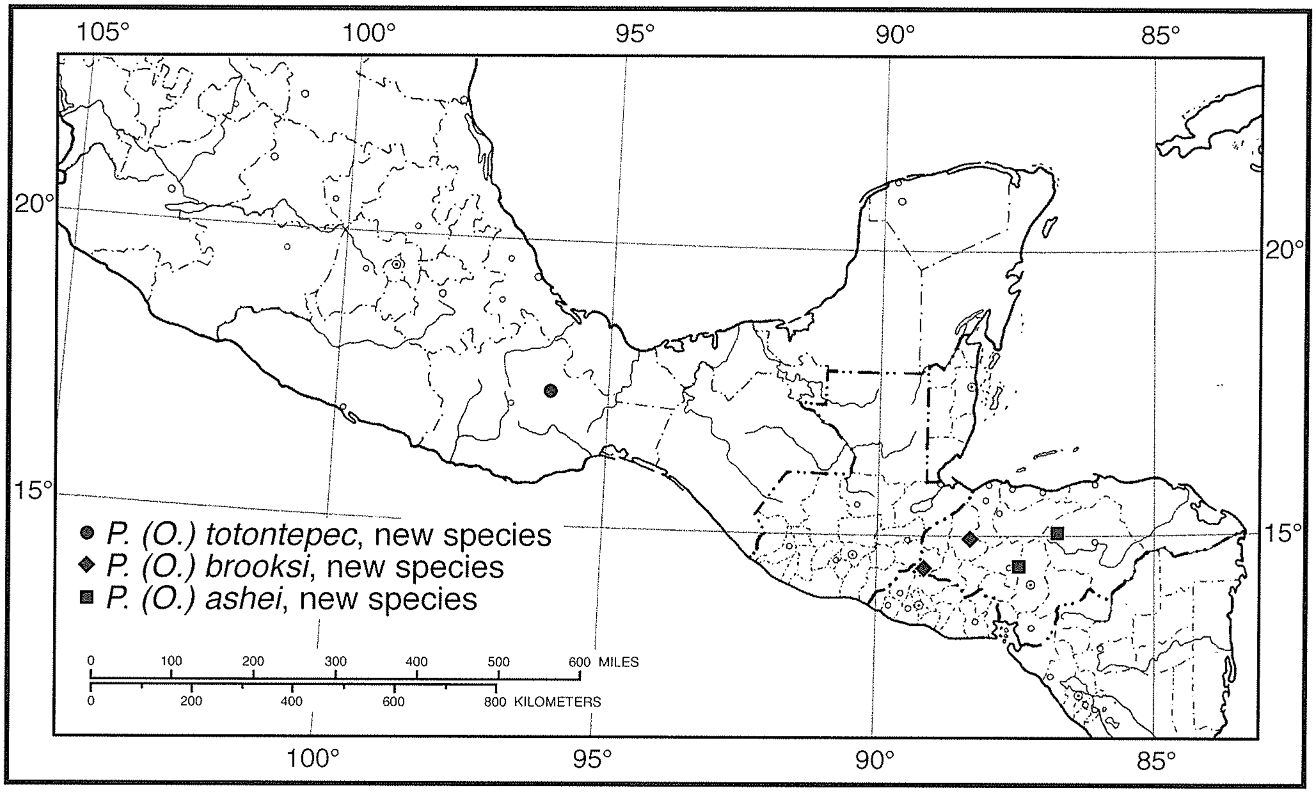

Figure 42. Map of a portion of Middle America showing positions of known localities for three new species of *Phloeoxena* (*Oenaphelox* Ball).

"#097 ex: under bark" [SEMC]. 3 additional PARATYPES, sex and label data as follows: 1 female: "HONDURAS: Ocotepe-/ que, 24 km E Ocotepeque/ El Guisayote, 14 VI 1994/ 2170m, 14°25'N,89°04'W/ J.Ashe,R.Brooks" [SEMC]. 1 male: "HONDURAS, Ocotepeque/ R.B. Guisayote/ 21 May 1995/ R. Turnbow " [RHTC]. 1 female, "HONDURAS: STA. BARBARA/ Cerro Santa Barbara, 11.5km.S./& 5.6km. W. Penas Blancas/ 1870m, 24.VIII.1994-220B/ R. Anderson, cloud. for. litt. berl." [CMNC].

Type locality. El Guisayote, 24 kilometers east of Ocotepeque, Departmento Ocotepeque, Honduras.

Specific epithet. A Latinized masculine eponym, based on the surname of Robert W. Brooks, Snow Museum, University of Kansas, who collected most of the type series.

Recognition. This species is readily separated from the other unicolorous *Oenaphelox* species by the relatively flat eyes, quadrate metepisternum, reduction of hind wings, and occurrence in Honduras.

Description. With character states of subgenus *Oenaphelox,* restricted or amplified as follows. Average SBL of males 5.82 mm. (5.80-5.84) and females 6.44 mm. (6.20-6.76).

Color. Dorsal surface brunneous, with lateral margins of pronotum and elytra paler; ventrally brunneous laterally and rufotestaceous medially. Antennae, mouthparts and legs rufo-testaceous.

Microsculpture. Head dorsally with mesh pattern isodiametric; pronotal mesh pattern isodiametric laterally, transverse on disc; elytral mesh pattern on disc elongate, sculpticells keeled (cf. Figs. 3B-D), nearly isodiametric at apex, with sculpticells convex, only.

Luster. Head and pronotum shiny, elytra sericeous.

Head. Eyes slightly reduced (ratio Hw/Fw = 1.476-1.550), head therefore relatively narrow: average Hw/Pl of males 0.818 (0.787-0.848), and females 0.880 (0.872-0.889).

Prothorax. Pronotum: disc moderately convex; lateral margins distinctly sinuate anteriad posteriolateral angles.

Pterothorax. Metepisternum quadrate, width of base and length of lateral margin subequal.

Elytra. Relatively short, average Pl/El of males 0.413 (0.400-0.427), and females 0.374 (0.372-0.376). Intervals slightly convex; interneurs shallowly impressed; disc with 3 setigerous punctures.

Hind wings. Brachypterous.

Male genitalia (41C, D). Median lobe slender, apical portion moderately long, parallel sided; membranous

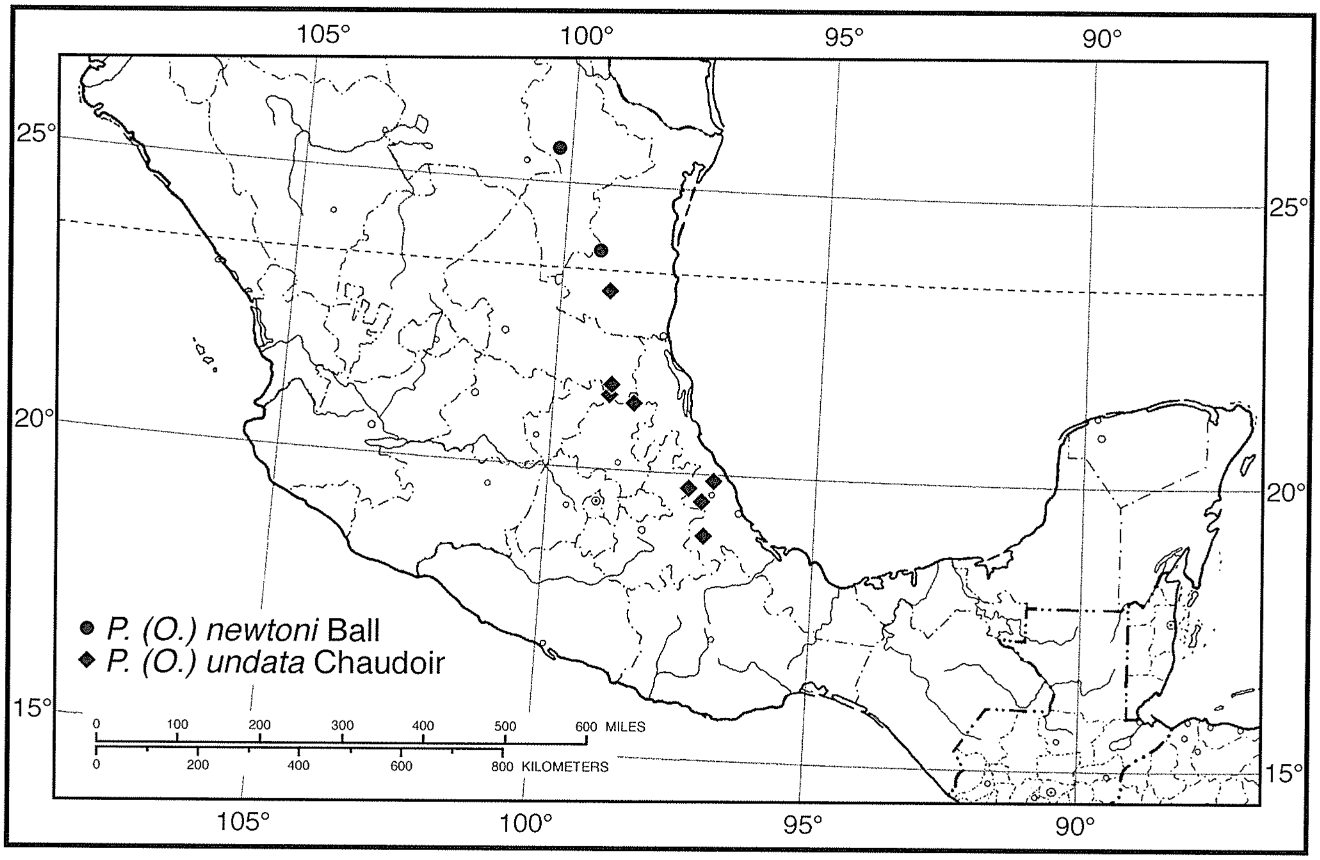

Figure 43. Map of Mexico and northern Central America, showing positions of known localities for two species of *Phloeoxena* (*Oenaphelox* Ball).

portion mostly dorsal; internal sac with 5 spines, all with large approximately circular bases.

Habitat. Probably tropical montane forest, at altitudes of at least 1870 and 2170 m. Adults live on logs or in leaf litter.

Geographical distribution (Fig. 42). This species is known from 2 mountains in western Honduras which are about 120 km. distant from one another.

Chorological affinities. This species is sympatric with *P. viridis,* and within the general range of *P. signata*, but seems unlikely to be related to these species of subgenus *Oenaphelox*. More important is its near but allopatric association with *P. ashei.*

Phylogenetic relationships. In its otherwise uniquely elongate apical portion of the median lobe of the male genitalia, this species is similar to the geographically proximal *P. ashei*. Moreover, as noted above, *P. brooksi* is similar in several apotypic features to *P. ashei* and to *P. totontepec*. If these 3 species form a clade, *P. ashei* and *P. brooksi* probably are adelphotaxa.

Material examined. Type specimens only. For further details, see above.

Months of collection. May-August.

Phloeoxena (Oenaphelox) ashei, new species

Figs. 36C, 41E-F, and 42

Type material. Eighteen specimens, as follows. HOLOTYPE male, labelled: "HONDURAS, Olancho/ La Muralla, 14 km N. La/ Union, 1450 m,25 VI 1994/ 15°06'N 86°42'W/ J.Ashe,R.Brooks #207/ ex: crustose fungi on log" [SEMC]. ALLOTYPE female, labelled same as holotype [SEMC]. Sixteen additional PARATYPES, sex and label data as follows: male, 4 females, same as holotype [SEMC]. Male, same as holotype except "#206 ex: gilled mushrooms" [SEMC]. 4 males, 2 females, same as holotype except "#208 ex: fungusy logs" [SEMC]. Male, same as holotype except

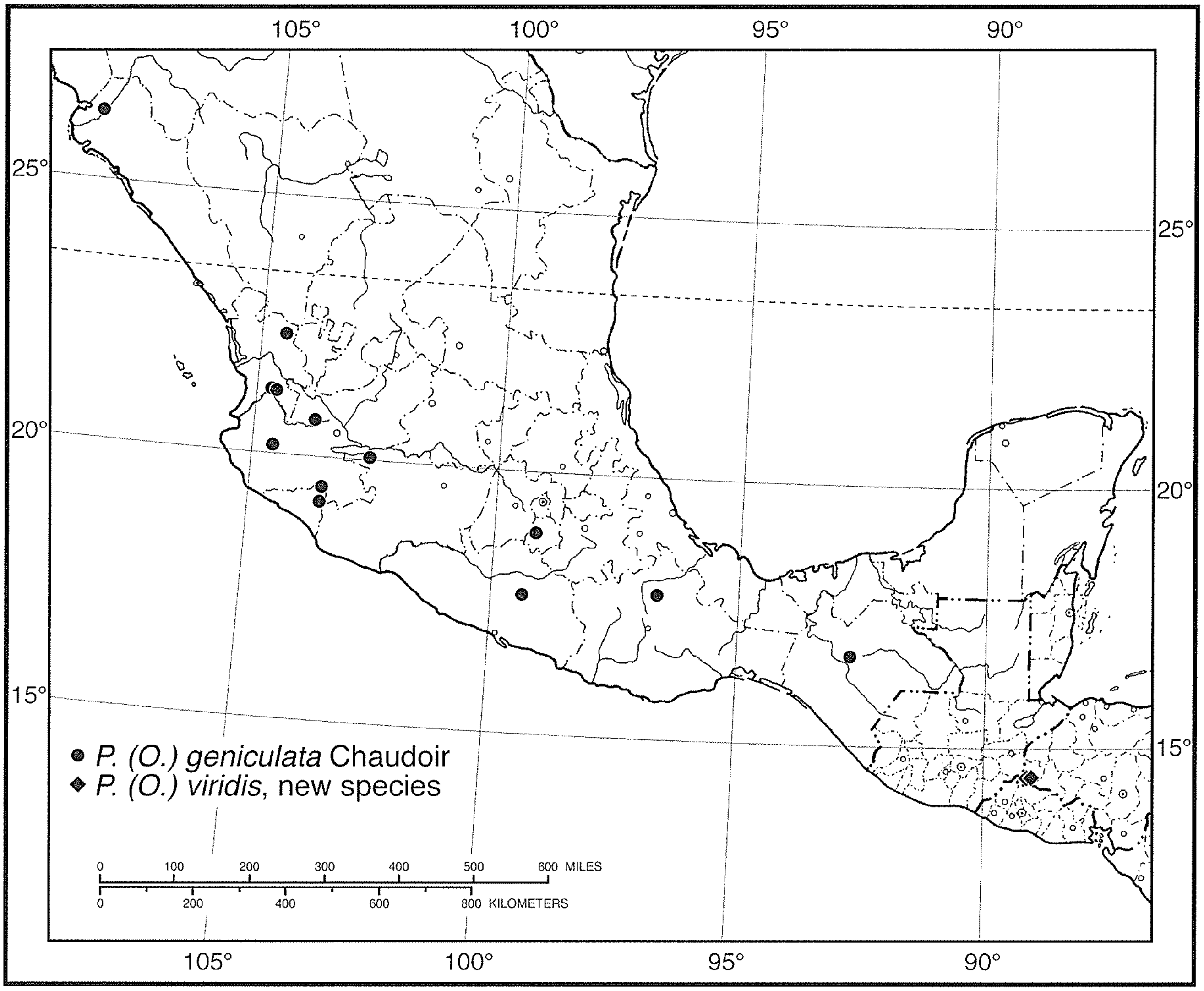

Figure 44. Map of Mexico and northern Central America, showing positions of known localities for two species of *Phloeoxena* (*Oenaphelox* Ball).

"#209 ex: flower fall" [SEMC]. Female, "HONDURAS Olancho/ P. N. La Muralla/ 29 Nov. 1995 R. Turnbow" [RHTC]. Female, "HONDURAS: OLANCHO/ P. N. La Muralla, 14 km N. La/ Union, 1450-1500m, 16-17.VIII./ 1994-206, R. Anderson, montane/ wet evergreen forest. beating" [CMNC]. Male, "HONDURAS: COMAYAGUA/ Mont. Comayagua, 18.0km. E./ Comayagua, 20.VIII.1994-215,2000 m., R. Anderson, oak/cloud/ forest, beating-under logs" [CMNC].

Type locality. Parque Nacional La Muralla, 14 kilometers north of La Union, Departmento Olancho, Honduras.

Specific epithet. A Latinized masculine eponym, based on the surname of James S. Ashe, Snow Museum, University of Kansas, who collected most of the type series.

Recognition. This species is readily separated from the other *Phloeoxena* species by the following combination of structural and chorological features: dorsal surface piceous to brunneous, except elytra (Fig. 36C) with 2 distinct fasciae; eyes relatively flat; metepisternum quadrate; brachypterous; and from a locality in Honduras.

Description. With character states of subgenus *Oenaphelox*, restricted or amplified as follows.

Average SBL of males 5.94 mm. (5.16-6.36) and females 5.56 mm. (4.92-5.84).

Color. Head dorsally and pronotum rufo-testaceous to piceous; elytra brunneous to piceous, with testaceous to rufo-testaceous fasciae; ventrally head and prothorax rufo-brunneous to nearly piceous, paler medially; abdominal sterna rufo-testaceous medially, infuscated laterally. Antennae, mouthparts and legs testaceous to brunneo-testaceous; femora darkened preapically.

Microsculpture: Head dorsally with mesh pattern isodiametric; pronotal mesh pattern isodiametric laterally, but distinctly transverse on disc; elytral mesh pattern elongate, sculpticells keeled (cf. Figs. 3A-C).

Luster. Sericeous, head and pronotum more shiny than elytra.

Head. Eyes small (ratio Hw/Fw = 1.471-1.632), head thus relatively narrow: average Hw/Pl of males 0.824 (0.800-0.854), and females 0.900 (0.825-0.946).

Prothorax. Pronotum: disc slightly convex; lateral margins distinctly sinuate anteriad posteriolateral angles.

Pterothorax. Metepisternum quadrate, width of base and length of lateral margin subequal.

Elytra (Fig. 36C). Rather short, average Pl/El of males 0.381 (0.369-0.390), and females 0.360 (0.344-0.379). Elytron: lateral margin markedly curved, and humerus rounded, relatively narrow; intervals slightly convex; interneurs faintly impressed from base to apex; disc with 3 setigerous punctures.

Hind wings. Brachypterous.

Abdominal sterna. Average for *Phloeoxena* species.

Male genitalia (Figs. 41E, F). Median lobe narrow, markedly pleuropic-left; apical portion elongate and flattened with preapical hook (Fig. 41E) pointed left laterad; internal sac with 1 or 2 short spines.

Habitat. Probably tropical lower montane forest to cloud forest, at altitudes between at least 1450 and 2000 m. Adults live in leaf litter, or on logs in association with fungi.

Geographical distribution (Fig. 42). This species is known only from the type locality in the mountains of north central Honduras.

Chorological affinities. No other species of the subgenus *Oenaphelox* is recorded from the above locality, but the possibly related *P. brooksi* is in adjacent mountain ranges about 100 km. distant from the type locality of *P. ashei*.

Phylogenetic relationships. In its male genitalic features, this species is isolated from all other members of *Phloeoxena,* but the elongate apical portion of the median lobe is similar to that of the geographically proximal *P. brooksi*. Moreover, as noted above, *P. ashei* is similar in several apotypic features to *P. brooksi* and to *P. totontepec*. If these 3 species form a clade, *P. ashei* and *P. brooksi* probably are adelphotaxa.

Material examined. Type specimens only. For further details, see above.

Months of collection. June, August, and November.

Phloeoxena (Oenaphelox) newtoni Ball
Fig. 43

Phloeoxena (Oenaphelox) newtoni Ball 1975b:151.

Type locality. Chipinque Mesa (near Monterrey), Nuevo Leon, México.

Habitat. Probably mesic oak-pine forest.

Geographical distribution (Fig. 43). This species is known from northeastern México. The additional record extends the previously known range of this species from a point to an area.

Phylogenetic relationships. This species is similar to the *totontepec* complex in external features, such as brunneous-piceous coloration, partially reduced metathorax, and brachyptery. In the somewhat reduced eyes (Hw/Pl 0.90-0.96) and less shortened elytra, (Pl/El 0.33-0.35), *P. newtoni* is intermediate between the *totontepec* complex and *P. undata*. The pronotum exhibits a uniform isodiametric mesh pattern, and the apical portion of the elytron is shiny. These features place *P. newtoni* closer to *P. undata*. The geographical ranges of *P. newtoni* and *P. undata* are close together, in contrast to the ranges of *P. newtoni* and the *totontepec* complex. The character states shared with the *totontepec* complex are regarded as convergent similarities, rather than as indicative of phylogenetic relationship, and as postulated by Ball (1975b:154), we continue to regard *P. newtoni* as the closest relative of *P. undata*.

Material examined. In addition to the material reported previously by Ball (1975b), we have seen a single specimen, from the following locality: **MEXICO. Tamaulipas**. Male, Rancho Nuevo, surface, 10.IV.1982, P. Sprouse (UASM). [The collector was a speleologist, so the reference to "surface" means simply that the specimen was not collected in a cave].

Month of collection. April.

Phloeoxena (Oenaphelox) undata Chaudoir
Fig. 43

Phloeoxena undata Chaudoir 1869a:147.

Type area. Mexico. The type is a specimen collected by Auguste Sallé, the mid-19th Century French professional collector, who worked extensively in the State of Veracruz, which is within the known geographical range of this species. Accordingly, we restrict the type area to this State.

Habitat. The new data presented below confirm that this species is an inhabitant of pine-oak forest and cloud forest, living on logs in association with fungi, at altitudes between at least 200 and 1800 m.

Geographical distribution (Fig. 43). Ball (1975a:209) recorded this species from localities in eastern México, from the states of Tamaulipas, Veracruz, and Oaxaca. The following records fill some of the many gaps among the few localities known previously.

Material examined. We have seen 22 specimens of this species, from the following localities, which are additional to those reported by Ball (1975a:209): **MEXICO. Hidalgo.** Male, 48.5 km. s. Tamazunchale, Hwy. 55, 1030 m., ex misc. mushrooms, 10.VII.1990, J.S. Ashe, K.J. Ahn, & R. Leschen (SEMC). **Puebla.** 4 females, 9.7 km. e. Teziutlan, 4-6.VIII.1960, H.F. Howden (CNCI). **San Luis Potosi.** 3 males, female, Municipio Xilitla, 24.1 km. SW Xilitla, 1500 m., under *Prunus* bark, mesophile for., *Quercus, Prunus, Liquidambar*, etc., 20.III.1988, P.W. Jones, P.W. Kovarik (TAMU). Male, 2.5 km. w. on unpaved road, at Limon, 15.2 km. n.. jct. Hwy. 120 & 85, 7.VII.1990, J.S. Ashe, K.J. Ahn, & R. Leschen (SEMC). 4 males, 6 females, 3 km. e. Xilitla, 600 m., fungus-laden log, 7.VII.1990, J.S. Ashe, K.J. Ahn, & R. Leschen (SEMC). **Tamaulipas.** Rancho del Cielo, 13 km. w. Gomez Farias, cloud forest, 6.VI.1983: female, 1200 m., R.S. Anderson (UASM); 2 females, 1000 m., S. & J. Peck (UASM). Male, 13 km. w. Gomez Farias, 24-29.VII.1971, G.E. & K.E. Ball (UASM). Female, nr. Gomez Farias, rd. to Rancho del Cielo, 14.VII.1982, R.H. Turnbow (TAMU). **Veracruz.** Female, 15.7 km. w. Las Vigas, Rte. 140, 1.1 km. s. hwy., 1780 m., mesophytic forest, under logs and bark, 12.VIII.1992, J.S. Ashe, H.E. Frania, & D. Shpeley (UASM). Female, 18.2 km. n. Misantla, 26.IX.1976, W.E. Clark (TAMU).

Months of collection. March and June-September.

Phloeoxena (Oenaphelox) geniculata Chaudoir
Fig. 44

Phloeoxena geniculata Chaudoir 1869a:151.

Type locality. Cuernavaca, Morelos, México.

Habitat. The new data presented below indicate that this species is an inhabitant of tropical lower montane forest or oak-pine forest, living on logs in association with fungi, at altitudes between 650 and 1600 m. and that adults probably are active during the rainy season.

Geographical distribution (Fig. 44). Ball (1975a:210 and 1975b:156) recorded this species from localities in western México, on or toward the western margins of the Sierra Madre Occidental. The following records, all from western México, extend the previously known range significantly, and serve to fill in the gaps among the localities known previously.

Material examined. We have seen 10 specimens of this species, from the following localities, which are additional to those reported by Ball (1975a:210 and 1975b: 156): **MEXICO. Chiapas.** Male, El Chorreadero, 8 km. s.e. Chiapa de Corzo, 650 m., under bark and fungus, 11.VI.1991, J.S. Ashe (SEMC). **Guerrero.** Female, 55 km. n.e. Villa de Zaragoza, 16.VII.1985, R.H. Turnbow (RHTC). **Jalisco.** 2 males, 79.4 km. s. Colima, Rte. 110, 1220 m., oak-pine litter, under rocks, 5.VIII.1985, H.E. Frania, D. Shpeley (UASM). Female, 5.3 km. s. Tequila, 1560 m., on rd. to microondas, oak forest., under bark, 25.VII.1985, H.E. Frania, D. Shpeley (UASM). **Nayarit.** Male, Volcan Ceboruco, 4-11 km. s. Jala, 8.X.1992, R.H. Turnbow (RHTC). Female, 12.9 km. n.w. Chapililla, Rte. 15, 1231 m., oak forest, leaf litter, 24.VIII. 1986, G.E. Ball, H.E. Frania (UASM). Male, 21 km. w. Chapililla, 9.X.1992, R.H. Turnbow (RHTC). Male, 48 km. s.e. Tepic, 1188 m., 19.VIII.1976, E.S. Ross (CASC). **Sinaloa.** Male, 14 km. n. La Capilla de Taxte, 30 IX.1990, R.H. Turnbow (RHTC).

Months of collection. June-October.

Phloeoxena (Oenaphelox) signata (Dejean)

Coptodera signata Dejean 1825:275.
Phloeoxena signata; Chaudoir 1869a:150.

Type area. Georgia, U.S.A.

Habitat. Most of the records reported below are from tropical deciduous, or seasonal forest, and thus similar to the kind of habitat recorded previously (Ball 1975a:221). Evidently, adults live on logs, in association with fungi. The altitudes, 213 to 900 m., are within the range of those reported previously (sea level to 1950 m., Ball 1975a:221). Adults are active from spring to fall, i.e., during the rainy season.

Geographical distribution. Ball (1975a:221-222) recorded this species from localities extending from southeastern United States to Panamá. The following records fill many of the gaps among the localities known previously.

Material examined. We have seen 11 specimens of this species, from the following localities, which are additional to those reported by Ball (1975a:221-222): **GUATEMALA. Alta Verapaz.** Male, 8 km. e. Tamahu, 700 m., 6.VI.1993, H. & A. Howden (UASM). **HONDURAS. Copan.** Male, 19 km. s.w. Santa Rosa de Copan, 8.X.1993, R.H. Turnbow (RHTC). **Francisco Morazán.** Male, 2 km. s. Zamarano, 900 m., riparian Ficus grove, 22.VIII.1994, R.S. Anderson (CMNC). **MEXICO. Campeche.** Female, Chicana Ruins, 10 km. e. Xpujil, 213 m., trop. seasonal for., 13-14.VII.1983, R.S. Anderson, W. Maddison (UASM). **Chiapas.** Female, El Chorreadero, 8 km. s.e. Chiapa de Corzo, 650 m., under bark and fungus, 11.VI.1991, J.S. Ashe (SEMC). **Colima.** Male, vic. El Terrero, 4.X.1992, R.H. Turnbow (RHTC). **Oaxaca.** Male, female, 77 km. e. La Ventosa, 21.VII.1963, J. Doyen (EMEC). **San Luis Potosi.** Female, El Salto Falls, 12 km. n.w. El Naranjo, 400 m., ex fungusy log, 5.VII.1990, J.S. Ashe, K.J. Ahn, & R. Leschen (SEMC). **Sinaloa.** Female, 48 km. n. Mazatlan, microondas El Indio. 470 m., trop. decid. for., leaf litter, 7.VIII.1986, G.E. Ball, H.E. Frania, & D.S. Mulyk (UASM). **PANAMA. Cocle.** Female, El Valle rd., 650 m., 20.V.1991, R.H. Turnbow (RHTC).

Months of collection. May-August, and October.

Phloeoxena (Oenaphelox) viridis, new species

Figs. 41G-H and 44

Type material. 3 specimens, as follows. HOLOTYPE male, labelled: "HONDURAS: Ocotepe-/ que, 24 km E Ocotepeque/ El Guisayote, 16 VI 1994/ 2170m, 14°25'N,89°04'W/ J.Ashe,R.Brooks #121/ ex: fogging fungusy log" [SEMC]. ALLOTYPE female, labelled same as holotype [SEMC]. One female PARATYPE labelled: "HONDURAS: Ocotepe-/ que, 12.7 km E & 2.4/ km S. Ocotepeque, Mpo./ Sinuapa, 15 VI 1994/ 1450m, 14°27'N,89°04'W/ J.Ashe,R.Brooks #115/ ex: treefall litter" [SEMC].

Type locality. El Guisayote, 24 km. east of Ocotepeque, Ocotepeque department, Honduras.

Specific epithet. A Latin adjective meaning green, in allusion to the faint metallic green color of the dorsal surface of adults of this species.

Recognition. This is the only known *Phloeoxena* that has the dorsal surface with a faint metallic green reflection.

Description. With character states of subgenus *Oenaphelox*, restricted or amplified as follows. SBL of male 4.48 mm. and average SBL of females 3.98 mm. (3.92-4.04).

Color. Dorsal surface dark brunneous to black, with faint metallic green reflection, elytral lateral margins paler; ventral surface dark brunneous, with abdominal sterna paler medially. Antennae rufo-testaceous, infuscated toward apex; mouthparts brunneous; legs with femora bicolored, mostly brunneous, apical portions paler, like tibiae and tarsi.

Microsculpture. Dorsal surface with mesh pattern mostly isodiametric, except slightly transverse on pronotal disc; sculpticells on elytral disc convex, but not markedly elevated and keeled.

Luster. Shiny.

Head. Eyes prominent, moderately bulged (ratio Hw/Fw = 1.857-1.929), head therefore relatively broad: Hw/Pl for male 1.130, for females 1.220.

Prothorax. Pronotum relatively short, Pl/El for male 0.349, for females, average 0.344 (0.333-0.355). Disc moderately convex; lateral margins sinuate anteriad posteriolateral angles.

Pterothorax. Metepisternum elongate, length of lateral margin more than width at base.

Elytra. Intervals varying, flat on disc, then slightly to moderately convex laterally; lateral subapical callus present; interneurs not to slightly impressed; disc with 3 setigerous punctures.

Hind wings. Fully developed.

Abdominal sterna. Average for *Phloeoxena* species.

Male genitalia (Figs. 41G-H). Apical portion of median lobe short, rounded at apex; membranous portion mostly left lateral, thus pleuropic-left; internal sac with 7 long, slender spines.

Habitat. Probably tropical lower montane forest and cloud forest, at altitudes between at least 1450 and 2170 m. Adults live probably in leaf litter on the ground, or on fungus-laden logs.

Geographical distribution (Fig. 44). This species is known from the type locality in western Honduras, only.

Chorological affinities. This species is sympatric with *P. brooksi*, and this locality is overlapped by the range of the related species, *P. signata*.

Phylogenetic relationships. Size, form, and armature of the male internal sac, characteristic of this species, are shared with *P. geniculata* and *P. signata*. Also, *P. viridis* and *P. signata* share similar elytral microsculpture. Except for the male genitalia, these other features may be plesiotypic, and thus of questionable value in establishing relationships. Nonetheless, we believe that *P. viridis* and *P. signata* are adelphotaxa.

Material examined. Type specimens only. For further details, see above.

Month of collection. June.

Subgenus *Phloeoxena (sensu stricto)*

Type species. *Phloeoxena picta* Chaudoir, 1869a (designated by Ball 1975a:178).

Recognition. Adults of this subgenus are recognized by the following combination of structural features. Mandibular lateroventral groove distinct, readily seen; elytral interneurs broad and shallow, intervals narrow and slightly convex or flat. Hind femur dorsal surface evenly rounded, not canaliculate; males with adhesive vestiture of fore tarsomeres 1-3 uniseriate squamo-setae; median lobe of male genitalia anopic, and internal sac without large spines. Elytral microsculptural sculpticells of adults of most taxa are keeled dorsally.

Included species. Including those described below, this subgenus contains 14 species, arranged in 2 species groups.

Phloeoxena schwarzi species group

This group, which includes 7 species, is known from the West Indian islands of the Greater Antilles, only. New information is available for the 4 species noted below.

Phloeoxena (s. str.) dealata Darlington

Phloeoxena dealata Darlington 1937:136.

Type material. We examined 2 paratypes (ISNB): 1 male and 1 female.

Type locality. Pico Turquino, Oriente province, Cuba.

Habitat. Montane tropical forest, at altitudes between at least 900 and 1850 m.

Additional material. We report the following record, primarily to confirm that this species, known only from the type locality was still extant in 1963: **CUBA, Oriente**. Female, Pico Turquino, VI.1963, F. (MNHC).

Phloeoxena (s. str.) imitatrix Darlington

Phloeoxena imitatrix Darlington 1934:114.

Type locality. Cayamas, Santa Clara Province, Cuba.

Variation. Adults of this species were characterized by bicolored elytra (Darlington 1934:114, and Ball 1975a:189). Subsequent to publication of the original description, but unknown to Ball when he treated the group, 2 population samples were collected by Darlington and others, in which the elytra of all specimens were unicolorous.

Habitat. Tropical montane forest, at altitudes between approximately 600 and 1000 m.

Geographical distribution. Although the bicolored and unicolored samples are geographically separated from one another, each group is represented in the same general areas: both are in central Cuba (Santa Clara and Cienfuegos Provinces) and both are in the east, in Santiago de Cuba Province (a part of the former Oriente Province). Thus, the geographical distribution of the 2 morphs is not consistent with a simple pattern of geographical differentiation, and so unlikely to be suitably recognized as geographical races. Because the only difference between the 2 groups seems to be elytral color, it is unlikely that specific difference is involved. Therefore, in our judgment, formal taxonomic recognition is not warranted.

Material examined. We have seen 19 specimens of this species, from the following localities, which are additional to those reported by Ball (1975a:189).
Bicolored morph: **CUBA. Oriente**. Female, Sierra Cristal, VI.1959, F. (MNHC). Female, Sagua-Baracoa Cupeyal, 19.IX.1963, F. (MNHC). Female, Cupeyal, VI.1966, F. (MNHC).
Unicolored morph: **CUBA Oriente**. 3 females, Loma del Gato, Cobre Range, 3-7.VII.1936, ca. 914 m., 8-14.V.1936, Darlington (MCZC). **Santa Clara.** 7 males, 10 females, Buenos Aires, Trinidad Mt., 762-1067 m., 8-14.V.1936, Darlington (MCZC).

Months of collection. May-July and September.

Phloeoxena (s. str.) schwarzi Darlington

Phloeoxena schwarzi Darlington 1934:115.

Type locality. Cayamas, Santa Clara, Cuba.

Habitat. Tropical montane forest, from about 600 t0 1000 m. altitude.

Material examined. We have seen 7 specimens of this species, from the following localities, which are additional to those reported by Ball (1975:190): **CUBA Santa Clara**. Buenos Aires, Trinidad Mts.: 2 males, female, 17-23.VI.1939, C.T. Parsons; male, female, VI.1939, Parsons; and 2 males, female, 762-1067 m., 8-14.V.1936, Darlington (MCZC). **DOMINICAN REPUBLIC Pedernales**. Male, 24 km. n. Cabo Rojo, 610 m., 21.VIII.1988, M. Ivie, Philips, & Johnson (MAIC).

Months of collection. May-June, and August.

Phloeoxena (s. str.) portoricensis Darlington

Phloeoxena portoricensis Darlington 1939:99.

Type material. We examined 2 paratypes (ISNB): 1 male and 1 female.

Type locality. El Yunque, Luquillo Mts., Puerto Rico.

Habitat. Tropical montane forest, at altitudes between at least 300 m. and 1000 m.

Geographical distribution. This species is known only from the Greater Antillean island of Puerto Rico.

Material examined. We have seen 15 specimens of this species, from the following localities, which are additional to those reported by Ball (1975a:190): **PUERTO RICO** 2 males, Caribbean N.F., El Verde Field Station, under bark, 300-450m., 9.V.1985, E.R. Hobeke, J.K. Liebherr, & S.W. Nichols (CUIC). Caribbean Nat. For., Mt. Britton Trail: male, female, beating, 28.V.1994, M.C. Thomas (FSCA); female, 25.V.1994, R. Turnbow (UASM). Male, Caribbean N.F., Mte. Britton-El Yunque Trail, under bark, 950-1000 m., 10.V.1985, E.R. Hobeke, J.K. Liebherr, & S.W. Nichols (CUIC). 4 males, El Yunque Station, Luquillo Forest, 2-5.VII.1969, H. & A. Howden (UASM). Guilarte Forest, J. Micheli (JMPR): female, 7.VI.1975; male, 20.IV.1975; male, 16.IV.1980. Female, Maricao Forest, Rd. 120, Km. 13.8, 10.V.1980, J. & N. Micheli (JMPR). Female, PRIB (MCZC).

Months of collection. April-June.

Phloeoxena picta species group

Included in the *picta* species group are mainland species whose collective range extends from Panamá northward to the slopes of the Cofre de Perote, Veracruz, México. To the 4 species known previously, we add 3, described below, and change the name of 1 taxon from subspecies to species.

Phloeoxena (s. str.) megalops erwinorum Ball

Phloeoxena (s. str.) megalops erwinorum Ball 1975a:194.

Type locality. Monteverde, Puntarenas, Costa Rica.

Habitat. Tropical forest including lower montane, montane, and cloud, between at least 1000 and 1800 m. Evidently, adults live in association with fungi of various species, on logs.

Geographical distribution. Previously known from Costa Rica only, this subspecies is now known also from eastern Panamá.

Chorological affinities. Adults of this species have been collected in some of the same localities and at the same time as adults of *P. limbicollis*.

Material examined. We have seen 14 specimens of this subspecies, from the following localities, which are additional to those reported by Ball (1975a:194): **COSTA RICA Guanacaste**. Estación Cacao, s.w. side

Volcan Cacao, 1000-1400 m., LS 32300, 375700: female, IX.1989; male, VI.1990 (INBC). **Puntarenas**. Monte Verde, 25.V.1989, J.S. Ashe, R. Leschen, & R.E. Brooks: female, 1450 m., ex polypore on log; male, 2 females, 1550 m., ex white *Faveolus* on log; and male, 1550 m., ex *Xylaria* (SEMC). Female, Parque Nacional La Amistad, Sect. Altmira, Cerro Biolley, 1800 m., LS 572400, 332700, #2371, 15.IX-14.X. 1993, R. Delgado (INBC). Male, Tres Colinas, Potrero Gde. Buenos Aires 1850 m., LS 340700, 566400, 21-25.VI.1992, M. Ramirez (INBC). **PANAMA Chiriqui**. Female, 5.6 km. n. Boquete, 08°49'23"N 82°25'18"W, La Culebra Trail, 1450 m., ex fungus-laden log, 15.VI.1996, J.S. Ashe, R.E. Brooks (SEMC). 3 males, female, La Fortuna, "Rio Hornito Trail" 08°42'N 82°14'W, 1000 m., ex fungus-laden log, 11.VI.1995, J.S. Ashe, R.E. Brooks (SEMC).

Months of collection. May-June, and September-October.

Phloeoxena (s. str.) biundata Steinheil

Phlaeoxena [sic!] *biundata* Steinheil 1875b:141. TYPE MATERIAL: HOLOTYPE female, labelled "Chucuri-Nare"; "TYPE" [red paper]; "biundata/ Steinh." [handwritten]; EX MUSAEO/ E. Steinheil"; "MUSEUM PARIS/ ex coll./ R. Oberthur"; "Phloeoxena/ biundata/ Steinh."; "J. Mateu det. 1978" (MNHP).

Phloeoxena (s. str.) biundata; Csiki 1932:1359.

Type area. The type area is located probably along the Rio Magdalena, in either Departamento Antioquia or Santander. It is somewhere between Puerto Nare (6°12'N, 74° 35'W) and Chucuri (6°53'N, 74° 02'W).

Recognition. Similar to *Phloeoxena megalops* in that the eyes are relatively large and the pale elytral fasciae form a cruciate pattern, the holotype of *P. biundata* is distinguished by its predominantly pale prothorax, by smaller size, and by low values for diagnostic proportions (see below for details; compare with data for *Phloeoxena megalops* in Ball 1975a:228, Fig. 116).

Additionally, this species differs from *P. megalops erwinorum* in lacking the shiny area posteriomedially on the elytra. In this respect, *P. biundata* is similar to the geographically most proximate subspecies of *P. megalops, P. m. chiriquina*. But the anterior margin of the anterior elytral fascia is distinctly irregular, and in this respect, *P. biundata* differs from *P. m. chiriquina,* whose members are characterized by an anterior fascia with its anterior margin more regular (Ball 1975a:205, Fig. 93). As well, the 2 elytral fasciae of *P. biundata* are of similar width, whereas the anterior fascia of *P. m. chiriquina* is much wider than the posterior fascia.

Description. With character states of subgenus *Phloeoxena*, restricted or supplemented as follows. Habitus like that of *P. megalops* Bates. SBL 3.78 mm. Values for diagnostic ratios as follows: Hw/ Fw 2.062; Hw Pwm 0.867; Hw/Pl 1.300; Pwa/ Pwb 0.896; and Pl/ El 0.299.

Color. Head capsule and labrum piceous. Prothorax testaceous or flavous, except pronotal dark mark on disc each side median longitudinal impression in form of large ring, each broken posteriorly. Elytra bicolored, background piceous, each elytron with 2 vermiculate fasciae, anterior one slightly broader than posterior one, joined along suture, thus in form of a cruciate pattern with both elytra together.

Microsculpture. Head and lateral areas of pronotum with mesh pattern isodiametric, sculpticells with dorsal surfaces convex, pronotal surface thus beaded. Elytron: mesh pattern over most of surface elongate, sculpticells in more or less parallel rows and keeled; posteriomedially mesh pattern isodiametric, sculpticells flat.

Luster. Generally slightly shining, elytra more or less uniformly silky, but not shining posteriomedially.

Pronotum. Lateral margins markedly sinuate posteriorly.

Pterothorax. Metasternum of normal size, metepisternum lateral margin longer than width of basal margin.

Elytra. Humeri broad, not narrow and sloped. Interval 3 of each elytron trisetose.

Hind wings. Assumed to be fully developed, but not checked.

Habitat. Probably tropical lowland forest, betwen at least 100 and 200 m. altitude.

Geographical distribution. This species is known only from the type locality, in northwestern Colombia.

Chorological affinities. The only known species of *Phloeoxena* in South America, *P. biundata* is distinctly isolated from its relatives, the closest of which are in Middle America.

Phylogenetic relationships. The putatively large eyes and cruciate pattern of the elytral fasciae are shared by *P. biundata* and *P. megalops*. Also, the 2 species are allopatric in their geographical ranges. We postulate then, that they are adelphotaxa.

Material examined. Only the holotype is known. For details, see above.

Phloeoxena (s. str.) limbicollis Bates

Phloeoxena graphiptera var. limbicollis Bates 1884:295.
Phloeoxena (s. str.) limbicollis; Ball 1975a;195.

Type locality. Bugaba, Panamá.

Habitat. Probably tropical lower montane forest, with an altitudinal range of at least 370 to 1700 m. Evidently, adults inhabit logs on the forest floor which are fungus-laden.

Geographical distribution. The new records reported do not extend the previously known range of this species, i.e., from Panamá northward to Costa Rica.

Chorological affinities. Adults of this species have been collected in some of the same localities and at the same time as adults of *P. megalops erwinorum*.

Material examined. We have seen 130 specimens of this species, from the following localities, which are additional to those reported by Ball (1975a:195): **COSTA RICA Alajuela.** Male, female, Peñas Blancas 850 m., under bark, 17.V.1989, J.S. Ashe, R.E. Brooks, & R. Leschen (SEMC). **Guanacaste.** Parque Nacional Guanacaste, Estación Cacao, Volcan Cacao, s.w. side, 1000-1400 m., LN 323300, 375700 (INBC): male, 21-28.V.1992, G. Rodriguez; female, XI-XII.1990, C. Chavez, R. Espinoza; female, III.1991; male, female, X.1989, R. Blanco, C. Chavez. **Puntarenas.** Female, Cerro Chomogo, 1550 m., under bark, 22.V.1989, J.S. Ashe, R.E. Brooks, & R. Leschen (SEMC). Monteverde: female, 1400 m., 8.V.1989; female, 1450 m., ex *Pleurotus* sp., 25.V.1989; and 2 males, 1450 m., ex *Schizophora paradoxa*, J.S. Ashe, R.E. Brooks, & R. Leschen, 25.V.1989 (SEMC). Female, Monteverde, 1500 m., beating, 25.II.1991, H. & A. Howden (UASM). 2 females, Parque Nacional Amistad, Estación Altmira, 1 km. S. Cerro Biolley, 1300-1450 m., LS 331700, 572100, VI.1996, J.F. Quesada (INBC). P.N. Amistad, Finca Cafrosa, Estación Las Mellizas, 1300 m. (INBC): 3 males, female, V.1990, M. Ramirez, G. Mora; female, VI.1991, M. Ramirez. Estación Pittier, 1670 m., LN 330900, 577400 (INBC): female, #5368, 23.V.1995, E. Ulate; #5898, 23-28.VI.1995, A. Picado; male, #4533, 23.I-2.II.1995, A. Picado. Female, Rancho Quemado, Osa Peninsula, LS 2921500, 511000, IX.1992, F. Quesada (INBC). Female, San Vito Las Cruces, 20.XI.1988, A. Solis (INBC). **PANAMA Chiriqui.** Hartmann's Finca: female, 20.V.1996, R.H. Turnbow (RHTC); female, 4-7.VII.1997, Wappes, Morris (JEWC). 30 males, 23 females, 27.7 km w Volcan, Hartmann's Finca 08°45'N 82°48'W, 1450 m., ex fungus-laden log, 14-16.VI.1995, J.S. Ashe, R.E. Brooks (SEMC). Same general locality, ex fungus-laden logs, 17-18.VI.1996, J.S. Ashe, R.E. Brooks (SEMC): 13 males, 15 females, 08°51'48"N, 82°44'36"W, 1450 m.; 7 males, 8 females, 08°51'48"N 82°44'36"W, 1650-1700 m.; 3 males, 2 females, 08°51'42"N 82°44'48"W, 1450 m. **Panamá.** Male, 2 females, Carti-El Llano Rd., Km 7.5 n. of Chepo 09°13'N 79°05'W, 370 m., ex fungus-laden log, 4.VI.1995, J.S. Ashe, R.E. Brooks (SEMC). **Veraguas.** Male, 6.1 km. n. of Sante Fé, Cerro Tute, 830 m., ex fungus-laden log, 12.VI.1996, J.S. Ashe, R.E. Brooks (SEMC).

Months of collection. January-March, May-July, and September-December.

Phloeoxena (s. str.) nigricollis Ball

Phloeoxena (s. str.) nigricollis Ball 1975a:195.

Type locality. San Quentin (Lacandon Forest), Chiapas, México.

Variation. The pronotum has broadly pale lateral areas in 3 females from Tela, Lancetilla Botanical Gardens, Atlantida, and 1 male, from El Guisayote, Ocotepeque, Honduras. In Other Honduran specimens, the pronotum is uniformly black.

Habitat. Tropical lowland forest and montane cloud forest, from altitudes of at least 10 m. to 1700 m. Many of the specimens were taken from fungus-covered logs, or otherwise in association with fungi growing on logs.

Geographical distribution. Known previously from southeastern Chiapas and adjacent parts of Guatemala, the material reported below extends the range of this species northward to Puebla and Veracruz, Mexico, and southward to Honduras.

Chorological affinities. Although the marked range extension brings the known limits of the putative species pair *P. limbicollis-nigricollis* closer together, the species remain geographically isolated from one another.

Material examined. We have seen 27 specimens of this species, from the following localities, which are additional to those reported by Ball (1975:196 and

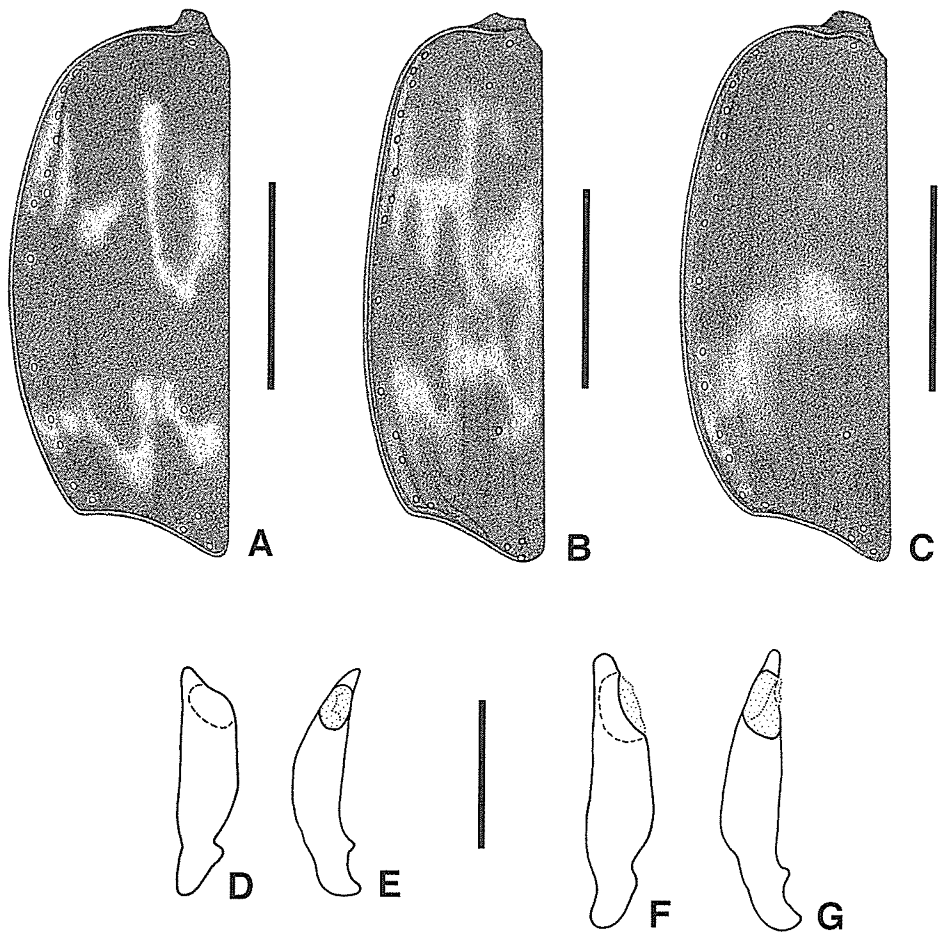

Figure 45. Line drawings of structural features of species of *Phloeoxena (sensu stricto)*. **A-C**, left elytron, dorsal aspect of: **A**, *P. batesi* Ball; **B**, *P. nitida*, new species and **C**, *P. obscura*, new species. **D-G**, male genitalia, median lobe, **D-F** and **E-G**, dorsal and left lateral aspects, respectively, of: **D-E**, *P. batesi* Ball and **F-G**, *P. obscura*, new species. Scale bars: **A-C** = 1 mm.; **D-G** = 0.5 mm.

1975b:154): **BELIZE. Cayo**. 2 males, 3.2 km. s. Orange Walk, 14.VIII.1956 (OSUC). **Orange Walk.** Female, Rio Bravo Conservation Area, Mahogany Trail, vic. of La Milpa Research Station, ex Lindgren funnel trap, 6-14.IX.1996, P.W. Kovarik (UASM). **Toledo Dist**. Female, Blue Creek Village, 9.VI.1981, W.E. Steiner (USNM). **GUATEMALA Baja Verapaz**. Male, 7.3 km. e. Purulhá, 1700 m., cloud forest, 19.V.1991 (CMNC). Male, female, 7.4 km. s. Purulhá, 1650 m., ex fungus-laden logs, 2.VII.1993, J.S.Ashe, R.E. Brooks (SEMC). 8 km s Purulhá, H. & A. Howden (UASM): female, 1.VI.1991; male, 4.VI.1993. **Zacapa**. Male, 3.5 km. s.e. La Union, 1700 m., cloud forest, 19.V.1991, R.S. Anderson (CMNC). **HONDURAS Atlantida**. Male, 2 females, Tela, Lancetilla Bot. Grd., 15°46'N 87°27'W, 10 m., ex fungus-laden log, 22-23.VI.1994, J.S. Ashe, R.E. Brooks (SEMC). Female, Tela, Lancetilla, 20 m., trop. evergreen forest, 23.VI.1994, R.S. Anderson (CMNC). **Cortes**. Male, 3 females, Lago Yojoa, Isla de Venado, 670 m., 23.VIII.1994, R.S. Anderson (CMNC). **Izabal**. Male, 2 females, 2 km. s.e. Mariscos, 250 m., ex fungus-laden log, 26.VI.1993, J.S. Ashe, R.E. Brooks (SEMC). **Olancho**. 2 females, P.N. La Muralla, 31.V.1995, R.H. Turnbow (RHTC). **MEXICO Oaxaca**. Female, 17.3 km. s. Valle Nacional, ca. 1000 m., montane tropical forest, 26.IV.1977, J.S. Ashe, H.E. Frania, & D. Shpeley (UASM). **Puebla**. Female, 9.7 km. e. Teziutlan, 4-6.VIII.1980, H.F. Howden (CNCI). **Veracruz**. Male, Dos Amates, V.1964, G. Halffter (CNCI). Male, Volcan San Martin, s.e. slope, 1220-1370 m., beating vegetation, 29.VII.1959, B.D. & B. Valentine (OSUC). 3 males, 29 km. n. San Andres, VI.21 (Nègre Coll -MNHP).

Months of collection. April-September.

Phloeoxena (s. str.) picta Chaudoir
Fig. 46

Phloeoxena picta Chaudoir 1869a:145.

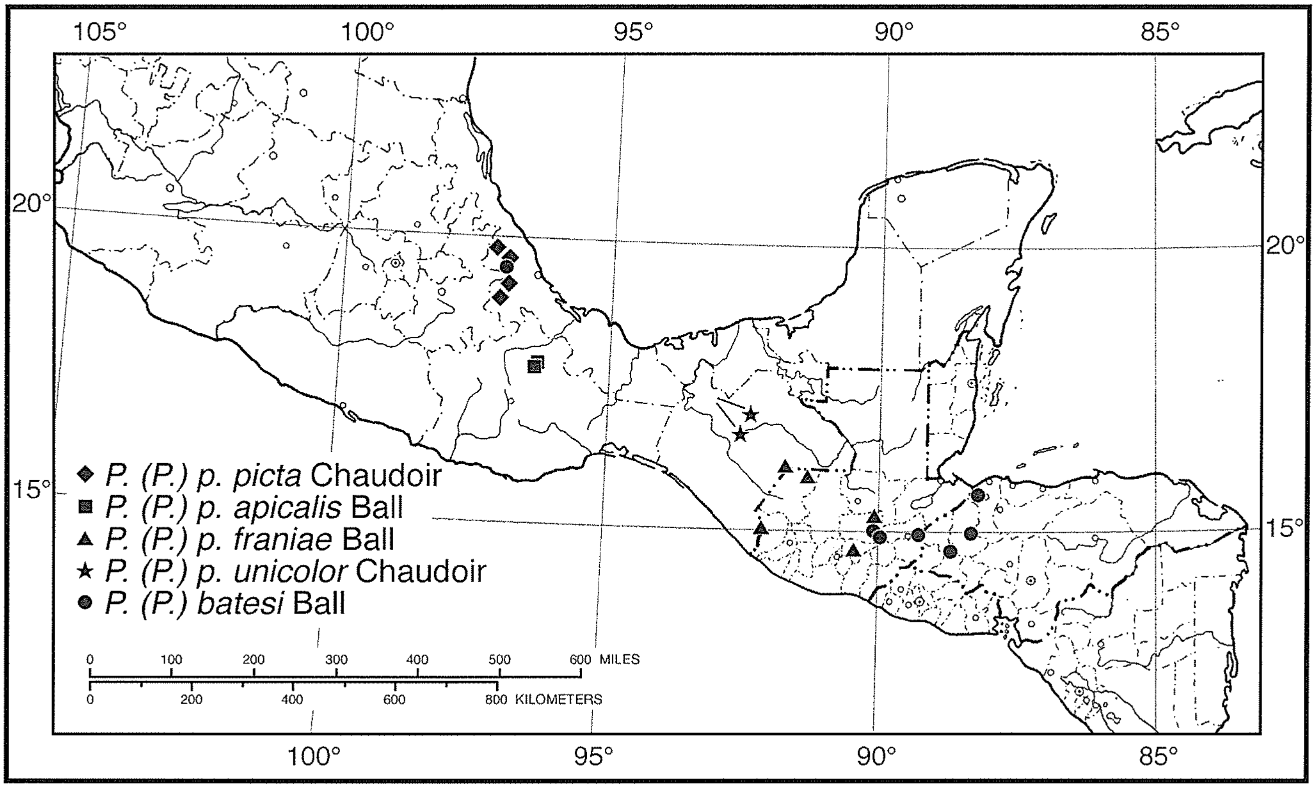

Figure 46. Map of southern Mexico and northern Central America, showing positions of known localities for the subspecies of *Phloeoxena (sensu stricto) picta* Chaudoir and *Phloeoxena (sensu stricto) batesi* Ball.

Synonymy and type locality. See Ball 1975a:201 and comments about *P. p. picta,* below. This polytypic species comprises 4 subspecies, as noted below.

Habitat. Tropical lower montane forest to cloud forest, between altitudes of at least 600 and 2400 m. The beetles live on logs, more or less in association with fungi, or directly on the forest floor, in leaf litter.

Geographical distribution (Fig. 46). Associated with highland areas, the range of *Phloeoxena picta* extends through the Middle American Chiapan-Guatemalan highlands from Guatemala northwestward to central Chiapas, and beyond the Isthmus of Tehuantepec to the Sierra Madre de Oaxaca to the Transvolcanic Sierra East in the Mexican state of Veracruz.

Material examined. Specimens and localities additional to those provided by Ball (1975) are presented below, for each subspecies.

Phloeoxena picta franiae Ball

Phloeoxena picta franiae Ball 1975a:200.

Type locality. Santa Cruz Barillas, Huehuetenango, Guatemala (Ball 1975a:200).

Geographical variation. A male collected at Lagunas de Montebello, Chiapas, exhibits elytral markings similar to those exhibited by the Oaxacan *P. picta apicalis,* but the medial elytral fascia is more complete than in specimens of that subspecies from Oaxaca (Ball 1975a:226; cf. Figs. 115 4a & 5). The Montebello specimen effectively bridges the difference in elytral color pattern between typical members of the 2 subspecies.

Habitat. As reported for the species, with an altitudinal range between at least 1280 m. and 2260 m.

Geographical distribution (Fig. 46). This subspecies occurs in the Chiapan-Guatemalan highlands, in western Guatemala, to the west of the range of *P. batesi*.

Material examined. Thirty one specimens from the following localities, which are additional to those reported by Ball (1975a:200): **GUATEMALA Baja Verapaz**. 3 males, 2 females, 4 km. s. Purulhá, 1650 m., ex fungus-laden logs, or crustose fungi on logs, 30.VI-02.VII.1993, J.S. Ashe, R.E. Brooks (SEMC). 2 males, 4.8 km. e. Purulhá, 1680 m., ex crustose fungus on logs, 29.VI.1993, J.S. Ashe, R.E. Brooks (SEMC). Male, female, 7.4 km. s. Purulha, 1650 m., ex crustose fungi on logs, 29.VI.1993, J.S. Ashe, R.E. Brooks (SEMC). **Sacatepequez.** 2 females, Guatemala City, Cerro Alux, 2260 m., wet oak forest litter, 12.VI.1991, R.S. Anderson (CMNC). **MEXICO Chiapas**. Male, Municipio de La Trinitaria, Lagunas de Monte Bello Parque Nacional, 1371 m., 28.XII.1981, D.E. Breedlove (CASC). Volcan Tacaná, n.e. slope: male, female, Union Juarez, Barranca Providencia, 1700 m., ex mouldy wood on ground, 19.XII.1975, H.E. Frania, J. Belicek (UASM); female, Union Juarez, Pico Gallo, 1940 m., ex bromeliads, 20.XII.1975, H.E. Frania, J. Belicek (UASM); female, ca. 2.4 km. n.w. Union Juarez, 2000 m., cloud forest, on vegetation, 18-19.IX.1992, G.E. Ball, R.S. Anderson (UASM); 2 males, 5 females, Rio Mala, 1830 m., 20.XII.1976, H.E. Frania, D.L.C. Procter (UASM); and 7 males, female, Rio Muxbal, 1460 m., H.E. Frania, D.L.C. Procter (UASM).

Months of collection. June-July, September, and December.

Phloeoxena picta unicolor Chaudoir

Phloeoxena unicolor Chaudoir 1869a:148.
Phloeoxena picta unicolor; Ball 1975a:200.

Type locality. "Mexique", here restricted to the vicinity of Pueblo Nuevo Solisthuacan, Chiapas, México (see Ball 1975a:201).

Habitat. As reported for *P. picta*, this subspecies, with an altitudinal range between at least 1300m. and 2100 m., lives in cloud forest.

Geographical distribution (Fig. 46). This subspecies is known only from northeastern Chiapas.

Chorological affinities. Between, but to the north of, the ranges of *P. p. apicalis* and *P. p. franiae, P. p. unicolor* is geographically isolated from its putatively closest relatives.

Material examined. 9 specimens from the following localities, which are near the type locality, but which are additional to those reported by Ball (1975a:201): **MEXICO Chiapas**. Rte. 195 (UASM): female, 5.9 km. e. Bochil, 1300 m., riparian forest, leaf litter, 16.IX.1992, R.S. Anderson, G.E. Ball; 4 males, 2 females, 11 km. s. Jitotol, 1650 m., cloud forest (*Pinus-Liquedambar*), 5.V.1977, J.S. Ashe, H.E. Frania, & D. Shpeley. Male, female, Yerba Buena Res., 2.1 km. n. Pueblo Nuevo Solisthuacan, 2100 m., cloud forest, on vegetation, 23.IX.1992, R.S. Anderson, G.E. Ball.

Months of collection. May and September.

Phloeoxena picta picta Chaudoir

Phloeoxena picta picta; Ball 1975a:201.

Type locality. "Mexique", here restricted to the vicinity of Cordova, Veracruz (see Ball 1975a:201).

Habitat. As reported for *P. picta*, this subspecies, with an altitudinal range between at least 1230 m. and 2400 m., lives in tropical lower montane forest and cloud forest.

Geographical distribution (Fig. 46). This subspecies, the northernmost of *Phloeoxena picta*, is known only from eastern Veracruz, México.

Chorological affinities. The range of this subspecies is closest to that of *P. picta apicalis*, its putative adelphotaxon. Nearby, on the middle slopes of the Cofre de Perote, at 2200 m., is the known Veracruz locality for *P. batesi*.

Material examined. Fifteen specimens from the following localities, which are additional to those reported by Ball (1975a:201): **MEXICO.** Female, Putzeys (ISNB). **Veracruz**. Female, 15.3 km. n. Coscomatepec, between Ixtapa & Cuiyachapa, 2300-2400 m., cloud forest, 6-7.VII.1975, G.E. Ball, H.E. Frania (UASM). 7 males, 3 females, microondas 10 air km. n.n.w. Huatusco, 2000 m., 14.VIII.1987, J.K. Liebherr, D.A. Millman (CUIC). Male, female, Rio Peña Blanca, n. Ixtepec, w. Coscomatepec, 2060 m., 6.VII.1975, H.E. Frania (UASM). Male, 7 km. e. Huatusco, Hwy. 125, 1230 m., ex fungus-laden log, 16.VII.1990, J.S. Ashe, K.J. Ahn, & R. Leschen (SEMC).

Months of collection. July-August.

Phloeoxena picta apicalis Ball

Phloeoxena picta apicalis Ball 1975a:202.

Table 13. Distribution of states of selected characters among population samples of *Phloeoxena picta batesi* Ball.

		Characters and Character States					
				Elytra			Femur
		Apical portion		No. of discal setae[2]			Color
Locality of sample[1]	N	Males	Females	4	5	6	
Cofradia, HONDURAS	1	——-	shiny	1			pale
Sta. Barbara, HOND.	23	dull	shiny	21	1	1	dark
Lempira, HOND.	2	——-	shiny	1	1		infusc.
La Union, GUAT.	5	shiny	shiny	5			dark
Teculutan, GUAT.	1	——-	shiny	1			pale
San Geronimo, GUAT.	1	——-	shiny	1			pale
Xico, Veracruz, MEX.	1	shiny	——-	1			pale

[1] Sequence of localities is from east to west.
[2] Total number of discal setae for both elytra.

Type locality. Vicinity of Valle Nacional, Oaxaca, México. (Ball 1975a:202).

Habitat. As reported for *P. picta*, this subspecies with an altitudinal range between at least 600 m. and 1100 m., the lowesr altitude for this species, lives in tropical lower montane forest.

Geographical variation. Specimens in the type series were characterized as having the medial pale fascia of the elytra narrow and broken (Ball 1975a:226, Fig. 115.5). The elytra of the specimens reported below lack the middle fascia, and thus have only the broad preapical fascia.

Geographical distribution (Fig. 46). Known only from the lower Atlantic slope of the Sierra Madre de Oaxaca.

Chorological affinities. This subspecies is the only known representative of *P. picta* in the mountains of Oaxaca. It is located between the ranges of *P. p. picta* to the north, and of *P. p. unicolor* and *P. p. franiae* to the southeast.

Material examined. We have seen 2 specimens of this subspecies, from the following locality, which is additional to those reported by Ball (1975a:202): **MEXICO Oaxaca**. 2 males, Vista Hermosa, 04.VII.1982, M.A. Ivie (MAIC).

Month of collection. July.

Phloeoxena batesi Ball, NEW STATUS
Figs. 45A, D-E

Phloeoxena picta batesi Ball 1975a:199.

Type locality. San Geronimo, Guatemala.

Ranking. Discovery of this taxon in the Mexican State of Veracruz indicates substantial overlap of its range with that of its putative closest known relative, *P. picta (s. lat.)*.

Descriptive notes. Average SBL of males 4.13 mm. (3.76-4.56) and females 3.99 mm. (3.72-4.20). Color pattern of elytra as in Fig. 45A. Male genitalia with median lobe as in Figs 45D-E, apical portion short, somewhat triangular.

Variation. The original description being based on a single female, nothing was known previously about variation for this species. The additional material reported here exhibits, overall, appreciable variation (Table 13), including features supposed to distinguish this species from *Phloeoxena picta*, such as color of the femora and glossiness of the surface of the apical portion of the elytra. The Santa Barbara, Honduras sample seems to be the most distinctive within this species, males exhibiting dull elytral apices and most specimens with a reduced number of discal setae.

Habitat. As reported for *P. picta*, this species, with an altitudinal range between at least 1320 and 2200 m., lives in deciduous tropical and tropical lower montane

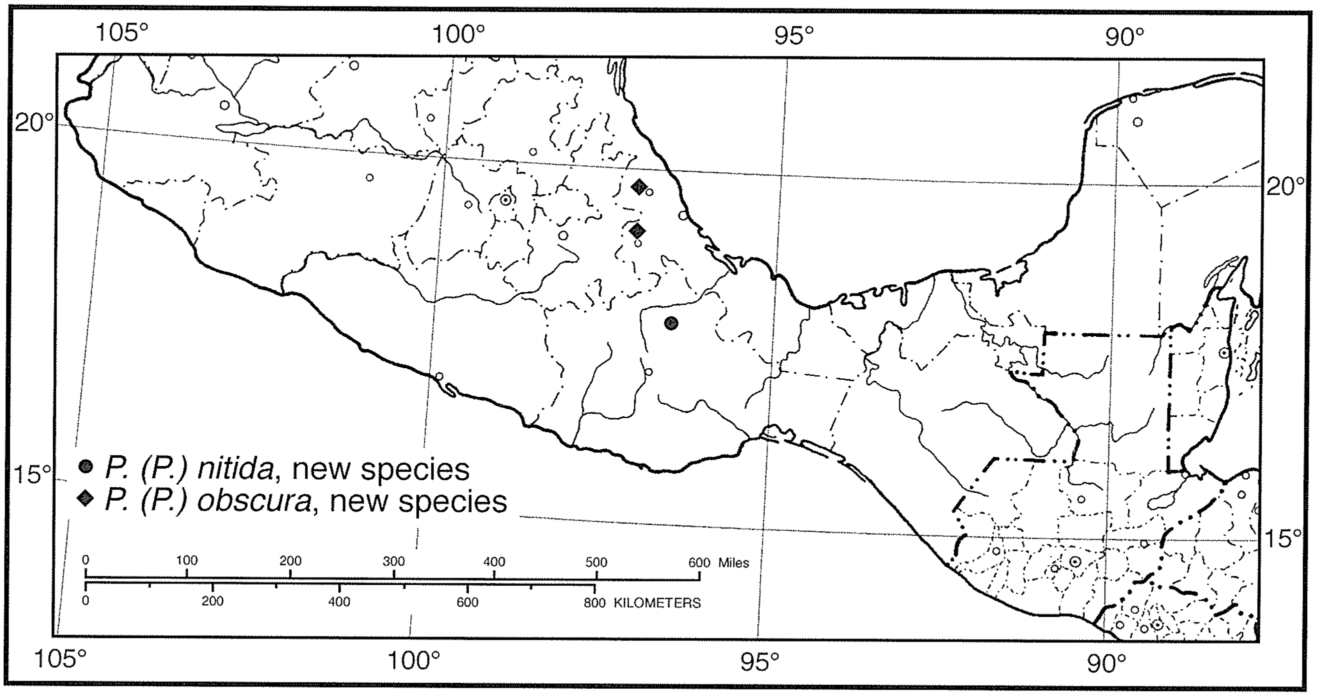

Figure 47. Map of southern Mexico and northern Central America, showing positions of known localities for two new species of *Phloeoxena (sensu stricto).*

forest. Specimens live in association with fungi on fallen tree trunks.

Geographical distribution (Fig. 46). This species is known from the Chiapan-Guatemalan highlands of western Honduras and adjacent parts of central Guatemala, and from Veracruz, México.

Chorological affinities. The range of *P. batesi* overlaps that of its closest relative, *P. picta*.

Material examined. Thirty three specimens, from the following localities, which are additional to those reported by Ball (1975a:199): **GUATEMALA Zacapa**. Sierra del Espiritu Santo, 3-3.5 km. s.e. La Union, 1500-1600 m., tropical montane forest: 2 males, 4.VI.1991 & 25.VI.1993, R.S. Anderson (CMNC); male, 2 females, 23.VI.1993, J.S.Ashe, R.E. Brooks (SEMC); male, female, on logs at night, 4.VI.1991, G.E. & K.E. Ball, D. Shpeley (UASM); and male, under bark, 6.VI.1991, G.E. & K.E. Ball, D. Shpeley (UASM). Female, Sierra de Las Minas, 20.3 km. w. Teculutan, 21.8 km. n., 1800-1900 m., beating vegetation, 8.VI.1991, G.E. & K.E. Ball, D. Shpeley (UASM). **HONDURAS Cortes**. Female, P.N. Cusuco, 18.7 km. n. Cofradia, 5.4 km. w. Buenos Aires, Cerro Jilinco, 1650 m., beating, 26.VIII.1994, R.S. Anderson (RSAC). **Lempira**. Female, 13.1 km. n.e. & 8.3 km. e. Gracias, Cerro Puca, 1600 m., *Liquidambar* forest, litter, 18.VI.1994, R.S. Anderson (CMNC). Female, 13.1 km. n.e. & 7.3 km. e. Gracias, 14°41'N 88°31'W, Cerro Puca 1320 m., ex fungi under log, 18.VI.1994, J.S. Ashe, R.E. Brooks (SEMC). **Santa Barbara**. Cerro Santa Barbara, 11.5 km. s. & 5.6 km. w. Peña Blanca, 14°57'N 88°05'W, 1800 m., 20.VI.1994, R.S. Anderson (CMNC): 5 males, 2 females, ex stick pile; 2 males, 10 females, ex decaying slash; 3 males, female, ex under bark. **MEXICO. Veracruz**. Female, Mun. Xico, Cofre de Perote, 19 km wnw Xico, 2200 m., oak-alder forest, in bromeliad, 8.VII.1999, E. Montes de Oca, J.R. Spence, & G.E. Ball (IEMM).

Months of collection. June-August.

Phloeoxena (s. str.) nitida, new species
Figs. 45B and 47

Type material. One specimen, HOLOTYPE female, labelled: "MEX, Oax./ 32mi.S.Valle/ Nacional,7000'/ V.21.71,Bright"; "specimen illustrated/ by D. Hollingdale/ 1998" [CNCI].

Type locality. 51.5 kilometers south of Valle Nacional, State of Oaxaca, México.

Specific epithet. A Latin genitive adjective, meaning bright, in allusion to the bright, shiny apical area on the elytra, and to the surname of the collector, Donald E. Bright, to whom this species is dedicated.

Recognition. Distinctive features of adults of this species are the extensive fasciate pattern of the elytra, and the shining elytral apices. This species is readily separated from the other 3 taxa of subgenus *Phloeoxena* with shiny apical area on the elytra by the following combination of structural features: metepisternum elongate; eyes moderately bulged; and from a locality in México.

Description. With character states of subgenus *Phloeoxena (s. str.),* restricted or amplified as follows. SBL of female 4.24 mm.

Color. Head and pronotum piceous; lateral margins of pronotum paler; elytra dark brunneous with rufo-testaceous fasciae (Fig. 45B); ventrally head and prothorax dark brunneous; abdomen rufo-testaceous medially, infuscated laterally. Antennae rufo-testaceous, infuscated; mouthparts and legs rufo-testaceous, apex of femora and tibiae and tarsi darker.

Microsculpture. Head and pronotal mesh pattern isodiametric; elytral mesh pattern elongate, sculpticells not keeled, except apical shiny patch with mesh pattern isodiametric.

Luster. Silky, with shiny area apically on elytra.

Head. Eyes moderately bulged (ratio Hw/Fw = 1.714).

Prothorax. Pronotum with disc slightly convex; lateral margins distinctly sinuate anteriad posteriolateral angles.

Elytra. Intervals flat; interneurs absent; disc with 3 setigerous punctures.

Hind wings. Fully developed.

Male genitalia. Not known.

Habitat. Cloud forest, at an altitude of at least 2134 m.

Geographical distribution (Fig. 47). This species is known only from the type locality, on the Atlantic slope of the Sierra Madre de Oaxaca.

Chorological affinities. Both *P. p. apicalis* Ball and *P. geniculata* Chaudoir have been collected near the type locality of this species.

Phylogenetic relationships. Possibly the adelphotaxon of *P. megalops* Bates.

Material examined. Holotype only. For further details, see above.

Month of collection. May.

Phloeoxena (s. str.) obscura, new species

Figs. 45C, F-G and 47

Type material. HOLOTYPE male, labelled: "MEX. Veracruz/ 15.3km.n.Coscoma/ tepec,betw.Ixtapa/ & Cuiyachapa/ 2300-2400m, cloud/ for. VII.6-7.1975"; "MEX. EXP. 1975/ G. E. Ball &/ H. E. Frania/ collectors [USNM]. ALLOTYPE female, labelled: "MEX. Veracruz/ Rio Pena Blanca,n./ Ixtepec,w.Coscoma-/ tepec, 2060m/ July 6, 1975"; "MEX. EXP. 1975/ G. E. Ball &/ H. E. Frania/ collectors" [USNM]. 3 additional PARATYPES, sex and label data as follows: 1 male same as holotype [UASM]. 1 female same as allotype [UASM]. 1 male: "MEXICO Veracruz 15.7/ km e Las Vigas; Rte/ 140;1.1 km s highway/ mesophytic forest/ 1780m; under logs &/ bark 12.VII.92 10-92"; "MEX. EXP. 1992/ J.S. Ashe,/ H.E. Frania,/ D. Shpeley colls."; "specimen illustrated/ by D. Hollingdale/ 1998" [UASM].

Type locality. Vicinity of Coscomatepec, State of Veracruz, México.

Specific epithet. A Latin feminine adjective, in allusion to the rather indistinct, thus obscure, elytral fasciae.

Recognition. This species is readily separated from the other *Phloeoxena* species by the following combination of color, structural, and chorological features: metepisternum quadrate; elytra bicolored, fasciae indistinct; and from a locality in México.

Description. With character states of subgenus *Phloeoxena (s. str.),* restricted or amplified as follows. Average SBL of males 4.28 mm. (4.16-4.36) and females 4.24 mm. (4.16-4.32).

Color. Head and pronotum rufo-brunneous to dark brunneous; elytra brunneous with slightly paler fasciae (Fig. 45C); ventrally rufo-brunneous to dark brunneous; abdomen rufo-testaceous to brunneous medially, infuscated laterally. Antennae and mouthparts rufo-brunneous to brunneous; legs darker.

Microsculpture. Head and pronotal mesh pattern isodiametric, except slightly transverse on pronotal disc; elytral mesh pattern elongate, (sculpticells not keeled), and apically with shiny patch of isodiametric mesh.

Luster. Head and pronotum shiny; elytra silky with shiny area apically.

Head. Eyes slightly reduced (ratio Hw/Fw = 1.438-1.600).

Prothorax. Pronotum: disc moderately convex; lateral margins distinctly sinuate anteriad posteriolateral angles.

Pterothorax. Metepisternum quadrate, width of base and length of lateral margin subequal.

Elytra. Intervals nearly flat; interneurs faintly impressed from base to apex; disc with 3 setigerous punctures.

Hind wings. Brachypterous.

Abdominal sterna. Average for *Phloeoxena* species.

Male genitalia (Figs. 45F-G). Apical portion of median lobe short, rounded at apex.

Habitat. Tropical lower montane forest and cloud forest, at altitudes between at least 1800 and 2400 m., adults living in association with fallen tree trunks. Geographical distribution. (Fig. 47). This species is known from the type locality in central Veracruz, México only, on the Atlantic slope of Volcan Citlaltepetl, and on the northeastern slope of the Cofre de Perote.

Chorological affinities. *Phloeoxena undata* Chaudoir and *P. signata* Dejean have been collected nearby at Cordoba and Jalapa respectively.

Phylogenetic relationships. Not postulated.

Material examined. Type specimens only. For further details, see above.

Month of collection. July.

Catascopus Kirby

Catascopus Kirby 1825:94. TYPE SPECIES: *Catascopus hardwickii* Kirby, 1825 (by monotypy). Dejean 1825:38. Lacordaire 1854:145. Bates 1869:72. Chaudoir 1869a:158. Bates 1883:178. Péringuey 1896:278. Jeannel 1949:1007. Basilewsky 1953:209. Jedlicka 1963: 379. Habu 1967:77. Darlington 1968:101. 1971:194, 327. Reichardt 1972:238. Ball 1975a:166. Reichardt 1977: 446. Basilewsky 1984: 538. Moore et al. 1987:284. Erwin 1990:48. Straneo 1994:143.

Catascopinus Alluaud 1935:16 (subgenus). TYPE SPECIES: *Catascopinus compressus* Murray 1857:325 (by monotypy).

Catascopoides Habu 1967:78. TYPE SPECIES: *Catascopus mirabilis* Bates, 1892 (by original designation).

Catascopidius Ball 1975a:166 (*lapsus calami* for *Catascopoides* Habu).

Dentiscopus Straneo 1994:148. TYPE SPECIES: *Catascopus mirabilis* Bates, 1892 (by original designation).

Nomenclatural note. Both *Catascopoides* Habu 1967 and *Dentiscopus* Straneo 1994 were proposed as subgenera by their respective authors. Both groups have the same type species, *Catascopus mirabilis* Bates, 1892. Thus, the names *Catascopoides* and *Dentiscopus* are objective synonyms, with the former name being senior and the valid name of the taxon.

Taxonomic treatment. Unlike most other Neotropical pericaline genera, *Catascopus* is pantropical. We place the Neotropical species treated here in a broader context by discussing the classification of this genus in rather general terms. This discussion is followed by a key that provides the means for distinguishing members of the subgenera and species groups. A detailed characterization is offered for only the Neotropical species group.

Classification. A classification based on a worldwide study of the genus is not available. Alluaud (1935) proposed the subgenus *Catascopinus* for a single West African species, but offered nothing else in the way of arrangement of taxa in the nominotypical subgenus. The Oriental species, the most diverse geographical assemblage of *Catascopus*, have been classified (Straneo 1994), and we use that system here. Straneo arranged the species in 2 subgenera, *Dentiscopus* Straneo (now *Catascopoides* Habu; see above) and *Catascopus s. str.* He arranged the species of the latter subgenus in 6 species groups, using an Arabic number (1-6) to designate each group. No doubt, the clearly defined *Catascopoides* is monophyletic, as is the previously proposed subgenus *Catascopinus*, but the more diverse assemblage, *Catascopus s. str.*, is likely to be paraphyletic. The Neotropical species key to *Catascopus s. str.*, principally on the basis of putatively plesiotypic features. Nonetheless, in contrast to Basilewsky (1953:208), who proposed that the Neotropical species should be placed in a genus apart from *Catascopus*, we elect to follow Ball (1975:166), and to retain the Neotropical species as members of the nominotypical subgenus. However, we propose a new species group for the Neotropical species: the *C. brasiliensis* species group. The following key distinguishes adults of the *brasiliensis* species group from the other supraspecific taxa of *Catascopus*.

Key to the subgenera of *Catascopus (s. lat.)*, and to the species groups of subgenus *Catascopus (s. str.)*, based on character states of adults (modified from Straneo 1994:147)

1 Size small, overall length[1] 6 mm. or less. Specimen from West Africa .... *Catascopinus* Alluaud
1' Size larger, overall length 9 mm. or more. Specimen from West Africa, or elsewhere 2

2(1') Elytron with apical margin distinctly trispinose; intervals markedly convex, each discal interval catenate, interrupted throughout its length by deep transverse impressions. Mandibles relatively straight, not markedly curved apically, thus incisors relatively short; left mandible with distinct preapical supraterebral tooth .... *Catascopoides* Habu
2' Elytron with apical margin with one or 2 spines, or unspined; intervals continuous, not interrupted by transverse impressions. Mandibles apically markedly curved, thus incisors relatively long; left mandible without supraterebral tooth near apex *Catascopus (s. str.)* 3

3(2') Pronotum anteriolaterally with more than one seta on each margin .... *C.* species group 6
3' Pronotum anteriolaterally with only one seta on each margin 4

4(3') Elytron with posteriolateral angle projected posteriorly as prominent spine 5
4' Elytron with posteriolateral angle not projected, either angulate or rounded 7

5(4) Elytron with sutural angle extended posteriorly as long spine .... *C.* species group 1
5' Elytron with sutural angle not prolonged, but acute or broadly truncate, truncation slightly concave posteriorly or not 6

6(5') Head dorsally posteriad eyes with deep transverse sulcus extended across surface .... *C.* species group 2
6' Head dorsally posteriad eyes without deep transverse sulcus, at most with shallow impression .... *C.* species group 3

7(4') Elytron with sutural angle prolonged posteriorly, spine-like .... *C.* species group 4
7' Elytron with sutural angle subtruncate, not produced as spine 8

8(7') Prosternum and pterosternum more or less densely setose. Geographical range: Oriental and eastern Palaearctic Regions .... *C.* species group 5
8' Prosternum and pterosternum nearly glabrous, with few short setae, widely separated from one another. Geographical range: Neotropical Region .... *C. brasiliensis* species group, p. 113

[1] Overall length is the approximate linear distance from the tip of mandibles (or labrum) to the apical margin of the elytra.

Catascopus brasiliensis species group

Recognition. The following combination of structural features distinguishes adults of this species group from the Old World species of the genus, and from the other Western Hemisphere genera of Pericalina. Size moderate (SBL mean value ca. 10-11 mm.), elytral dorsal surface metallic green or blue (rather dull to shiny), ventral surface of thorax sparsely setose, and middle and hind tibial posterior (dorsal) surface with sericeous luster, canaliculate or not. Further, males exhibit a small patch of setae basoventrally on each fore femur (Fig. 48), and sternum VII has 4 setae ventrally, near the posterior margin (i.e., same as females). These features of the males are believed to be of special significance in establishing the monophyly of the *C. brasiliensis* species group.

Description. Habitus (cf. Ball 1975a:158, Fig. 25) rather slender, size moderate (SBL ca. 9-13 mm.).

Color. Dorsal surface bright to dark metallic green or blue, head and pronotum of most individuals darker than elytra; ventral surface brunneous to piceous. Antennae and palpi rufopiceous to piceous. Legs with femora rufous to piceous, other articles rufopiceous to piceous.

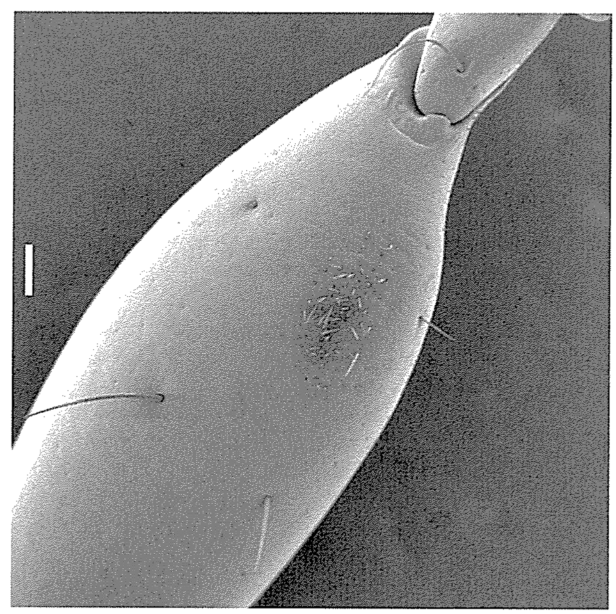

Figure 48. SEM photograph of the left fore femur, ventral aspect, of a male *Catascopus obscuroviridis* Chaudoir, showing the preapical patch of short white setae. Scale bar = 100 μm.

Macrosculpture. Integument generally smooth, but head dorsally sparsely micropunctate, and frontal impressions smooth or more or less finely, longitudinally strigulose. Pronotal disc transversely, finely, rather sparsely strigulose, lateral grooves more or less corrugated, with rather deep transverse impressions throughout length. Elytron with or without a single line of small punctures in discal intervals.

Microsculpture. Dorsal surface of head, including clypeus, either smooth or with microlines very fine, sparse, mesh pattern not formed. Labral mesh pattern isodiametric, sculpticells dorsal surfaces slightly convex. Pronotum: mesh pattern on disc transverse, or microlines partially effaced; laterally, mesh pattern primarily longitudinal, but isodiametric in places, microlines fine. Elytron: mesh pattern on intervals isodiametric to transverse or slightly diagonal, sculpticells as long as wide to 5X longer than wide, posterior margin of each sculpticell raised slightly or not. Ventrally, proepipleural mesh pattern longitudinal, sculpticells narrow, proepisternal mesh pattern more or less diagonal, sculpticells of various widths; prosternal mesh pattern transverse; pteropleural mesh pattern isodiametric to slightly transverse; pterosternal mesh pattern transverse medially; abdominal sternal mesh pattern more or less isodiametric laterally, mesh pattern transverse medially, sculpticells narrower and microlines finer than laterally. Middle and hind tibial posterior surface mesh pattern longitudinal, sculpticells dorsal surfaces convex.

Luster. Body surface generally shiny, elytra shiny to subiridescent. Middle and hind tibial posterior surface somewhat sericeous.

Chaetotaxy. Standard for Pericalina, except maxillary stipes basolaterally with 2 setae, and males (like females) with 4 setae ventrally near posterior margin of abdominal sternum VII. Elytron with 3 to 6 discal setae in interval 3, interval 5 with or without 1 or 2 setae near base; umbilical series with about 15 setae, located close to one another basally and apically, more widely but evenly spaced medially. Legs (fore, middle, and hind): coxae (0, ca. 8, 3); trochanters (1, 1, 1); femora, ventrad (2, 2, 2); femora, dorsal (few, numerous, few). Fore, middle and hind legs with tarsomere 5 on each ventrolateral margin with row of several setae.

Vestiture. Dorsal surface glabrous (except fixed setae). Ventrally, prosternum and pterosterna medially with few scattered setae (both sexes about same). Abdominal sterna without vestiture. Middle and hind legs with tarsomere 1 ventrally more densely setose than tarsomeres 2-4. Tarsomeres 1 and 2 dorsally with scattered setae. Male tarsomeres 1-3 ventrally with adhesive vestiture of biseriate squamo-setae.

Head. Clypeal anterior margin shallowly concave, frontoclypeal suture shallow, fine. Frontal impressions irregular overall, but predominantly linear, moderately deep, extended posteriorly about to plane of middle of eyes; without postocular sulcus. Genae moderately broad, wider than width of antennomere 1. Eyes relatively large (but varying in size interspecifically), moderately bulged. Antennomeres 3 and 4 subequal in length, antennomeres 5-11 more or less compressed, sense organs ("pubescence") confined to dorsal and ventral margins, broad medial area smooth, asetose.

Mouthparts. Standard for *Thyreopterus* genus-group (see Table 2 for details). Readily observed features: labrum elongate, anterior margin narrow, medially with deep notch; terminal palpomeres slender; and mental tooth prominent, apex acute.

Pronotum. Form as in Figs. 49A-D, between one quarter and one third length of elytra (mean values for ratio Pl/El 0.26-0.30; values slightly but consistently higher for males than for females of the same species [Table 14]). Transverse, distinctly constricted posteriorly, with disc variously convex. Anterior margin narrowly, indistinctly beaded, broadly concave; lateral margins beaded, distinctly sinuate posteriorly, and posterior margin medially distinctly beaded, laterally bisinuate. Anterior angles narrowly to broadly rounded apically, more or less projected anteriad; posteriolateral angles about rectangular. Dorsal surface with median longitudinal impression narrow, rather deep, not extended to either anterior or posterior margin; anterior and posterior transverse impressions broader, less distinctly indicated; lateral grooves narrow to broad; posteriolateral impressions deep, rather broad, irregular in outline, continuous laterally with lateral groove each side. Setal punctures laterally on pronotal bead, posterior puncture at posteriolateral angle, anteriolateral puncture in about anterior third of lateral margin.

Pterothorax. Metepisternum elongate, lateral margin distinctly longer than anterior width. Metasternum longer than middle coxal cavity.

Elytra. Elytron elongate, humerus broadly rounded, lateral margin subsinuate anteriorly, and posterior (apical) margin sinuately subtruncate (cf. Ball 1975a:167, Fig. 43A), with posteriolateral angle and sutural angle broadly rounded, neither one spinose. Basal transverse portion (anteriad basal ridge) very narrow, basal ridge terminated in about plane of interneur 3 (i.e., not extended to suture). Interneurs distinctly punctate throughout most of length; parascutellar interneur distinctly separated from interneur 1; interneurs 1-8 complete, extended nearly to posterior margin. Intervals broad, slightly convex. Umbilical punctures rather widely, evenly spread medially, more closely spaced anteriorly and posteriorly.

Hind wings. Fully developed, with both oblongum and wedge cells rather small, reduced.

Legs. Average proportion for Pericalina. Fore tibia with few setae and slight depression preapically on broad anterior surface. Middle and hind tibial posterior (sericeous) surface clearly or indistinctly longitudinally canaliculate, or more or less flattened. Tarsomeres dorsal surfaces flattened, hind tarsomere 1 less than twice length of tarsomere 2. Claws smooth, not serrate or pectinate.

Abdominal sterna. Sternum VII in males with posterior margin medially shallowly incised, in females, truncate.

Male genitalia. Median lobe (Figs. 49E-L) left pleuropic (not anopic [Ball 1975a:168]); preapical orifice large (Figs. 49G-J) to small (Figs. 49K-L); shaft relatively thick (Fig. 49E) to relatively slender (Fig. 49K), apical portion short (Figs. 49G-H) to very short (Figs. 49K-L). Parameres with left one larger, apical portion curved mediad; right paramere smaller than left, apex broadly rounded (cf. Ball 1975a:167, Figs. 42C-D).

Ovipositor. Average for *Thyreopterus* genus-group (cf. Ball and Shpeley 1983:748, Figs. 3a-c).

Habitat. The members of this species group are inhabitants of lowland wet to dry tropical forests, between altitudes of near sea level to at least 1600 m. Adults are night-active, both on wing and on foot. They live on freshly fallen tree trunks (Erwin 1990:48), running on the surface at night, and resting under bark by day.

Key to the species and subspecies of the *Catascopus brasiliensis* species group based on structural features of adults

1 Specimen from South America .... *C. b. brasiliensis* Dejean, p. 121

1' Specimen from Middle America 2

2(1) Elytron with 4 to 6 discal setigerous punctures in interval 3 of each elytron; microsculpture mesh pattern predominantly isodiametric .... *C. validus* Chaudoir, p. 115

2' Elytron with 3 setigerous punctures in interval 3 of each elytron, or 3 in 1 elytron and 4 in the other; microsculpture mesh pattern predominantly slightly to moderately transverse 3

3(2') Pronotum margin (Fig. 49D) with small denticle, in association with anteriolateral setigerous puncture; anteriolateral angles moderately projected, narrowly rounded or angulate .... *Catascopus obscuroviridis* Chevrolat, p. 122

3' Pronotum (Fig. 49C) with lateral margin smooth, evenly rounded, without small denticle; anteriolateral angles broadly rounded, more prominent ... *Catascopus b. chontalensis* Bates, p. 122

Catascopus validus Chaudoir
Figs. 49A, E-F and 50

Catascopus validus Chaudoir 1854:131. TYPE MATERIAL: see note below, about types.

Catascopus guatemalensis Bates 1883:178. TYPE MATERIAL: 5 males, 9 females, as follows. LECTOTYPE (here designated), female, labelled: "Type/ HT" [circular, ringed with red]; "Cerro Zunil/ 4000 ft./ Champion"; "BCA Col. I.1/ Catascopus/ guatemalensis/ Bates"; "Catascopus/ guatemalensis/ Bates" [handwritten, Bates' hand?] (BMNH). Thirteen PARALECTOTYPES, as follows. Male, "Cerro Zunil/ 4000 ft./ Champion"; "Ex/ Godman/ and/ Salvin"; "Type/ 7155" [red paper]; "Catascopus/ guatemalensis/ Bates" [handwritten, Bates' hand?]; "M + winged"; "ADP 08000" (MCZC). Male, "Cerro Zunil/ 4000 ft./ Champion"; "Ex/ Godman/ and/ Salvin"; "Type" [broad red transverse line at bottom]; "M + winged"; "ADP 08001" (MCZC). Male, "Cerro Zunil/ 4000 ft./ Champion"; "BCA Col. I.1/ Catascopus/ guatemalensis/ Bates"; "Catascopus/ guatemalensis/ Bates" [handwritten, Bates' hand?]; "M + winged"; "ADP 07998" (MCZC). 2 males, 4 females, "Cerro Zunil/ 4000 ft./ Champion"; "B.C.A. Col. I. 1./ Catascopus/ guatemalensis/ Bates" (BMNH). Female, "Cerro Zunil/ 4-5000 ft./ Champion"; "B.C.A. Col. I. 1./ Catascopus/ guatemalensis/ Bates"; "Catascopus/ guatemalensis/ Bates" [handwritten, Bates' hand?] (BMNH). Female, "Cerro Zunil/ 4000 ft./ Champion"; "V + winged"; "ADP 07999" (USNM). Female, "Cerro Zunil,/ 4000 ft./ Champion."; "Catascopus/ guatemalensis/ Bates!" [handwritten, Bates' hand?] (ISNB). Female, "Capetillo,/ Guatemala,/ G. C. Champion"/ "B.C.A. Col. I.1/ Catascopus/ guatemalensis/ Bates"; "Catascopus/ guatemalensis/ Bates" [handwritten, Bates' hand?]; "Paratypus" (red paper) (UDAE, Straneo Coll). **NEW SYNONOMY**.

Type localities. For *Catascopus validus*, only "Mexico" is given as the source for the type specimen, the latter being received from "M. Guex". We have no reason to restrict further the type area at this time.

For *Catascopus guatemalensis,* the lectotype was collected on Cerro Zunil, Quezaltenango, Guatemala, and the slope of this volcano, at about 1200 m. altitude, is accepted as type locality.

Notes about type material. One would expect that the box label in the Oberthür-Chaudoir collection associated with the type material of *Catascopus validus* Chaudoir would indicate the collector as "M. Guex" (see above). In fact, the box label indicates "Sallé" in that role. 6 authentic Chaudoir specimens (i.e., each with the characteristic "Ex Musaeo/ Chaudoir" label) are associated with said box label. One of these specimens is labelled "mexicanus m/ Mexico", and "Orizaba". These labels are handwritten on green paper, and indicate that this specimen was from the Dejean collection. One specimen is represented by a card-mounted mentum, only. Because none of these specimens seem to have been collected by Guex, we assume that one was lost (or was misplaced), and thus the specific name, *Catascopus validus*, is without a type specimen. A neotype might be chosen from the Chaudoir material, but we are reluctant to do that until a concerted effort has been made to locate the missing Guex specimen. Meanwhile, we accept the Sallé material (as determined by Chaudoir) as being a correct representation of this species.

Recognition. In addition to features noted in the key above, specimens of *C. validus* are distinguished from those of other Neotropical *Catascopus* species by larger size (SBL more than 11 mm., Table 14), and head relatively narrow (values for ratio Hw/Pwm relatively low, Table 14). In the latter respect, specimens of this species and of *C. b. chontalensis* are similar. The male genetalic median lobe (Figs. 49E-F) is distinctive in form and extent of the preapical orifice (much more extensive than that of *C. obscuroviridis* and slightly less extensive than that of *C. brasiliensis).*

Description. With character states of the *C. brasiliensis* species group, restricted or amplified as follows. For data about size (SBL, mm.) and proportions, see Table 14.

Color. Dorsal surface rather dark metallic green. Legs with femora piceous.

Microsculpture. Elytral mesh pattern on intervals isodiametric to slightly transverse (sculpticells as wide as long, or 1.5X longer than wide) or diagonal, sculpticells relatively wide, with posterior margin of each raised slightly.

Luster. Elytra shiny, not subiridescent.

Chaetotaxy. Elytron with 4 to 6 discal setae in interval 3, interval 5 with or without 1 or 2 setae near base.

Head. Eyes relatively small (values for ratio Fw/ Hw relatively high [see Table 14]).

Pronotum. Form as in Fig 49A, proportions as in Table 14. Anterior angles broadly rounded apically, prominently projected anteriad. Lateral margins evenly rounded. Lateral grooves broad.

Legs. Middle and hind tibial posterior (sericeous) surface clearly longitudinally canaliculate.

Male genitalia. Median lobe (Figs. 49E-F) broad, in dorsal aspect markedly constricted basad (Fig. 49E); in left lateral aspect (Fig. 49F), with basal bulb sharply projected ventrad; in left lateral aspect, shaft ventral surface about straight, not curved; preapical orifice large, nearly half length of shaft; apical portion short, broad, apex broadly rounded.

Habitat. This species seems to be restricted to montane tropical forest, with no specimens collected at an altitude of less than 1200 m. altitude. Data available suggest that the habits of adults of this species are about standard for the *C. brasiliensis* species group. See this topic above, in the treatment of this species group.

Geographical distribution. (Fig. 50). This species seems to be discontinuously distributed, being known only from localities in the eastern state of Veracruz, México (lower slope of the Sierra Transvolcanica) and montane western Guatemala.

Chorological affinities. The range of this species is overlapped by the more extensive ranges of *C. b. chontalensis* and *C. obscuroviridis*. However, the principal parts of the ecological ranges of the latter 2 species seem to be at a lower altitude than is the range of *C. validus*. Therefore, this species might be effectively isolated from the other 2.

Phylogenetic relationships. The approximately isodiametric mesh pattern of elytral microsculpture and form of the median lobe of the male genitalia (Figs. 49E-F) of *Catascopus validus,* with its moderately extensive preapical orifice seem quite primitive. On this basis, *Catascopus validus* is postulated to be the adelphotaxon of *C. brasiliensis and C. obscuroviridis*. The remoteness of the relationship of *C. validus* seems assured by its relatively isolated geographical position (higher altitude, and in Nuclear Middle America).

Material examined. In addition to the type material noted above, we have seen 25 specimens from the following localities: **GUATEMALA. Baja Verapaz.** Male, 8 km. s. Purulhá, 1660 m., tropical montane forest, ex U-V light, 19.V.1991, G.E. & K.E. Ball, D. Shpeley (UASM). **MÉXICO.** 2 males, Putzeys (ISNB). 2 females (BMNH). Female, Bowring (BMNH). 2 males, Putzeys (ISNB). **Veracruz**. Male, female, Cordova, Sallé (BMNH). Jalapa: 2 males (BMNH); 8 males, 1 females, Hoege (BMNH); 2 females, M. Trujuillo (BMNH); female, Wickham (BMNH). Female, Xalapa, La Briones, 1340 m., 25.XI.1994, F.F. Purrington, C. Drake (UASM). **State?** Female, J'uqui (spelling?), Fry (BMNH). Male, Chierbor (spelling?), Bonvouloir (BMNH).

Months of collection. May and November.

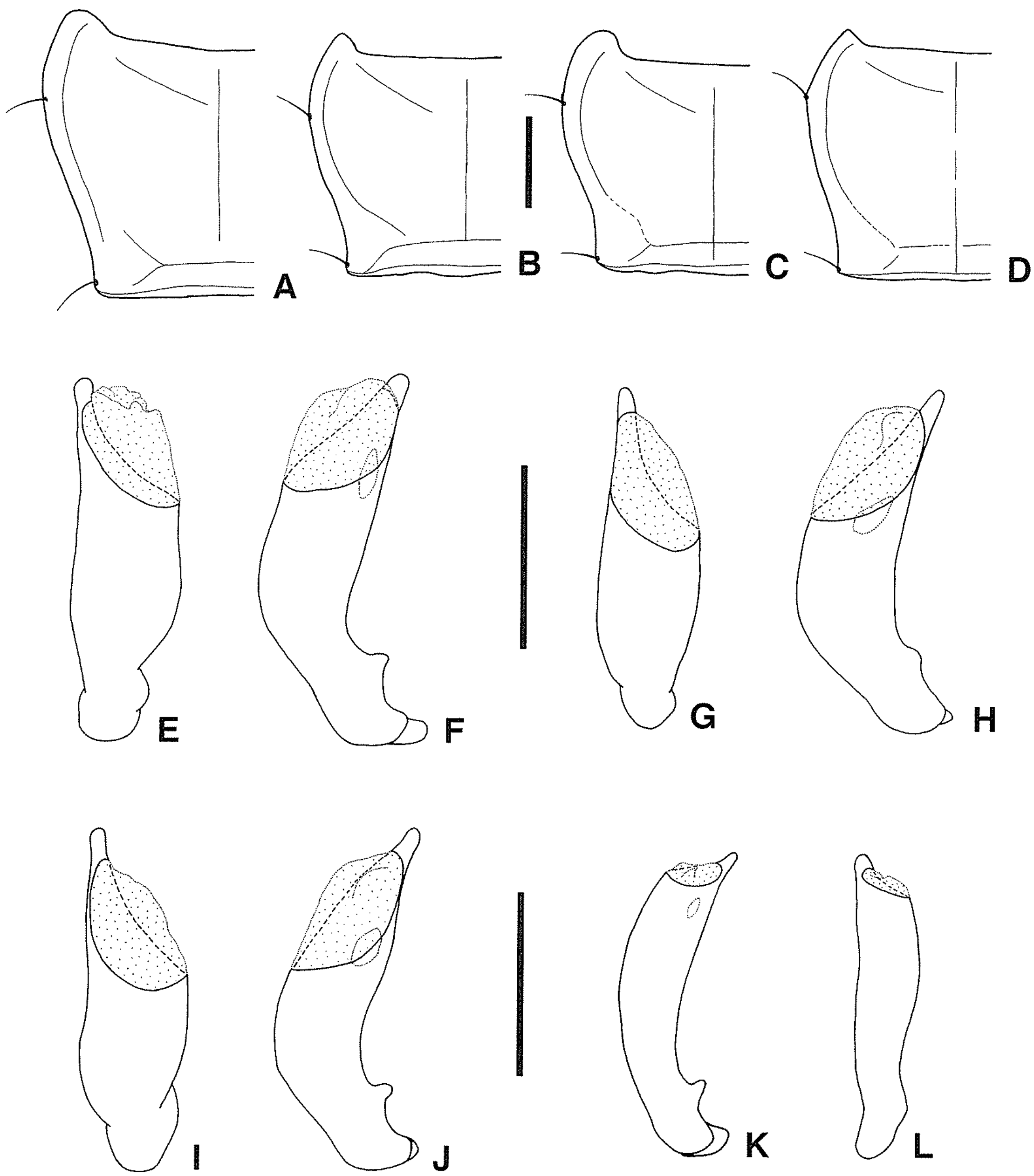

Figure 49. Line drawings of structural features of the Western Hemisphere species of *Catascopus* Kirby. **A-D**, pronotum, dorsal aspect, of: **A**, *C. validus* Chaudoir; **B**, *C. b. brasiliensis* Dejean; **C**, *C. b. chontalensis* Bates; **D**, *C. obscuroviridis* Chevrolat. **E-L**, male genitalia, median lobe: **E**, **J**, **I**, and **K**, dorsal aspect; **F**, **H**, **J**, and **L**, left lateral aspect. **E-F**, *C. validus* Chaudoir; **G-H**, *C. b. brasiliensis* Dejean; **I-J**, *C. b. chontalensis* Bates; and **K-L**, *C. obscuroviridis* Chevrolat. Scale bars = 1.0 mm.

Catascopus brasiliensis Dejean
Figs. 49B-C, G-J, and 50

Catascopus brasiliensis Dejean 1831:454. TYPE MATERIAL: a single specimen, in Oberthür-Chaudoir Collection (MNHP), in front of the following box label: "brasiliensis/ Dejean/ Brésil/ Coll. Dejean". HOLOTYPE female, labelled: "brasiliensis m./ in Brasilia" [green paper]; "Lacordaire" [green paper]; "Ex Musaeo/ Chaudoir" [red print]. Type area. Brazil.

Catascopus cayennensis Chaudoir 1872:248. TYPE MATERIAL: 2 specimens, in Oberthür-Chaudoir Collection (MNHP), in front of the following box label: "cayennensis/ Chaud/ Cayenne/ Deyrolle". LECTOTYPE female, labelled: "Ex Musaeo/ Chaudoir" [red print]. PARALECTOTYPE female, la-

Figure 50. Map of Middle America and South America showing positions of known localities for the species of *Catascopus* Kirby and *Catascopellus* Straneo.

belled same as lectotype. Type area. Cayenne. **NEW SYNONYMY.**

Catascopus chontalensis Bates 1878:605. TYPE MATERIAL: 4 specimens (we have seen only the 2 following). 2 Bates specimens in the Oberthür-Chaudoir collection (MNHP), as follows. LECTOTYPE (here designated), male, labelled: "Chontales/ Nicaragua"; "M"; "H.W. Bates/ Biol. Cent. Amer". PARALECTOTYPE female, labelled: "Chontales/ Nicaragua"; "V"; "chontalensis/ Bates"; "H. W. Bates/ Biol. Cent. Amer". Bates 1883:179. **NEW SYNONYMY.**

Type localities. The type area for *C. brasiliensis* is Brazil, according to the original description of this taxon. Considering the extensive geographical variation exhibited by the South American specimens of this species, a more precise locality is desirable. Accordingly, we select the state of Rio de Janeiro on the basis that a specimen so labelled fits rather well the original description of the species.

The type specimens of *C. cayennensis* are recorded in the original description as coming from "Cayenne", or French Guiana. Presently, no reason is evident for designating a more specific locality. For *C. b. chontalensis,* Chontales, Departamento de Chontales,

Table 14. Data about variation in Standardized Body Length (mm.) and various proportions for species of genus *Catascopus* Kirby.

		Males			Females	
Value/ Ratio / Species	N	Range	Mean	N	Range	Mean
SBL (mm.)						
C. validus Chaudoir						
Guatemala	6	11.28-12.64	12.21	7	10.72-12.64	11.66
México	10	10.96-13.24	12.06	6	11.04-12.68	11.70
C. b. brasiliensis Dejean						
S. America	8	9.30-11.36	10.33	9	9.50-11.44	10.47
C. b. chontalensis Bates						
México	10	9.84-10.88	10.34	7	9.68-11.68	10.33
C. obscuroviridis Chevrolat						
Costa Rica	4	9.20- 9.72	9.56	4	9.16- 9.88	9.21
México	9	9.32-10.40	9.84	11	9.16-11.08	9.93
Hw/Fw						
C. validus Chaudoir						
Guatemala	6	1.56-1.61	1.59	7	1.54-1.61	1.56
México	4	1.52-1.67	1.56	6	1.54-1.56	1.55
C. b. brasiliensis Dejean						
South America	8	1.56-1.67	1.61	9	1.56-1.64	1.61
b. chontalensis Bates						
México	10	1.59-1.67	1.64	7	1.61-1.67	1.64
C. obscuroviridis Chevrolat						
Costa Rica	4	1.82-1.92	1.85	4	1.78-1.85	1.82
México	9	1.75-1.89	1.85	11	1.78-1.85	1.78
Hw/Pwm						
C. validus Chaudoir						
Guatemala	6	0.85-0.92	0.89	7	0.90-0.94	0.92
México	4	0.86-0.93	0.90	6	0.88-0.92	0.90
C. b. brasiliensis Dejean						
South America	8	0.86-0.99	0.92	9	0.88-0.99	0.94
C. b. chontalensis Bates						
México	10	0.81-0.92	0.87	7	0.87-0.95	0.90
C. obscuroviridis Chevrolat						
Costa Rica	4	0.94-0.97	0.95	4	0.94-0.98	0.96
México	9	0.90-0.97	0.94	11	0.91-0.96	0.93
Pl/Pwm						
C. validus Chaudoir						
Guatemala	6	0.68-0.71	0.70	7	0.65-0.69	0.67
México	4	0.68-0.74	0.70	6	0.66-0.68	0.67
C. b. brasiliensis Dejean						
South America	8	0.66-0.73	0.70	9	0.65-0.71	0.68
C. b. chontalensis Bates						
México	10	0.65-0.69	0.67	7	0.61-0.68	0.65
C. obscuroviridis Chevrolat						
Costa Rica	4	0.73-0.78	0.74	4	0.70-0.73	0.71
México	9	0.70-0.74	0.72	11	0.65-0.76	0.68

Table 14. Continued.

Value/ Ratio	Species	Males N	Males Range	Males Mean	Females N	Females Range	Females Mean
Pl/Pwb							
	C. validus Chaudoir						
	Guatemala	6	0.92-0.97	0.94	7	0.85-0.95	0.89
	México	4	0.87-0.98	0.92	6	0.88-0.93	0.90
	C. b. brasiliensis Dejean						
	South America	8	0.86-0.97	0.92	9	0.85-0.91	0.88
	C. b. chontalensis Bates						
	México	10	0.85-0.94	0.89	7	0.82-0.90	0.86
	C. obscuroviridis Chevrolat						
	Costa Rica	4	0.92-1.00	0.97	4	0.90-0.98	0.93
	México	9	0.92-1.02	0.97	11	0.86-1.00	0.92
Pl/El							
	C. validus Chaudoir						
	Guatemala	6	0.27-0.29	0.28	7	0.26-0.27	0.26
	México	4	0.27-0.30	0.28	6	0.26-0.27	0.27
	C. b. brasiliensis Dejean						
	South America	8	0.27-0.31	0.29	9	0.27-0.30	0.28
	C. b. chontalensis Bates						
	México	10	0.28-0.30	0.29	7	0.26-0.28	0.27
	C. obscuroviridis Chevrolat						
	Costa Rica	4	0.29-0.30	0.30	4	0.28-0.30	0.29
	México	9	0.29-0.31	0.30	11	0.27-0.31	0.28

Nicaragua is the type locality, determined from original description and locality data associated with the type material.

Type material. The specimen indicated as holotype of *C. brasiliensis* is 1 of 4 in the Oberthür-Chaudoir Collection. It is the only 1 with labels indicating its authenticity as having been examined by Dejean, who, in the original description reported that it was based on a single specimen, from Brazil, received from Lacordaire. Of the other 3 specimens, 2 (male and female) bear only the typical "Ex Musaeo Chaudoir" labels, and the third 1 (a female) is labelled additionally "Sta. Catherina"

Recognition. See key and above, and descriptive notes, below. In many respects, *C. brasiliensis* seems to be between *C. validus* and *C. obscuroviridis*. The middle and posterior tibiae have the posterior surface either indistinctly canaliculate, or flat, not canaliculate. Males of *C. brasiliensis* have the fore femoral pit smaller (ratio length of pit/ length of femur less than 0.135) than in the other 2 species, and the male genitalic median lobe (Figs. 49G-J) is distinctive, particularly in the longer apical portion and in the larger preapical orifice.

Description. With character states of the *C. brasiliensis* species group, restricted or amplified as follows. For data about size (SBL, mm.) and proportions, see Table 14.

Color. Dorsal surface bright to dark metallic green or blue, head and pronotum of most individuals darker than elytra. Legs with femora rufous to piceous.

Microsculpture. Elytral mesh pattern on intervals transverse or diagonal, sculpticells 1.5-5X as long as wide, relatively long, each with posterior margin raised slightly, or not.

Luster. Elytra shiny to subiridescent.

Chaetotaxy. Elytron of most specimens with 3 discal setae in interval 3, interval 5 asetose.

Head. Eyes of intermediate size for species group (values for ratio Fw/ Hw intermediate [see Table 14]).

Pronotum (Figs. 49B-C). Proportions as in Table 14. Anterior angles narrowly to broadly rounded apically, more or less projected anteriad. Lateral margin evenly rounded, not slightly projected at base of anteriolateral seta. Lateral grooves narrow (Fig. 49B) to broad (Fig. 49C).

Legs. Middle and hind tibial posterior (sericeous) surface indistinctly longitudinally canaliculate, or more or less flattened.

Male genitalia. Median lobe (Figs. 49G-J) broad, in dorsal aspect markedly constricted basad (Fig. 49G-I); in left lateral aspect (Fig. 49H-J), basal bulb moderately sharply projected ventrad; in left lateral aspect, shaft ventral surface curved slightly; preapical orifice large, slightly more than half length of shaft; apical portion short, sloped gradually to narrowly rounded apex.

Way of life. Data available suggest that the habits of adults of this species are about standard for the *C. brasiliensis* species group. See this topic above, in the treatment of this species group.

Habitat. See this topic below, in the subspecies treatments.

Geographical distribution (Fig. 50). This species ranges from southeastern Brazil in South America northward in Middle America from Panamá to eastern Veracruz, México.

Chorological affinities. The ranges of *C. brasiliensis* and *C. obscuroviridis* overlap substantially (from Panamá to eastern México), and both have been taken in the same localities. Although the range of *C. brasiliensis* overlaps that of C. *validus* to the north, the 2 seem to be isolated altitudinally, with *C. brasiliensis* occurring at lower altitudes.

Phylogenetic relationships. This species is postulated to be the adelphotaxon of *C. obscuroviridis,* primarily on the basis of shared transverse microsculpture mesh pattern of the elytra.

Catascopus b. brasiliensis Dejean

Figs. 49B, G-H, and 50

Type locality. See this topic above, with the species-level treatment of *C. brasiliensis.*

Recognition. Markedly similar to adults of *C. b. chontalensis,* those of *C. b. brasiliensis* exhibit a more transverse mesh pattern of elytral microsculpture (sculpticells 3-5X longer than wide) and the lateral grooves of the pronotum are narrower (Fig. 49B; cf. Fig. 49C). They differ also in variability, with *C. b. brasiliensis* being the more varied.

Geographical variation. Color of the dorsal surface varies from green (over most of range) to dark blue (Tambopata, Peru). Color of the femora varies from piceous (over most of range) to rufous (Cayenne, and Rio Napo Basin, in cis-Andean Ecuador). Elytral microsculpture varies: specimens over most of the range of the subspecies have the posterior margin of each sculpticell raised slightly, whereas specimens from the Upper Amazon Basin do not exhibit such a raised rim. Although most adults have 3 discal setigerous punctures on each elytron, the holotype of *C. brasiliensis* was reported as having 4 (the 1 elytron that we examined has only 3 punctures; presumably the missing elytron was the 1 with the 4 punctures). A specimen from Rio de Janeiro (Fry. Coll., BMNH) also has 4 setigerous punctures on 1 elytron. Specimens from the upper part of the Amazon Basin have the middle and hind tibiae with the posterior surfaces smoother and less sericeous than specimens from elsewhere.

Habitat. In the southeastern part of its range, this subspecies lives in the Atlantic Forest. In the Amazon Basin, it lives in tropical lowland forest, to an altitude of at least 400 m.

Geographical distribution (Fig. 50). This subspecies, ranges extensively through northern cis-Andean South America.

Chorological affinities. The ranges of *C. b. brasiliensis* and *C. b. chontalensis* are allopatric. Probably the ranges meet in northern South America.

Phylogenetic relationships. This subspecies and *C. b. chontalensis* are postulated as adelphotaxa.

Material examined. In addition to the holotype, we have seen 18 specimens of this species, from the following localities: **ARGENTINA. Misiones**. Female, Bembers (spelling?), 21.I.1945, Hayward, Willink, Golbach (MNHP). **BOLIVIA. Cochababma**. Male, Region Chapare, 400 m., V.1949, Zischka (MNHP). **BRAZIL**. Female (PMCT). Male, Putzeys (ISNB). Male, Bonvouloir (BMNH). **Para**. Male, Bowring (BMNH). **Rio de Janeiro**. Female, Rio de Janeiro, Fry (BMNH). **Rondonia**. Male, Fazenda Rancho Grande, 62 km. s. Ariquiemes, 12-22.XI.1991, Hg vapor light, L.G. Bezark, D.E. Russell (CASC). **Santa Catarina**. Female, Hansa Humboldt, 1933, A. Maller (MNHP). Female, Nova Teutonia, 21.XII.1956, F. Plaumann (MNHP). Male, Nova Teutonia, 27°11'B 52°23', 300-500 m., 21.XII.1956, F. Plaumann (MNHP). Female, Nova Teutonia, 27.Br.° 52.-53.L°, 11.IX.1934, Plaumann (BMNH). **ECUADOR. Napo.** Yasuni Scientific Station, K.W. Will (CUIC): 2 females, 00°40'36"S, 76°24'02"W, head lamp, at night, 17.IV.1998; male, 00°39'19"S, 76°27'12"W, 20.IV.1998. **PERU. Madre de Dios**. Female, Pakitza, 12°07'S 70°58'W, on trees at night, BIOLAT/COLE 000006411, 06.XI.1990, T.L. Erwin, (USNM). **Tambopata**. Male: 15 km. n.e. Puerto Maldonado, 200m, ex: under bark, 1.VII.1989, J.S. Ashe, R. Leschen, #347 (SEMC).

Months of collection. January, April-May, July, September, and November-December.

Catascopus b. chontalensis Bates
Figs. 49C, I-J and 50

Type locality. See this topic above, with the species-level treatment of *C. brasiliensis*.

Recognition. See this topic above, with the subspecies-level treatment of *C. b. brasiliensis*. Adults of *C. b. chontalensis* exhibit a less transverse mesh pattern of elytral microsculpture (sculpticells 1.5-4X longer than wide) and the lateral grooves of the pronotum are wider (Fig. 49C; cf. Fig. 49B).

Variation. Color of the dorsal surface varies from darker to brighter green. One specimen (from 5 km. e. Tavela, Oaxaca) has 4 setae on the right elytron, with the normal 3 setae on the left elytron.

Habitat. Lowland tropical forest, at altitudes between at least 300 and 900 m.

Geographical distribution (Fig. 50). Confined to Middle America, the range of this subspecies extends from Panamá northward to the state of Veracruz, in eastern México.

Chorological affinities. The range of this subspecies and of *C. b. brasiliensis* are allopatric. The ranges of this subspecies and of *C. obscuroviridis* overlap broadly. One collection (Coyame, at Lake Catemaco, Veracruz) suggests that adults of these 2 taxa are synchronic, as well as being sympatric. Specimens of both species have been collected in Chontales, Nicaragua, possibly in the same place and at the same time. See also this topic for *C. validus*, above.

Phylogenetic relationships. See this topic for *C. b. brasiliensis*, above.

Material examined. In addition to the type specimens noted above, we have seen 25 specimens, from the following localities: **GUATEMALA**. **Peten.** Male, Tikal, at light, ADP 55523, 17.V.1956, T.H. Hubbell (UMMZ). **MEXICO.** Female (BMNH). Male, Bowring (BMNH). **Chiapas**. Female, Km. 23, Carretera Montebello, Santa Elena, 24.III.1980, L. Rivera (CASC). 2 males, female, 18.3 km. s. Soluschiapa, 640 m., 25.IV.1966, G.E. Ball, D.R. Whitehead (UASM). **Veracruz**. 2 males, female, Cordova, Sallé (BMNH). Female, Jalapa, Hoege (BMNH). 2 females, Lake Catemaco, 305 m., 24-25.V.1969, H.F. Howden (UASM). Coyame, Lake Catemaco, D.R. Whitehead (UASM): 2 males, u-v light, 10-18.VII.1963; male, female, ex under bark, 1-15.VII.1963. Male, Rio Metlac Cyn., 4 km. w. Fortin, de las Flores, 900 m., 13.VIII.1987, J.K. Liebherr, D.A. Millman (CUIC). **NICARAGUA.** Male, Fry (BMNH). **Chontales**: female, Janson (BMNH); female, E.M. Janson (BMNH). **PANAMA. Canal Zone.** Coco Solo Hospital, 9°21'N 79°51'W, light trap, H.P. Stockwell (USNM): female, ADP 45704, 6.V.1972; female, ADP 68267, 8.V.1976. Male, Barro Colorado Island, ADP 07984, 10-17.V.1964, W.D. & S.S. Duckworth (USNM). **Chepo.** Male, Altos de Maje, at light, ADP 45074, 17.V.1975, H.P. Stockwell, D. Engelman (USNM).

Months of collection. March-May and July-August.

Catascopus obscuroviridis Chevrolat
Figs. 48, 49D, K-L, and 50

Catascopus obscuroviridis Chevrolat 1835:186. TYPE MATERIAL: single specimen in Chevrolat Collection (OXUM). HOLOTYPE female, labelled: "Chevrolat/ Carabidae/ Fr. W. d. Poll/ Pres. 1909/ B. Poulton"; "TYPE COL: 127/ Catascopus/ obscuroviridis/ Chevr/ HOPE DEPT. OXFORD"; "HOLOTYPE V/ Catascopus/ obscuroviridis/ Chev./ By Erwin '76".

Catascopus mexicanus Chaudoir 1877:201. TYPE MATERIAL: 1 specimen in Oberthür-Chaudoir Collection (MNHP), associated with the following box label: "mexicanus/ Chaud/ Mexique/ Boucard". HOLOTYPE female, labelled: "Ex Musaeo/ Chaudoir" [red print]. **NEW SYNONYMY**.

Catascopus angulicollis Bates 1878:605. TYPE MATERIAL: a single specimen, in Oberthür-Chaudoir Collection (MNHP). HOLOTYPE female, labelled: "Chontales/ Nicaragua"; "V"; "angulicollis/ Belt" [previous 3 labels handwritten]; "G. W. Bates/ Biol. Cent. Amer.". **NEW SYNONYMY**.

Type localities. In the original description of *C. obscuroviridis*, Chevrolat noted that the unique specimen had been collected (probably by Auguste Sallé or his mother) "Des environs de Mexico", which is most appropriately interpreted to mean Mexico City. However, it seems unlikely that this species occurs anywhere on the Mexican Plateau. Because the Sallés, who had been employed as professional collectors by Chevrolat, spent substantial amounts of time in the vicinity of Cordoba, which is at 914 m. altitude and within the altitudinal range of *C. obscuroviridis*, this seems to be a more likely source area for the holotype.

According to the original description (Chaudoir 1877:201) the type specimen of *C. mexicanus* was collected in México, having been purchased from "M. Boucard". No additional geographical information is associated with the holotype. With no pressing reason to specify a type locality more precisely, "México" will suffice for the present.

The holotype of *C. angulicollis* was collected at Chontales, Nicaragua, which will be type locality for a southern geographical race of *C. obscurovididis*, should the results of future work indicate recognition of subspecies.

Both of the names *Catascopus mexicanus* and *C. angulicollis* recorded above were based on single specimens, according to the original descriptions. Thus, each specimen is recognized as a holotype.

Recognition. In addition to features recorded in the key above, adults of this species are recognized by relatively small size (Table 14) and large eyes (Table 14). The median lobe (Figs. 49K-L) of the male genitalia is markedly distinctive.

Description. With character states of the *C. brasiliensis* species group, restricted or amplified as follows. For data about size (SBL, mm.) and proportions, see Table14.

Color. Dorsal surface bright to dark metallic green. Legs with femora piceous.

Microsculpture. Elytral mesh pattern on intervals transverse to slightly diagonal, sculpticells 1.5-3X longer than wide, each with posterior margin slightly raised.

Luster. Elytra shiny, not subiridescent.

Chaetotaxy. Elytron with 3 (most specimens) or 4 (1 elytron, only) discal setae in interval 3.

Head. Eyes relatively large for species group (values for ratio Fw/ Hw low [see Table 14]).

Pronotum. Form as in Fig 49D, proportions as in Table 14. Anterior angles apically narrowly rounded to pointed, projected anteriad. Lateral margin slightly projected at base of anteriolateral seta. Lateral grooves narrow to broad.

Legs. Middle and hind tibial posterior (sericeous) surface clearly longitudinally canaliculate.

Male genitalia. Median lobe (Figs. 49K-L) slender; in dorsal aspect (Fig. 49K) gradually constricted basally; in left lateral aspect (Fig. 49L), basal bulb moderately projected ventrad, dorsal surface curved in even arc, ventral surface evenly and rather slightly curved; preapical orifice relatively small (Figs. 49K-L), much less than half length of shaft; apical portion relatively very short (Figs. 49K-L), apex narrowly rounded.

Habitat. Tropical lowland forest (evergreen, thorn, and gallery), at altitudes between at least near sea level and 1400 m.

Geographical distribution (Fig. 50). The range of *C. obscuroviridis* extends from eastern Panamá (Canal Zone) northward to central México (Veracruz in the east and Jalisco in the west).

Chorological affinities. The range of *C. obscuroviridis* overlaps broadly the ranges of *C. b. chontalensis* and *C. validus*. For details, see this topic for *C. validus*, above.

Phylogenetic relationships. This species is the putative adelphotaxon of *C. brasiliensis*, based on the synapotypic feature of transverse elytral microsculpture. Although the markedly distinctive male genitalia of *C. obscuroviridis* do not support this hypothesis of relationship, no other extant species known could be its adelphotaxon.

Material examined. In addition to the type material noted above, we have seen 50 specimens of this species, from the following localities: **BELIZE. Corozal**. Female, Rio Hondo, Blancaneau (BMNH). **COSTA RICA. Guanacaste.** Female, 5 km. n.e. Bebedero, 28.III.1974, W. Vandevender (EMEC). Female, Cañas, 23.X.1971, F. Cordero (EMEC). La Pacifica, 4 km. n.w. Cañas, P. Opler (EMEC): 2 males, ex under bark, 20.XII.1973; female, ex under bark, at night, 13.II.1971. Female, 2.4 km. S. Potrerillos, ADP 07985, 27.VII. 1967, O.S. Flint, Jr. [labelled homotype of both *C. obscuroviridis* Chevrolat and *C. mexicanus* Chaudoir by T. L. Erwin] (USNM). Male, Santa Rosa National Park, ADP 55000, 14-16.VI.1980, D.H. Janzen & W. Hallwachs (USNM). Male, Tilarán, 800 m., ADP 07983, 28.VI.1930, F. Nevermann (USNM). **GUATEMALA. Escuintla**. Female, Conradt (BMNH). Male, female, Zapote, G.C. Champion (BMNH). **Departamento?** Male, Cayaga, ADP 07986, III.18, W. Schauss (USNM). **MEXICO. Chiapas.** Female, Cinco Cerros, 10.VI.1989, P.K. Lago (PKLC). Male, El Aguacero, 16 km. w. Ocozocuautla, 680 m., 5.VI.1990, H. & A. Howden (UASM). 2 males, 7.9 km. n. Frontera Comalapa, 732 m., at night, ex log, 18.VI.1966, G.E. Ball, D.R. Whitehead (UASM). Male, 26.2 km. s.w. Las Cruces, 860 m., 25.VIII.1967, G.E. Ball, T.L. Erwin, & R.E. Leech (UASM). 3 males, 18.5 km. s. Solosuchiapa, Rte. 195, 640 m., 25.IV.1966, G.E. Ball, D.R. Whitehead (UASM). Female, Parque Laguna Belgica, 12.VI.1991, B. Ratcliffe, J.S. Ashe, & M. Jameson (SEMC). **Jalisco**. 3 males, 6 females, nr. Ixtapa, gallery forest, ex under bark, 22.XII.1970, G.E. Ball (UASM). **Morelos**. 2 males, female, 8.7 km. e. Cuernavaca, 1400 m., thorn forest, on log, 29-30.VI.1966, G.E. Ball, D.R. Whitehead (UASM). **Nayarit.** Male, San Blas, 28.VI.1955, D. Giuliani

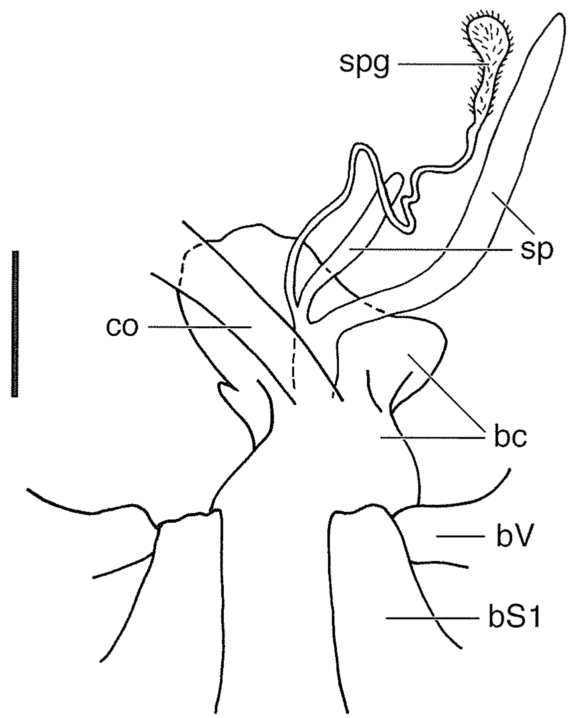

Figure 51. Line drawing of female genital tract, ventral aspect, of *Catascopellus crassiceps* Straneo. Scale bar = 0.25 mm. Legend: **bc**, bursa copulatrix; **bS1**, base of stylomere 1; **bV**, base of valvifer; **co**, common oviduct; **sp**, spermatheca; and **spg**, spermathecal gland.

(CASC). **Oaxaca**. Male, female, 5 km. e. Tavela, 825 m., tropical riparian forest, 21.VI.1979, J.S. Ashe, G.E. Ball, & D. Shpeley (UASM). Female, Temascal, VII.11.1965, A.B. Lau (USNM). **Puebla**. 72 km. n. Acatlan, 30.VII.1963 (CASC): male, W.A. Foster; male, J. Doyen. **Tabasco**. Female, 95.6 km. s.e. Villahermosa, 30.5 m., u-v light, 6-7.VI.1966, G.E. Ball, D.R. Whitehead. **Veracruz**. Cotaxtla, Cotaxtla Experiment Station, D. H. Janzen: 4 males, respectively, 23. I.1962 (EMEC), 23.VI.1962 (CASC)(EMEC), and 12.VII.1963 (EMEC). Female, Lake Catemaco, 305 m., 1-15.VII.1963, D.R. Whitehead (UASM). Male, 15.3 km. n.e. El Tropico, 26-27.VI.1985, I.S. Askevold, Heffern (UASM). Male, Jalapa, Höge (BMNH). **Yucatan.** Female, 12 km. n. Piste, 24.V.1984, R.H. Turnbow (UASM). **PANAMA. Canal Zone**. Female, Coco Solo Hospital, light trap, 20.IV.1972, H. Stockwell (USNM).

Months of collection. January-August, October, and December.

Catascopellus genus-group

This monobasic genus-group is distinguished here for the first time.

Recognition. This genus-group is distinguished within the subtribe Pericalina by the following combination of structural features. Body (including elytra) and appendages generally setose. Head large, longer than prothorax; eyes small, width of gena thus more than width of antennomere 1 (scape). Mouthparts (see Table 2 for complete characterization) with labrum nearly quadrate, distinctly longer than clypeus, row of 6 setae dorsally, near anterior margin; mandibles (Figs. 8A-F) not explanate, without dorsal projections, terebrae narrow, scrobes hardly visible in dorsal aspect, left mandible with supraterebral ridge complete (Fig. 8A, **str**), ventral grooves present (Fig. 8C, **vg**), and terebral ridge (Fig. 8A, **tr**) curved evenly into incisor tooth (Fig. 8A, **i**); maxilla with maxillary palpomere 4 distinctly longer than 3, galea with galeomeres 1 and 2 relatively narrow, not partially fused, galeomere 2 shorter than 1; labium with submentum separated from mentum by distinct mental suture, mentum with prominent tooth, lateral lobes prominent, epilobes widened preapically, premental glossal sclerite apically quadrisetose, without paramedial setae, and palpiger asetose; labial palpomere 3 narrow, not securiform. Elytral apical margin markedly sinuate. Tarsal claws ventral surfaces smooth, not pectinate. Male middle tibia with distinct notch preapically, in ventral (inner) surface. Male fore tarsomeres 1-4 ventrally (Figs. 12D-F) with adhesive vestiture of articulo-setae, 1 and 4 with vestiture apicad only, 2 and 3 with entire surface covered; each articulo-seta with shaft rugose on distal surface, plate oblong, sides rounded, pointed distally; tactile setae ventrally one row each side. Male genitalic median lobe slightly left-pleuropic, dorsal membranous portion small. Ovipositor (Figs. 13A-E): stylomere 2 subfalcate, lobed basally, basal lobe short, broad; blade (distal portion) flattened in medioventral plane and turned, with dorsomedial ensiform seta ventrad (Fig. 13B); surface virtually without microlines, except near apex of basal lobe, meshes not formed; ventrolateral surface with about 10 deep pits, each with short sense organ; ensiform setae 3, 2 dorsolateral (**les**), and medial 1 ventrad (**mes**); subapical setose organ (Fig. 13C) nearly medial, furrow rather wide, irregularly oval, with 2 short nematiform setae (**ns**) and several furrow-pegs (**fp**). Internal reproductive organs of female (Fig. 51): bursa copulatrix with spermatheca (**sp**) bipartite, with large "blind sac" (Shpeley and Ball 1993: 28, Figs. 13A, B), and spermathecal gland (**spg**) with duct long.

Included taxa. This genus-group includes only the monobasic genus *Catascopellus* Straneo.

Phylogenetic relationships. Ball (1975a:169) placed *Catascopellus* in the somotrichoid genus-group, based on the setose dorsal surface of the adults. He noted, however, that *Catascopellus* was a discordant element in the somotrichoids, but he was unable to place the genus elsewhere. Mateu (1975:207-209), ignoring the setose body, suggested a close relationship between *Catascopellus* and several Afro-Madagascan thyreopteroids, namely *Xenitenus* Peringuey, *Cylindropectus* Mateu, and *Metascopus* Basilewsky. This was a more reasonable hypothesis than that of Ball. However, we believe that, in view of the distinctive combination of structural features noted above, as well as its geographically and ecologically isolated position (south temperate forest of Chile), *Catascopellus* is best isolated in a genus-group of its own.

In body form, integumental details of adults, and stylomere 2 with 3 ensiform setae, *Catascopellus* is thyreopteroid, but in form and proportions of ovipositor stylomere 2, females are most like those of the eucheiloid species group. The similarities with the thyreopteroids are postulated to be plesiotypic, whereas the similarities with the eucheiloids are postulated to be apotypic.

Catascopellus Straneo

Catascopellus Straneo 1969:972.

Type species. *Catascopellus crassiceps* Straneo 1969:972 (by original designation and monotypy).

This genus has been characterized clearly previously (Mateu 1975; Ball 1975a) with details additional to those provided in the original description. With the features noted above in the diagnosis of the *Catascopellus* genus-group, another description of this genus is unnecessary.

Catascopellus crassiceps Straneo

Figs. 8A-F, 12D-F, 13A-E, and 51

Catascopellus crassiceps Straneo 1969:972.

Type locality. Lonquimay, Malleco Province, Chile. Mateu 1975:207. Ball 1975a:70.

Habitus, dorsal aspect, mentum, prementum and tarsomere 5 and claws were illustrated by Straneo (1969). Mateu (1975:209, Fig. 3) added line drawings of the male genitalia, ovipositor sclerites and internal female reproductive organs, and Ball (1975a:70, Fig. 43D), a habitus photograph. Illustrated here are mandibles (Figs. 8A-F), fore tarsal vestiture (Figs. 12D-F), sclerites of the ovipositor (Figs. 13A-E), and the internal genitalia of a female (Fig. 51). Details are noted above, in treatment of the *Catascopellus* genus-group.

Habitat. Probably Chilean-Argentinian *Arucaria* forest (Hueck 1972:3), at altitudes between at least 700 m. and 1600 m.

Geographical distribution (Fig. 50). Known originally from the type locality only, additional records are reported here. The range of this species is now known to include south temperate Chile and westernmost Argentina, between 38°-39° S. lat., and 71°-73° W. long.

Material examined. We have seen 23 specimens from the following localities: **ARGENTINA. Nequen.** Male, female, Alumine, s.e. Lago Alumine, 1100 m, 16.III.1979 (UASM; ZMUC). **CHILE. Arauco.** Female, Alto Caicupil, 720-1100 m, 12.I.1954, L. Peña (MCZC). Male, Cabréria, 9-10.I.1977, L. Peña (MCZC). 5 males, 3 females, Caramarida, 1-6.I.1954, L. Peña (MCZC). 2 females, Caramarida, 25-31.XII.1953 L. Peña (MCZC). Female, Pichinahuel, 1400-1600 m., 12-20.II.1953, L. Peña (MCZC). Female, Piedra del Aguila, e. Nahuelbuta, II.63, L. Peña (MCZC). **Malleco.** Male, female, L. Icalma, 13-17.I.1962, L. Peña (MCZC). 2 females, Liucura, Lonquimay, 6-10.I.1959, L. Peña (MCZC).

Months of collection. January-March and December. Teneral specimens collected in January and February.

Eurycoleus genus-group

The following are added to the characterization (Ball and Shpeley 1983:751) of this taxonomic complex. Plesiotypic features are dorsal surface glabrous, impunctate except standard fixed setae, males with adhesive vestiture on fore tarsomeres 1-3 biseriate squamo-setae, head capsule dorsally with median impression posteriad eyes, maxilla with galea slender, galeomeres 1 and 2 not partially fused, galeomere 2 shorter than 1, labium with submentum and mentum separated by mental suture, and glossal sclerite ventrally without pair of setae preapically. Apotypic features are body form explanate, at least moderately so, mandibles (Figs. 8G-V) short, explanate, without dorsal projections, scrobes mostly visible in dorsal aspect, with broad terebrae, left mandible (Figs. 8G, O) terebral ridge straight, and supraterebral ridge evident only anteriorly and posteriorly, not medially, without retinaculum, and terebral tooth, premolar and molar in form of a composite complex (see Table 2 for detailed presentation of features of mouthparts), and fore tibia without preapical spur. Mouthparts of this genus-group were brought into prominence with transfer of *Stenoglossa* Chaudoir to the *Pericalus* genus-group, as a species group of *Coptodera* Dejean.

Geographical distribution. The range of the *Eurycoleus* genus-group extends in cis-Andean South America from northern Argentina westward to the upper reaches of the Amazon Basin, northward and westward almost to the Pacific Coast, and to the Isthmus of Panamá, and in Middle America from Panamá northward to the Mexican state of Veracruz in the east and the state of Sinaloa in the west.

Included genera. The genus *Lelis* Chaudoir and *Eurycoleus* Chaudoir are the only genera in this genus-group.

Evolution. The generally less explanate body and particularly the less explanate mandibles (Figs. 8G-N) suggest that of the 2 genera in this complex, *Lelis* is more primitive than *Eurycoleus* (Figs. 8O-V). Species in the latter genus exhibit a complex behavior pattern, involving specialized feeding on pupae of endomychids (Erwin and Erwin 1976; Erwin 1979). We suspect that the species of *Lelis* will exhibit a less complex behavior pattern because of their structurally more primitive position.

Lelis Chaudoir

Lelis Chaudoir 1869b:231. Bates 1883:185. Ball 1975a:174.

Type species. *Lelis obtusangula* Chaudoir 1852 (subsequent designation by Brauer 1870:117).

Recognition. For recognition of adults, see the key to genera and subgenera of Pericalina.

Description (from Ball, 1975a:174). Form moderately broad, *Lebia*-like. Size small to moderate (SBL 5.5-8.5 mm.).

Color. Various: dorsal surface generally somber (rufo-brunneous-brunneous) or distinctly bicolored, with head and prothorax rufotestaceous and elytra uniformly metallic green or blue, or black with rufotestaceous fasciae. Antennae, mouthparts and legs uniformly rufotestaceous, or with various articles more or less infuscated.

Microsculpture. Head capsule: dorsally, surface of clypeus, frons and vertex smooth, microlines not evident at 100X; posteriad transverse occipital impression mesh pattern isodiametric; ventral surface smooth. Labral mesh pattern isodiametric; ventrally, submental and mental mesh pattern slightly transverse, microlines fine. Pronotal mesh pattern markedly transverse, longitudinally oriented microlines few, or surface smooth. Elytral mesh pattern more or less transverse, longitudinally directed microlines few to many, depending upon species.

Luster. Dorsal surface shining, not iridescent; ventral surface, especially abdominal sterna, iridescent.

Chaetotaxy. Standard array present. Elytral interval 3 trisetose.

Vestiture. Prosternum and metasternum sparsely setose; middle and hind coxae setose ventrally. Abdominal sterna III-VII more densely setose, or glabrous. Tarsomeres 1-3 dorsally, each with few scattered setae.

Head. Frontal impressions broad, irregular, moderately deep. Eyes large, bulged.

Mouthparts. Mandibles as in Figs. 8G-N, scrobes shallow, form explanate, but less so than in genus *Eurycoleus*. See Table 2 for details. Labrum, maxillae and labium as noted in treatment of *Eurycoleus* genus-group.

Prothorax. Pronotum transverse, anterior margin moderately deeply concave; posterior margin sinuate to truncate medially, laterally sloped obliquely forward; lateral margins reflexed, not beaded; lateral setigerous punctures in lateral margins. Anterior angles very broadly rounded; posterior angles obtuse.

Elytra. Lateral margins rounded, subparallel, slightly reflexed laterally. Apical margin moderately to markedly concave, preapical and apical angles distinctly rounded to slightly dentate (intraspecific variation). Interneurs distinctly impressed, punctate or smooth; intervals moderately convex to flat.

Legs. Proportions average, hind tarsus shorter than hind tibia. Anterior femur without ventral accessory setae. Hind tarsus with tarsomere 1 twice length of tarsomere 2. Tarsal claws pectinate.

Abdominal sterna. Sternum VII of males with posterior margin shallowly notched medially, apical setae 4 (same as females).

Male genitalia (Figs. 52A-H). Median lobe left pleuropic, preapical orifice slightly to left, less than half to ca. 3/4 length of shaft; shaft slender to broad, apical portion short to very short; apex narrowly to broadly rounded. Internal sac with small plate-like group of microtrichia (contrasts markedly with extensive field of males of *Eurycoleus*).

Female genitalia. Not studied in detail; stylomere 2 generally similar to that of *Eurycoleus*.

Habitat. Like many other pericalines, members of the genus *Lelis* seem to be associated with fungi growing on fallen trees, in tropical lowland forest and tropical lower montane forest. Bates (1869:72) recorded *Coptodera polygona* Bates (= *Lelis quadrisignata* Buquet) "running amongst fungi on the bark of a dead tree, in company with *Eurycolei* and *Stenognathus melanarius*".

Geographical distribution (Fig. 53). The range of this genus extends in South America from eastern Brazil westward nearly to Pacific coastal Colombia, and northward in Middle America from Panamá to Veracruz in eastern México.

Classification. Chaudoir (1869b:231-234) recognized 2 groups of species based on whether the elytra were concolorous or variegated. We do not employ such grouping in any formal sense. Further, we think it likely that 1 of the species with concolorous elytra (*Lelis obtusangula* Chaudoir) is ancestral to the other species, and thus not in any of the previously recognized groups.

Nomenclatural note. Chaudoir (1869b) included in his treatment of the "Coptodérides", the genus *Lelis,* which was proposed (l.c.: 231) for 5 Neotropical species, 3 of which were new, 1 had been described originally in the genus *Lebia* Latreille, and 1 in *Coptodera* Dejean. In that same year, Bates (1869) described new Neotropical pericalines, including several placed in *Coptodera* which were, however, members of *Lelis*. Neither of these major 19th Century workers, who maintained a very amicable and thus exemplary working relationship, was aware of this overlap at the time that it happened, which proved to be especially unfortunate because descriptions of 2 of the species of *Lelis* were based on specimens received from Bates by Chaudoir, for study.

Bates (1870), when he discovered this overlap, published a list of the resulting synonyms. Subsequent workers accepted the Bates names as the senior synonyms, and thus valid names for the species involved. Again, unfortunately, the generic associations for the Bates' names were accepted as he had indicated, though subsequently, Bates recognized the validity of the genus *Lelis*. Shpeley and Ball (1993:129) transferred 3 species from *Coptodera* to *Lelis*.

Key to species of *Lelis* Chaudoir, based on structural features of adults

1 Elytral dorsal surface non-metallic, with or without pale fasciae 2

1' Elytral dorsal surface uniformly metallic blue or green, without pale fasciae 3

2(1) Elytral dorsal surface concolorous, dark brunneous or piceous; head and pronotum rufobrunneous. Dorsal surface of pronotal mesh pattern of disc transverse, complete, sculpticells distinct .... *L. obtusangula* (Chaudoir), p. 127

2' Elytral dorsal surface bicolored, with 2 pale fasciae, more or less extensive. Head and pronotum rufotestaceous, or pronotum bicolored with dark median vitta, laterally rufotestaceous. Pronotal mesh pattern incomplete, much of surface smooth, without microlines .... *L. quadrisignata* (Buquet), p. 128

3(1') Antennae and legs bicolored, piceous and rufotestaceous: antennomeres 3 and 4 and tibiae piceous, other articles of these appendages rufotestaceous .... *L. bicolor* Chaudoir, p. 134

3' Antennae and legs uniformly rufotestaceous .... *L. rutila* (Bates), p. 132

Lelis obtusangula (Chaudoir)

Figs. 52A-B and 53

Coptodera obtusangula Chaudoir 1852:65. TYPE MATERIAL: 1 specimen in the Oberthür-Chaudoir collection (MNHP), associated with the following box label: "obtusangula/ Chaud/ Brésil/ Novofrib. Bescke". HOLOTYPE male, labelled: "Ex Musaeo/ Chaudoir" [red print]; "HOLO/ TYPE" [circular, ringed with red].

Lelis obtusangula Chaudoir 1869b:233. Csiki 1932:1381.

Note about type material. Chaudoir (1869b:234) stated that the original description of *Coptodera obtusangula* was based on a single specimen.

Type locality. Nova Friburgo (= Novo Friburgo), Rio de Janeiro, Brazil.

Recognition. The single known specimen of this species exhibits, in addition to a generally and nearly uniform somber-colored dorsal surface and distinct and complete system of microlines on the pronotum, larger size, broader head, and longer elytra than adults of the other species of *Lelis*.

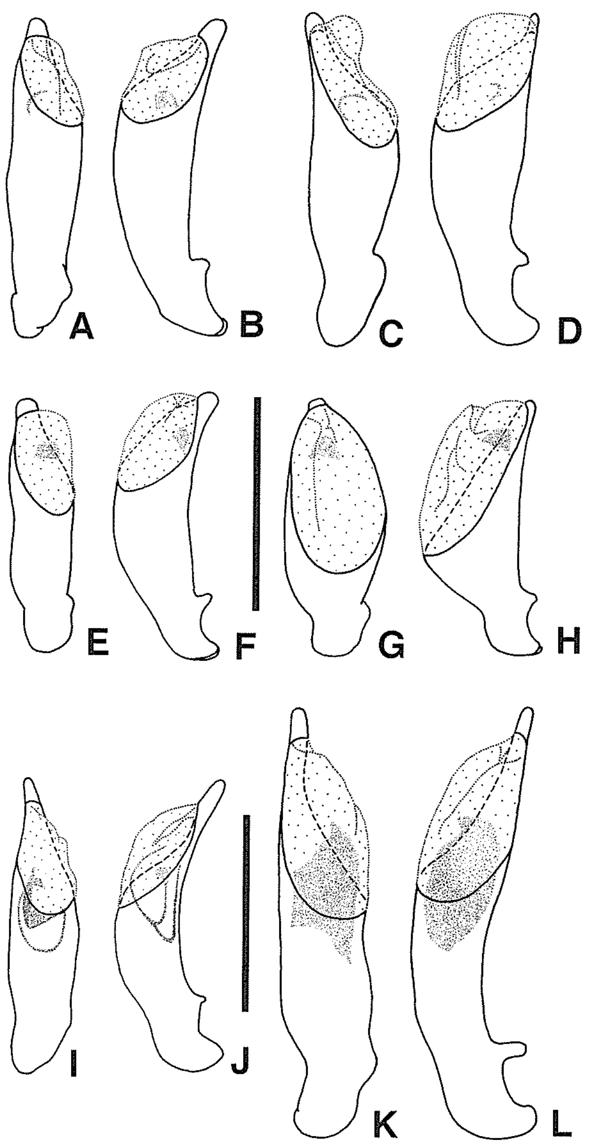

Figure 52. Line drawings of male genitalia, median lobe, of the species of *Lelis* Chaudoir and *Eurycoleus Chaudoir*. **A**, **C**, **E**, **G**, **I**, and **K**, dorsal aspect; **B**, **D**, **F**, **H**, **J**, and **L**, left lateral aspect. **A-B**, *L. obtusangula* (Chaudoir); **C-D**, *L. quadrisignata* (Buquet); **E-F**, *L. rutila* (Bates); **G-H**, *L. bicolor* Chaudoir; **I-J**, *E. erwini*, new species; and **K-L**, *E. fofus* Reichardt. Scale bars = 1.0 mm.

Description. Character states of genus *Lelis*, restricted or amplified as follows. Form *Coptodera*-like (more slender than other species of *Lelis*). Values for SBL and ratios Hw/Fw, Hw/Pwm, Pwb/Pwm, and Pl/El as in Table 15.

Color. Head and pronotal dorsal surface rufobrunneous, lateral margins of pronotum slightly paler. Antennae rufobrunneous. Mouthparts (labrum, mandibles, maxillary palpi, mentum and labial palpi) rufous. Elytra dark brunneous, or piceous. Coxae and trochanters rufotestaceous, femora, tibiae and tarsi brunneous. (Note: the specimen appears somewhat teneral, and may be discolored. So, color of more mature specimens might not match the description given here. Nonetheless, dark color likely is the norm of this species).

Microsculpture. Pronotal mesh pattern distinct, transverse, with network of microlines essentially complete over dorsal surface. Elytral mesh pattern predominantly transverse, but with many longitudinally oriented microlines; thus width of sculpticells various over surface.

Vestiture. As described for genus; abdominal sterna III-VII glabrous.

Head. Relatively broad (cf. values for ratios Hw/Fw and Hw/Pwm).

Pronotum. Relatively markedly constricted posteriorly (cf. values for ratio Pwb/Pwm).

Elytra. Relatively elongate (cf. values for ratio Pl/El). Intervals convex, interneurs moderately deep, straight, smooth, not crenulate-punctate.

Male genitalia (Figs. 52A-B). Median lobe: basal bulb projected slightly ventrad; shaft relatively slender, in left lateral aspect (Fig. 52B), ventral surface curved slightly ventrad toward apical portion; preapical orifice less than half length of shaft; apical portion short, moderately broad in both dorsal and left lateral aspects, apex broadly rounded.

Habitat. Probably Atlantic Forest, in southeastern Brazil.

Geographical distribution (Fig. 53) **and chorological affinities**. This species is known only from the type locality, which is located in eastern Brazil. *Lelis obtusangula* is the only species of its genus known from this area.

Phylogenetic relationships. The rather narrow, long form of the body, distinct microsculpture of the pronotum, and approximately uniform somber color of the dorsal surface indicates an isolated, possibly ancestral, position for this species.

Material examined. We have seen only the holotype. For details, see above.

Lelis quadrisignata (Buquet)

Figs. 52C-D and 53

Lebia quadrisignata Buquet 1834:676. TYPE MATERIAL: 2 females in the Oberthür-Chaudoir collection (MNHP), associated with the following box label: "quadrisignatus/ Buquet/ Cayenne/ coll. Dejean". LECTOTYPE (here designated), female,

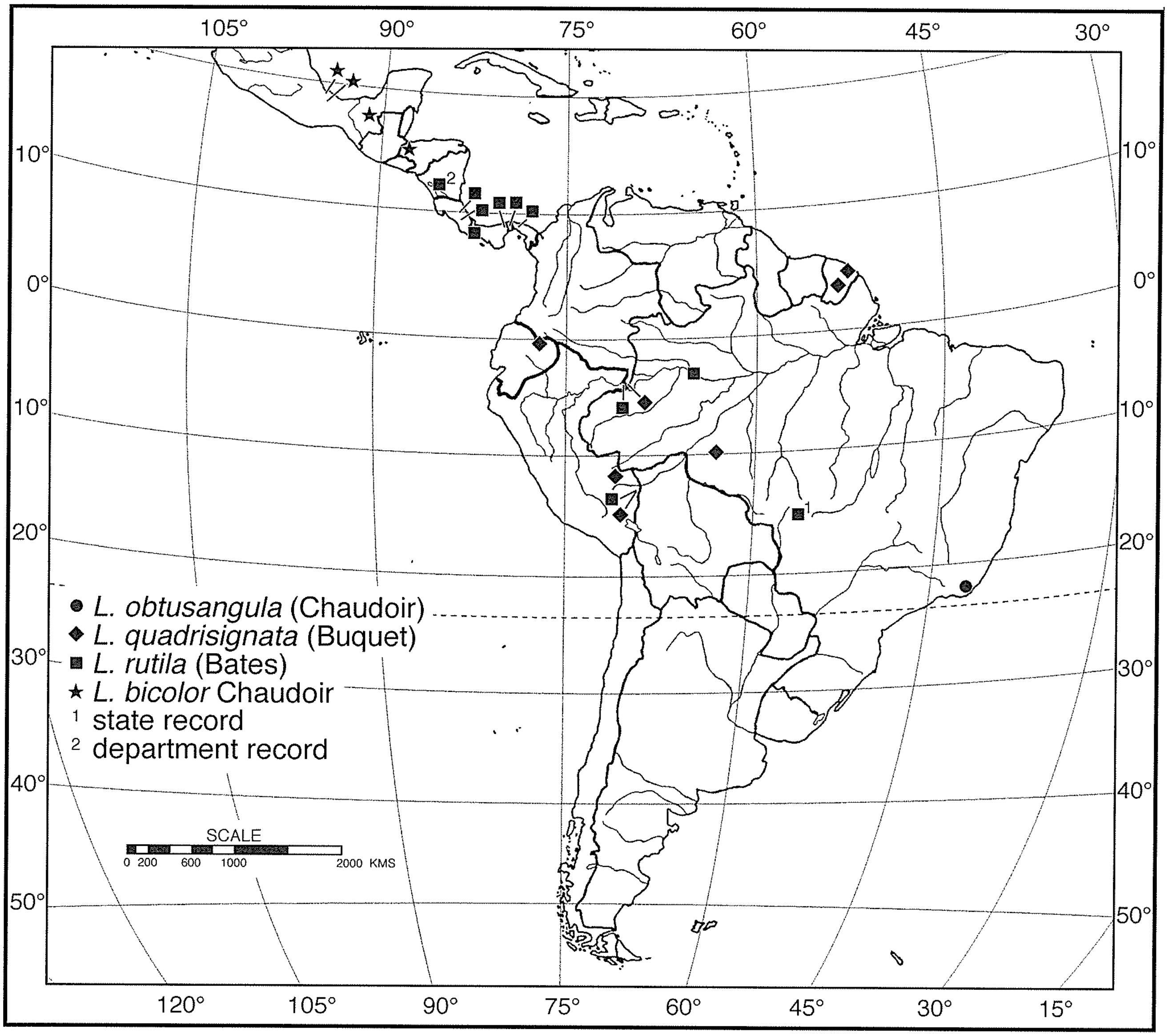

Figure 53. Map of southern Middle America and South America showing positions of known localities for the species of *Lelis* Chaudoir.

labelled: "Buquet" [handwritten on green paper]; "Ex Musaeo/ Chaudoir" [red print]; "LECTO/ TYPE" [circular, ringed with purple]. PARALECTOTYPE female, labelled: "D. Reiche" [handwritten]; "Ex Musaeo/ Chaudoir" [red print].

Lelis quadrisignata; Chaudoir 1869b:234. Csiki 1932:1381.

Coptodera polygona Bates 1869:72. TYPE MATERIAL: specimen in Oberthür-Chaudoir collection. LECTOTYPE female (selected by Shpeley and Ball [1993: 129], labelled: "Ega;"; "polygona/ Bates"; "Lelis/ bifasciata/ Chaud"; "EX MUSAEO H.W. BATES/ 1892"; "LECTO-/TYPE" [disc ringed with purple]; "LECTOTYPE/ Coptodera/ polygona/ Bts/ det. George E. Ball '72" (MNHP). Bates 1870: XVI. Csiki 1932:1373. **NEW SYNONYMY.**

Lelis bifasciata Chaudoir 1869b:235. TYPE MATERIAL: female, in Oberthür-Chaudoir collection, associated with the following box label: "polygona/ Bates/ Amazone/ Ega/ Bates". HOLOTYPE labelled: "bifasciata/ Chaud" [handwritten]; "Ex Musaeo/ Chaudoir" [red print] (MNHP). Bates 1870: XVI. **NEW SYNONYMY.**

Coptodera bifasciata; Csiki 1932:1373.

Lelis polygona; Shpeley and Ball 1993:129.

Coptodera latipennis Bates 1869:72. TYPE MATERIAL: 1 specimen in Oberthür-Chaudoir collection. HOLOTYPE female, labelled: "S. Paulo/ Amaz";

Table 15. Data about variation in Standardized Body Length (mm.) and various proportions for species of genus *Lelis*.

		Males			Females	
Value/ Ratio Species	N	Range	Mean	N	Range	Mean
SBL (mm.)						
L. obtusangula (Chaudoir)	1	8.48		—		
L. quadrisignata (Buquet)[1]	5	6.36-7.40	6.91	7	6.96-7.96	7.35
L. rutila (Bates)[2]	25	5.52-7.92	6.65	29	5.64-8.08	7.17
L. bicolor Chaudoir[3]	4	6.08-7.00	6.59	1	6.36	
Hw/Fw						
L. obtusangula (Chaudoir)	1	1.667		—		
L. quadrisignata (Buquet)	5	1.859-2.044	1.901	7	1.841-2.041	1.919
L. rutila (Bates)	24	1.751-1.961	1.852	29	1.724-1.923	1.828
L. bicolor Chaudoir	4	1.773-1.876	1.829	1	1.818	
Hw/Pwm						
L. obtusangula (Chaudoir)	1	0.923		—		
L. quadrisignata (Buquet)	5	0.848-0.887	0.864	7	0.821-0.860	0.844
L. rutila (Bates)	25	0.800-0.878	0.836	29	0.806-0.881	0.837
L. bicolor Chaudoir	4	0.840-0.867	0.849	1	0.851	
Pwb/ Pwm						
L. obtusangula (Chaudoir)	1	0.769		—		
L. quadrisignata (Buquet)	5	0.769-0.804	0.785	7	0.745-0.784	0.767
L. rutila (Bates)	25	0.800-0.848	0.821	29	0.786-0.862	0.821
L. bicolor Chaudoir	4	0.811-0.860	0.828	1	0.830	
Pl/El						
L. obtusangula (Chaudoir)	1	0.204		—		
L. quadrisignata (Buquet)	5	0.209-0.228	0.222	7	0.215-0.232	0.225
L. rutila (Bates)	25	0.220-0.241	0.230	29	0.207-0.231	0.221
L. bicolor Chaudoir	4	0.211-0.229	0.221	1	0.209	

[1] Geographically compound sample, with specimens from French Guiana, Brazil, Ecuador, and Peru.

[2] Geographically compound sample, with specimens from the Amazon Basin (*L. rutila* Bates), eastern Panama (*L. cyanipennis* Steinheil), western Panama (*L. insculpta* Bates), and Costa Rica and Nicaragua (*L. rufipes* Chaudoir).

[3] Geographically compound sample, with specimens from Mexico and Honduras.

"latipennis/ Bates" [handwritten]; "EX MUSAEO/ H. W. BATES/ 1892"; "HOLOTYPE/ Coptodera/ latipennis/ Bates/ det. George E. Ball '72" (MNHP). Csiki 1932:1373. **NEW SYNONYMY.**

Lelis latipennis; Shpeley and Ball (1993: 129).

Notes about type material. Chaudoir (1869b:235) recorded that he had 2 specimens of *L. quadrisignata*: 1 received by Dejean from Buquet, the other from the Reiche collection. Probably both specimens came to Chaudoir from the same source, for Reiche had acquired the Dejean collection, after the latter's death. The Dejean specimen, identified by the green label with Buquet's name thereon, was arbitrarily chosen as lectotype.

Chaudoir (1869b:235) stated that he based the description of *L. bifasciata* on a single specimen received from Bates.

Type localities. For *L. quadrisignata*, the type locality is the Rio Jari, French Guiana (collecting site of the lectotype, as determined from Buquet's original description).

For both *L. polygona* and *L. bifasciata*, the type locality is the same: "Ega", or as recognized now, Tefé, Amazonas state, Brazil.

As indicated in the original description, the type locality of *L. latipennis* is São Paulo, state of Amazonas, Brazil.

Notes about synonymy. The character states believed to be species-specific (minor differences in body proportions and details of color) seem to us to be indicative of individual variation rather than indicating different species. Accordingly, we have grouped in a single species the types of the species noted above. The name *L. quadrisignata* Buquet was the first in the complex to be proposed, and is the valid name of this species.

Recognition. Adults of this species resemble those of *L. obtusangula* in details of elytral structure, and some specimens have nearly uniformly dark elytra. However, the 2 groups differ in color of pronotum and appendages, and in size and body proportions (see Table 15).

Description. Character states of genus *Lelis*, restricted or amplified as follows. Form moderately explanate. Values for SBL and ratios Hw/Fw, Hw/Pwm, Pwb/Pwm, and Pl/El as in Table 15.

Color. Head, antennae, and mouthparts (labrum, mandibles, maxillary palpi, mentum, and labial palpi) rufotestaceous. Prothorax rufotestaceous, or pronotum dorsomedially with broad brunneous vitta. Elytra bicolored, each elytron with 1 or 2 rufotestaceous fasciae, background piceous. Fasciae various in extent, from occupying as much as half to less than a quarter of elytral surface, posterior fascia extended or not to posterior margin. Legs with coxae, trochanters, and tarsi rufotestaceous, femora and tibiae principally rufotestaceous, but with piceous overtones.

Microsculpture. Pronotal mesh pattern generally effaced, surface smooth, but with indistinct indication of transverse mesh pattern. Elytral mesh pattern predominantly transverse, but with many longitudinally oriented microlines; thus width of sculpticells various over surface.

Vestiture. As described for genus, abdominal sterna III-VII sparsely setose.

Head. Narrower than head of *L. obtusangula* (cf. values for ratios Hw/Fw and Hw/Pwm).

Pronotum. Compared to other species of *Lelis*, the pronotum of *C. quadrisignata* is markedly constricted posteriorly (cf. values for ratio Pwb/Pwm).

Elytra. Shorter than *L. obtusangula* (cf. values for ratio Pl/El). Intervals convex, interneurs moderately deep, straight, smooth, not crenulate-punctate.

Male genitalia. (Figs. 52C-D). Median lobe: basal bulb projected slightly ventrad; shaft relatively slender basad, but distinctly widened toward preapical orifice; in left lateral aspect (Fig. 52D), ventral surface straight toward apical portion; preapical orifice about half length of shaft; apical portion short moderately broad in dorsal aspect (Fig. 52C), but markedly narrower in left lateral aspect (Fig. 52D); apex broadly rounded in dorsal aspect, narrowly rounded in left lateral aspect.

Habitat. Probably tropical lowland forest, at altitudes between at least 50 m. and 270 m. Adults seem to live in association with fungi on fallen trees.

Geographical distribution. The range of this species extends in lowlands from French Guiana westward through the upper reaches of the Amazon Basin in cis-Andean South America.

Chorological affinities. The range of this species and of *L. rutila* overlap broadly in Amazonian South America. Specimens of both species have been collected in the same locality (15 km. n.e. Puerto Maldonado, Peru), but in association with different genera of fungi. For details, see "Material examined" below, and under *L. rutila.*

Phylogenetic relationships. This species is the postulated adelphotaxon of *L. rutila* + *L. bicolor*, based on shared apotypic features of color pattern (pale head and prothorax, in contrast to darker elytra) and a moderately explanate body, compared to *L. obtusangula*.

Material examined. In addition to the type material noted above, we have seen 24 specimens, as follows: **BRAZIL. Amazonas.** Female, Pebas, M. de Mathan (MNHP). Male, 3 females, Ega, M. de Mathan (MNHP). **Rondonia**. Female, 62 km sw Ariquemes, nr. Fzda. Ranco Grande, 4-6.XI.1997, J.E. Egers (FSCA). **BOLIVIA. Department?** 2 males, Sta. Helena, August, W.M. Mann (USNM). **COLOMBIA. Amazonas**. Female, Leticia, 213 m., 11.VII.1970, H. & A. Howden (UASM). **ECUADOR. Napo**. Female, Limoncocha, 12-14.III.1976, J.M. Campbell (UASM). Male, Yasuni Scientific Station, 00°40'36"S 76°24'02"W, 210 m., headlamp, 20.IV.1998, K.W. Will (CUIC). **Sucumbios**. Sacha Lodge, 0.5°S 76.5°W, 270 m., ex malaise: female, 12-22.II.1994, Hibbs (SEMC); male, 22.II-4.III.1994 (SEMC); male, 16-29.VIII.1994 (SEMC). Sacha Lodge, 0°28'14"S 76°27'35"W, 270 m., ex fungus covered log, R.E. Brooks: male, female, 23.III.1999 (SEMC); male, 24.III.1999 (SEMC). **FRENCH GUIANA.** Female, Roura, 2.3 km. s., 4°43'34"N 52°18'24"W, 50 m., ex fungus-laden log, 24.V.1997, J.S. Ashe, R.E. Brooks (SEMC). Female, Saül, Mt. Galboa summit, 3°37'18"N 53°16'42"W, 740 m., ex fungus-laden log, 6.VI.1997, J.S. Ashe, R.E. Brooks (SEMC). Male, Saül, 7 km. n., 2-9 km. n.w. Les Eaux Claires, along Rue de Belison trail, 3°39'46"N 53°13'19"W, 220-240 m., ex fungus-laden log, 2.VI.1997, J.S. Ashe, R.E. Brooks (SEMC). **PERU. Madre de Dios**. Male, Pakitza, 12°07'S 70°58'W, in dining room, 8.XI.1990, T.L. Erwin (USNM). Male, Tambopata Prov., 15 km. n.e. Pto. Maldonaldo, 200 m., ex

Sparassis, 30.VI.1989, J.S. Ashe, R. Leschen (SEMC). Female, Tambopata Prov., 15 km. n.e. Pto. Maldonaldo, Reserva Cuzco Amazonica, 12°33'S 69°03'W, trail to Z2, 200 m., ex *Favolus hexagonalis*, 12.VI.1989, J.S. Ashe, R.E. Brooks (SEMC). Female, Rio Tambopata, ex large white flat polypore, 12.I.1987, J. McHugh (CUIC).

Months of collection. January-August and November.

Lelis rutila (Bates)

Figs. 8G-N, 52E-F and 53

Coptodera rutila Bates 1869:72. TYPE MATERIAL: 1 of 3 specimens in the Oberthür-Chaudoir collection, associated with the following box label: "rutila/ Bates/ Amazone/ Ega Bates". LECTOTYPE female (selected by Shpeley and Ball 1993:129), labelled: "Ega" [handwritten]; "rutila/ Bates" [handwritten]; "Lebia/ viridipennis/ Chaud." [handwritten]; "EX MUSAEO/ H. W. BATES/ 1892" (MNHP). Bates 1870:XVII. Csiki 1932:1373.

Lelis viridipennis Chaudoir 1869b:233. TYPE MATERIAL: 2 females in the Oberthür-Chaudoir collection (MNHP), associated with the following box label: "rutila/ Bates/ Amazone/ Ega Bates". LECTOTYPE (here designated), labelled: "viridipennis/ Chaud"; "Ex Musaeo/ Chaudoir" [red print]. PARALECTOTYPE, labelled: "38"; "Ex Musaeo/ Chaudoir" [red print]. Bates 1870:XVII. Csiki 1932:1373. Shpeley and Ball 1993:129.

Lelis cyanipennis Steinheil 1875a:103. TYPE MATERIAL: LECTOTYPE (here designated), a female in the Oberthür-Chaudoir collection (MNHP), labelled: "Columb or./ (Lindig); cyanipennis/ Steinh" [green vertical strip on left side]; "Ex Musaeo/ E. Steinheil". **NEW SYNONYMY**.

Lelis rufipes Chaudoir 1877:201. TYPE MATERIAL: 1 female in the Oberthür-Chaudoir collection (MNHP), associated with the following box label: "rufipes/ Chaud/ Nicaragua/ Chontales Bates". LECTOTYPE (here designated), labelled: "Ex Musaeo/ Chaudoir" [red print]. Csiki 1932:1381. **NEW SYNONYMY**.

Coptodera insculpta Bates 1883:185. TYPE MATERIAL: 2 specimens in the Oberthür-Chaudoir collection (MNHP): LECTOTYPE (here designated), female, and a PARALECTOTYPE female, each labelled: "Bugaba/ Panama./ Champion"; "Lelis/ insculpta/ Bates" [handwritten]; "H. W. Bates/ Biol. Cent. Amer." Also, 4 additional PARALECTOTYPES: Male and female on 1 card, "Bugaba/ 800-1500 ft./ Champion"; "in fungus/ [illegible]" [handwritten]; "V + winged"; "ADP/ 22983"; "V + winged"; "ADP/ 22991"; "B.C.A. Co. I.1/ Lelis/ insculpta/ Bates"; "HOMOTYPE [red print]/ Lelis/ insculpta/ Bts [handwritten] (BMNH). Female, "Bugaba/ Panama/ Champion"; "Ex/ Godman/ and/ Salvin"; "Type/ 7150" [red paper]; "Lelis/ insculpta/ Bates" [handwritten]; " M +winged"; "ADP/ 08201" (MCZC). Male, "Bugaba/ 800-1500 ft./ Champion"; "Lelis/ insculpta/ Bates" [handwritten]; " M +winged"; "ADP/ 08202" (USNM). **NEW SYNONYMY**.

Notes about type material. The Chaudoir type specimens of *L. viridipennis* were received from Bates. In addition to these 2 specimens, the lectotype of *Coptodera rutila* is also associated with the box label indicated above.

Evidently the original description of *L. cyanipennis* (Steinheil 1875a:103) was based on more than 1 specimen, because a range of measurements was given.

Type localities. The type locality for both *L. rutila* and *L. viridipennis* is Tefé (= Ega), Amazonas, Brazil. For *L. cyanipennis*, according to information in the original description, the type specimens were collected in the vicinity of the Muzo emerald mine, located at an altitude of 548 m. (1800') in the Colombian Cordillera Oriental, Boyacá Department. For *L. rufipes*, the type locality is Chontales, Nicaragua; and for *L. insculpta*, the type locality is Bugaba, Chiriqui Province, Panamá.

Recognition. In addition to the characters used in the key above, specimens are recognized by smaller size, relatively narrower head, and shorter elytra than adults of the other species of *Lelis* (see Table 15).

Description. Character states of *Lelis*, restricted or amplified as follows. Form moderately explanate. Values for SBL and ratios Hw/Fw, Hw/Pwm, Pwb/Pwm, and Pl/El as in Table 15.

Color. Head and prothorax, antennae, mouthparts (labrum, mandibles, maxillary palpi, mentum and labial palpi) and legs rufotestaceous. Elytra bright metallic blue or green.

Microsculpture. Pronotal mesh pattern generally effaced, surface smooth, but with indistinct indication of transverse mesh pattern. Elytral mesh pattern predominantly transverse (see "Geographical variation", below).

Vestiture. As described for genus, abdominal sterna III-VII sparsely setose.

Head. Narrower than head of *L. obtusangula* (cf. values for ratios Hw/Fw and Hw/Pwm).

Mouthparts. Mandibles as in Figs. 8G-N. For details, see Table 2.

Pronotum. Less constricted posteriorly than in *L. obtusangula* or *L. quadrisignata* (cf. Table 15, values for ratio Pwb/Pwm).

Elytra. Relatively short (cf. values for ratio Pl/El). Intervals slightly convex to flat, interneurs shallow, crenulate-punctate.

Male genitalia. (Figs. 52E-F). Median lobe: basal bulb projected slightly ventrad; shaft, in left lateral aspect (Fig. 52F), ventral surface curved ventrad moderately abruptly toward apical portion; preapical orifice about half length of shaft; apical portion very short, moderately broad in both dorsal and left lateral aspects, apex broadly rounded.

Geographical variation. Elytral microsculpture and convexity of the elytral intervals exhibit variation. Throughout most of the geographical range of *L. rutila*, the intervals are flat, or virtually so. In western Panamá (Bugaba, Chiriqui Province), the intervals are slightly convex. This was recorded as a feature for recognition of *L. insculpta*. Also, throughout most of the range of *L. rutila*, the elytral sculpticells are wide and short, with microlines very fine and longitudinally oriented microlines very few. In northwestern Colombia and eastern Panamá (Canal Zone and vicinity), the microlines are coarser, and longitudinally oriented microlines are more numerous, thus the sculpticells are narrower, some only slightly transverse. Such microsculpture is exhibited by the holotype of *L. cyanipennis*.

Habitat. Probably tropical lowland forest, at altitudes from near sea level to at least 500 m. Evidently, adults live in association with fungi on logs.

Geographical distribution (Fig. 53). The range of this species extends at low altitude through the upper reaches of the Amazon Basin in cis-Andean South America northward to trans-Andean Colombia, and to Nicaragua, in Middle America.

Chorological affinities. The range of this species and *L. quadrisignata* overlap broadly in South America. For further details, see discussion of this topic in the treatment of *L. quadrisignata,* above. An allopatric distribution is exhibited by *L. rutila* and its putative closest relative, *L. bicolor*.

Phylogenetic relationships. On the basis of overall close similarity in morphological features, and in a feature postulated as derived (uniform metallic blue-green color of elytra), this species is the adelphotaxon of *L. bicolor*.

Material examined. In addition to the type specimens noted above, we have seen 54 specimens, as follows: **BRAZIL. Amazonas**. Female, Ega (BMNH). 4 females, Ega, 1st trimester, M. de Mathan (MNHP). **Mato Grosso**. 2 males, 3 females, LeMoult (CUIC). Male, female, XII, LeMoult (CASC). **COSTA RICA. Cartago**. Turrialba, O.L. Cartwright (USNM): female, 21.V.1951; female, 8.VI.1951. **San Jose**. San Carlos, Schild, Burgdorf: male, 2 females (USNM); 2 females (MCZ). **FRENCH GUIANA**. Male, 3 females, Cayenne (Maindron-Babault Coll. MNHP). **NICARAGUA. Chontales**. Female, Janson (BMNH). Female (Bates Coll. MNHP). **PANAMA. Canal Zone**. Barro Colorado Island: male, 29.VII.1924, N. Banks (MCZ); male, 29.VI.1936, O. Park (FMNH); 2 females, 22-24.XI.1944, R.H. Arnett (FMNH): female, in rotten log, 26.V.1972, R.T. Allen (USNM); female, K.W. Cooper (MCZ); 2 males, 9°10'N 79°50'W, among *Polyporus* caps on log end, 27.VI.1974, T.L. Erwin, D.R. Whitehead (USNM); 2 males, 2 females, same as previous except 02.VII.1974 (USNM); male, 2 females, 9°10'N 79°50'W, between fruiting bodies of *Polyporus* (fairy fungus), 10.VII.1973, T.L. & L.J. Erwin (USNM); Gatun Lake, VII.1923, R.C. Shannon (USNM). Male, female, Pipeline Rd., 1.6 km. n. 1st bridge, 9°07'N 79°43'W, on underside of log near *Polyporus*, 30.VI.1974, T.L. Erwin, D.R. Whitehead (USNM). **Chiriqui**. Bugaba, Champion: 3 males, female (BMNH); 3 males, 3 females, 243-457 m. (BMNH). **Colon**. Parque Nac. Soberania, Pipeline Rd., Km. 6.1, 09°07'N 79°45'W, 40 m., J.S. Ashe, R.E. Brooks: male, fogging fungus-laden log, 2.VI.1995 (SEMC); 2 females, ex crustose polypore, 2.VI.1995 (SEMC); male, ex fungus-laden log, 21.VI.1995 (SEMC). Female, Parque Nac. Soberania, Pipeline Rd., 09°07'N 79°45'W, fungus, 19.V.1995, J. Jolly, C. Chaboo (SEMC). Parque Nac. Soberania, Pipeline Rd., Km. 10+, 09°07'N 79°45'W, 150 m., ex fungus-laden log, 2.VI.1995, Ashe, Brooks (SEMC). **Panamá**. Male, 8 km. e. Chepo, 9°12'N 79°00'W, 305 m., 17.IX.1972, Stockwell (USNM). Female, Gamboa, 09°04'N 79°45'W, 30 m., ex *Favolus*, 3.VI.1995, Ashe, Brooks (SEMC). **PERU. Junin**. Male, Rio Chanchamayo, (E. Steinheil Coll. MNHP). **Loreto**. Male, headwaters of Loreto Yacu river, Yegua indian village, fungus, 23.IV.1970, B. Malkin (UASM). **Madre de Dios**. Male, Tambopata Prov., 15 km. n.e. Puerto Maldonaldo, 200 m., ex *Favolus hexagonalis*, 12.VII.1989, J.S. Ashe, R. Leschen (SEMC).

Months of collection. April-July, September, and November-December.

Lelis bicolor Chaudoir
Figs. 52G-H and 53

Lelis bicolor Chaudoir 1869b: 231. TYPE MATERIAL: 2 specimens in the Oberthür-Chaudoir collection (MNHP), associated with the following box label: "bicolor/ Chaud/ Mexique/ Sallé". LECTOTYPE (here designated), male, labelled: "M "; "Ex Musaeo/ Chaudoir" [red print]; "LECTO/ TYPE" [circular, ringed with purple]. PARALECTOTYPE female, labelled: "Ex Musaeo/ Chaudoir" [red print]. Bates 1883: 185.

Type locality. Orizaba, Veracruz, México (determined from original description (l.c., p. 233).

Recognition. See the key to species of *Lelis*, above.

Description. Character states of genus *Lelis*, restricted or amplified as follows. Form moderately explanate. Values for SBL and ratios Hw/Fw, Hw/Pwm, Pwb/Pwm, and Pl/El as in Table 15.

Color. Head and prothorax rufotestaceous. Antennomeres 3 and 4 infuscated; 1-2 and 5-11 rufotestaceous. Mouthparts (labrum, mandibles, maxillary palpi, mentum and labial palpi) rufotestaceous. Elytra bright metallic blue or green. Legs with tibiae and tarsomeres 1-3 infuscated, coxae, trochanters, femora, and tarsomere 4-5 rufotestaceous.

Microsculpture. Pronotal mesh pattern generally effaced, surface smooth, but with indistinct indication of transverse mesh pattern. Elytral mesh pattern predominantly transverse, but with numerous longitudinally oriented microlines; sculpticells thus relatively narrow.

Vestiture. As described for genus, abdominal sterna III-VII sparsely setose.

Head. Narrower than head of *L. obtusangula* (cf. values for ratios Hw/Fw and Hw/Pwm).

Pronotum. Less constricted posteriorly than in *L. obtusangula* or *L. quadrisignata* (cf. Table 15, values for ratio Pwb/Pwm).

Elytra. Relatively short (cf. values for ratio Pl/El). Intervals slightly convex to flat, interneurs shallow, crenulate-punctate.

Male genitalia. (Figs. 52G-H). Median lobe: basal bulb projected slightly ventrad; shaft very broad, in left lateral aspect (Fig. 52H), ventral surface curved slightly, but straight toward apical portion; preapical orifice about 3/4 length of shaft; apical portion short, moderately broad in both dorsal and left lateral aspects, apex broadly rounded.

Habitat. Probably tropical lower montane forest, at altitudes between at least 760 and 1220 m. Adults live on fallen tree trunks in association with fungi.

Geographical distribution. The range of *L. bicolor* extends from northern Honduras to Veracruz, in southeastern México.

Chorological affinities and phylogenetic relationships. See these topics above, in treatment of *L. rutila*. Although adults of these taxa are markedly similar in external features, and seem thus to be closely related, males differ markedly in details of the median lobe of the genitalia. So, it seems appropriate to treat them as separate species.

Material examined. In addition to the type material noted above, we have seen 5 specimens, as follows: **HONDURAS. Santa Barbara**. 2 males, La Fe, Finca La Roca, 5.3 km. s. Peña Blanca, 14°57'N 88°02'W, 740 m., ex *Favolus*, 19.VI.1994, Brooks, Ashe (SEMC). **MEXICO. Chiapas**. Female, Ocosingo Rd., 76 km. s. Palenque, rain forest, 760 m., 29.VII.1983, S. & J. Peck (UASM). **Veracruz**. Male, Cosamaloapam, Sallé (BMNH). Male, Playa Vicente, Sallé (BMNH).

Months of collection. June-July.

Eurycoleus Chaudoir

Eurycoleus Chaudoir 1848:124. Reichardt 1972:237-249. Ball 1975a:175.

Type species. *Coptodera fasciatopunctata* Reiche (by monotypy).

Recognition. For recognition of adults, see key to genera and subgenera of Pericalina.

Description (from Ball, 1975a:175). Form broad, explanate, deplanate. Size moderate (SBL 7.5-10.0 mm.).

Color. Predominantly rufous to testaceous, elytra diaphanous, more or less extensively spotted with darker pigment; palpomeres, legs, and tergum and sternum VII variously darkened; antennae uniformly testaceous or variously darkened.

Macrosculpture. Dorsal surface of head, pronotum and elytra very finely and moderately densely punctulate, punctulae shallow.

Microsculpture. Microlines of dorsal surface of head and pronotum obsolete. Labrum with microlines fine, mesh pattern isodiametric. Elytra, dorsal surface, microlines fine, mesh pattern transverse, sculpticells rather wide; epipleural mesh pattern isodiametric. Ventral surface with mesh pattern predominantly transverse, but abdominal sterna II-VII laterally with mesh pattern isodiametric.

Luster. Dorsal surface generally rather dull; ventral surface more shiny.

Chaetotaxy. Standard for Pericalina, except umbilical setae concentrated anteriorly and posteriorly with very wide asetose diastema medially.

Vestiture. Dorsal surface glabrous excepting fixed setae. Ventral surface of thoracic and abdominal sterna III-VII, and of middle and hind coxae sparsely setose. Males with biseriate adhesive vestiture on fore tarsomeres 1-3.

Head. Frontal impressions shallow, broad, irregular. Vertex with shallow transverse impression posteriad eyes; latter large, bulged.

Mouthparts. Labrum as in Figs. 5C-D. Mandibles as in Figs. 8O-V. See Table 2 for detailed characterization. Reichardt (1972: Figs. 1-2) provides illustrations of a maxilla and labium (ventral aspects).

Prothorax. Pronotum broad, maximum width more than 0.66 width of elytra at humeri, slightly convex medially, markedly transverse, broadly explanate laterally. Anterior margin shallowly concave; posterior margin truncate medially, sloped obliquely forward laterally; lateral margins sloped mediad posteriorly, not sinuate. Anterior angles very broadly rounded; posterior angles obtuse; sides reflexed broadly, subangulate medially.

Pterothorax. Metathorax: metepisternal lateral margin longer than width at base.

Elytra. Lateral margins broadly rounded, markedly explanate, with thin, plate-like extensions; apical margin obliquely truncate, not sinuate; preapical and apical angles rounded. Interneurs obsolete, or moderately developed, and intervals slightly convex.

Hind wings. Macropterous.

Legs. Not long and slender. Males fore femur with few setae ventrally toward base (accessory setae). Hind tarsus evidently shorter than hind tibia; hind tibial posterior (dorsal) surface keeled. Hind tarsomere 1 elongate, more than twice length of tarsomere 2. Tarsal claws pectinate.

Male genitalia. Median lobe left pleuropic, preapical orifice somewhat to left, very large; apical portion very narrow in ventral aspect; internal sac with large apical field of microtrichia.

Ovipositor. As for *Eurycoleus* genus-group (see Ball and Shpeley 1983:751).

Way of life. Erwin (1975) and Erwin and Erwin (1976) provide an incisive account of the remarkable associations of *Eurycoleus macularius* (under the name *E. macularis*, evidently a *lapsus calami)*. Associations include a white polypore fungus, *Tremetes scabrosa*, growing on logs of smooth-barked trees *(Inga* and *Apeiba)*, endomychids of the genus *Amphix*, erotylids and tenebrionids of the genera *Priotelus* and *Poecilesthus*, respectively. These latter beetles are also associated with the fungus and trees with which *E. macularius* is associated.

Adults of *E. macularius* eat larvae, pupae, and teneral adults of *Amphix* species, the larvae of which eat the fungus *Tremetes scabrosa*. The endomychid larvae pupate in groups, in the vicinity of the fungus on which they have fed. *Eurycoleus macularius* females lay their eggs near the pupal assemblages of the endomychids. The first instar carabid larvae are active hunters, seeking and finding the endomychid pupae. The carabid larvae eat the endomychid pupae, the later instars becoming short-legged and sedentary. In this respect and in some other aspects of the life history, these carabids are ectoparasitoid-like, and Erwin and Erwin (1976: 221) treat them as primitive ectoparasitoids.

Color (reddish or testaceous and black, considered to be aposematic) of the dorsal surface and color pattern of the adult carabids is markedly similar to the coloring of adult erotylids of the genus *Priotelus* and adult tenebrionids of the genus *Poecilesthus*. These latter beetles are also associated with the fungi on which *E. macularius* lives. Evidently, the carabid, erotylid, and tenebrionid adults all produce noxious compounds, which have been demonstrated to serve a defensive function. In view of the aposematic coloring and similar pattern (dark markings on a reddish background) of these beetles, and ability to produce defensive compounds, Erwin and Erwin (1976:220) inferred that the association of the beetles is an example of Müllerian mimicry.

More generally, adults are very active, running with alacrity. Nocturnal flight is indicated by capture of specimens at light.

Because of the marked structural similarity of adults of all of the species of *Eurycoleus,* including, where known, association with fungi on logs, we infer that the way of life described above is typical of the genus as a whole. Differences in color pattern of adults may indicate mimetic association of other species with other tenebrionid or erotylid species. At least 1 other mimetic complex might be suggested, for adults of the *E. tredecimpunctatus* species group, with their fewer but larger dark elytral marks.

Habitat. Tropical lowland forest and tropical lower montane forest, on fallen tree trunks, in association with fungi (as noted above).

Geographical distribution. The range of *Eurycoleus* is co-extensive with the range of the *Eurycoleus* genus-group.

Table 16. Geographical distribution of the species of *Eurycoleus* Chaudoir, by area.

	South America			Mesoamerica		
	Southern & Eastern	Amazonian	Northern	Central America	Mexico	Total Areas
Species						
E. poecilopterus (Buquet)	X	X				2
E. macularius (Chaudoir)			X	X	X	3
E. ornatus Bates				X	X (east)	2
E. erwini, new species				X		1
E. fofus Reichardt		X				1
E. tredecimpunctatus Chaudoir		X	X	X	X	4
E. septemplagiatus Chaudoir	X					1
E. octosignatus Bates					X (west)	1
Total Species	2	3	2	4	4	

Classification. Reichardt (1972: 239) arranged the 6 species known to him at the time, in 2 groups: the *E. poecilopterus* group and the *E. tredecimpunctatus* group. We adopt this classification, as indicated below.

Chorological aspects. We summarize here the distribution pattern of the genus, in terms of constituent species, and in terms of 5 areas (Table 16), 3 in South America, and 2 in Middle America. Of the 8 species, 3 are known only from Middle America, 3 are known from South America only, and 2 occur on both land masses. Only 2 species are in eastern and southern South America, and 3 are in the Amazon Basin. A subtraction pattern is indicated, from north to south.

Both the *E. poecilopterus* and *E. tredecimpunctatus* species groups are represented both in Middle America and South America. Putatively close relatives (species pairs *E. poecilopterus-macularius, E. ornatus-erwini, E. fofus-tredecimpunctatus,* and *E. septemplagiatus-octosignatus)* are completely or principally allopatric.

Included species. This genus includes 8 species.

Key to the species of *Eurycoleus* Chaudoir, based on character states of adults

1 Each elytron (Figs. 54A-C) with more than 10 small, black spots 2

1' Each elytron (Figs. 54D-I) with less than 10 black spots 3

2(1) Pronotum concolorous; antenna concolorous, black. Geographical range: western cis-Andean South America and Middle America, Colombia to southern México ... *E. macularius* (Chevrolat), p. 138

2' Pronotum bicolored: ground color testaceous, with black mark on each margin, mark on posterior margin large, more or less trilobed. Antenna bicolored, with antennomere 1 testaceous and antennomeres 2-11 black. Geographical range: cis-Andean South America, only .... *E. poecilopterus* (Buquet), p. 137

3(1') Pronotum bicolored: ground color testaceous, with black markings 4

3' Pronotum concolorous, testaceous 6

4(3) Apex of elytron pale. Geographical range: cis-Andean South America (eastern Brazil) .... *E. septemplagiatus* Chaudoir, p. 142

4' Apex of elytron with black marking. Geographical range: Middle America, principally México 5

5(4') Each elytron (Fig. 54H) with 2 black spots along suture, fused with its counterpart on opposite elytron; disc with 3 spots, not in contact with darkened (but not black) lateral margin. Geographical range: western México, Oaxaca and Durango .... *E. octosignatus* Bates, p. 142

5' Each elytron (Fig. 54D) with 3 spots along suture; disc with 3 spots, humeral spot small, median spot large, both in contact with black lateral margin. Geographical range: eastern México (Veracruz) and Belize .... *E. ornatus* Bates, p. 139

6(3') Femora concolorous, testaceous. Geographical range: western cis-Andean South America (Co-

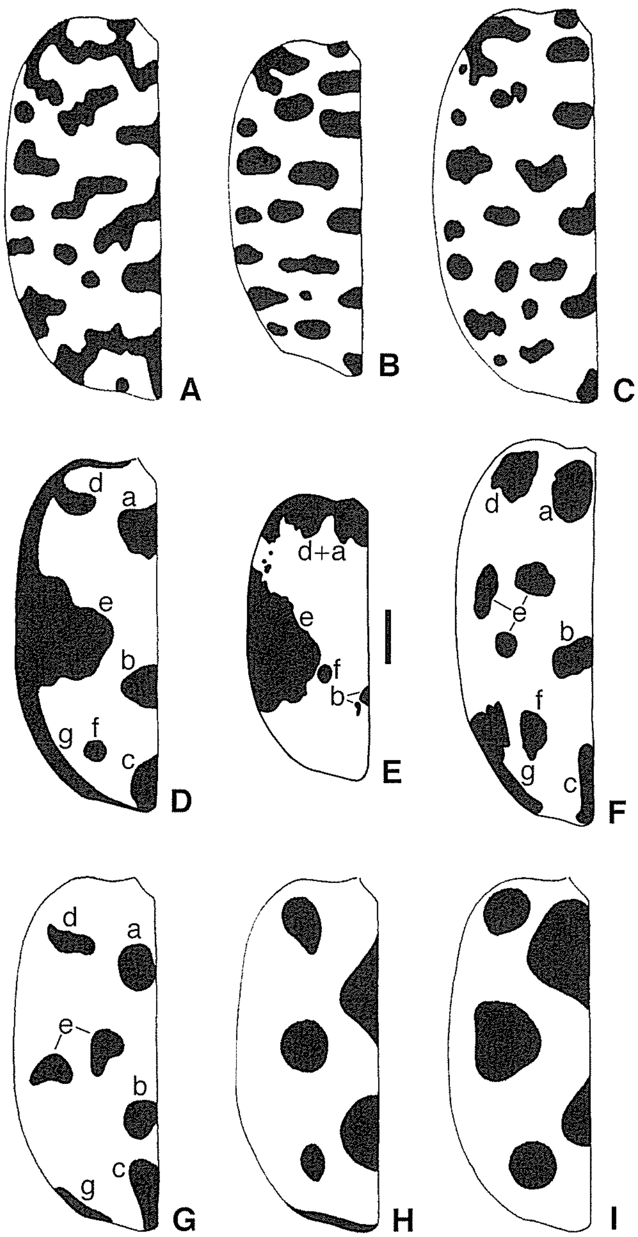

Figure 54. Line drawings of left elytron, dorsal aspect, of the species of *Eurycoleus* Chaudoir showing dark blotches (modified from Reichardt 1972:246, Figs. 8-14). **A**, *E. poecilopterus* (Buquet); **B**, *E. macularius* (Chevrolat) (Colombia); **C**, same (México); **D**, *E. ornatus* Bates; **E**, *E. erwini*, new species; **F**, *E. fofus* Reichardt; **G**, *E. tredecimpunctatus* Chaudoir; **H**, *E. octosignatus* Bates; **I**, *E. septemplagiatus* Chaudoir. Scale bar = 1.0 mm. Legend: **a**, suturo-basal; **b**, suturo-medial; **c**, suturo-apical; **d**, humeral; **e**, disco-medial; **f**, disco-preapical; and **g**, marginal.

lombia, Bolivia, Peru and Brazil) ....
.... *E. fofus* Reichardt, p. 141

6' Femora bicolored, testaceous with black apices. Geographical range: Middle America 7

7(6') Elytron (Fig. 54G) with 2 discal black spots; humeral spot narrow, oriented transversely, sub-humeral in position. Geographical range: western cis-Andean South America (Colombia) and Middle America (Panamá-México) ....
.... *E. tredecimpunctatus* Chaudoir, p. 141

7' Elytron (Fig. 54E) with basal area broadly black, apical area uniformly rufotestaceous. Geographical range: southwestern Costa Rica ....
.... *E. erwini*, new species, p. 140

Eurycoleus poecilopterus species group

Recognition. Members of this species group exhibit more than 10 small, more or less transverse marks on each elytron (Figs. 54A-C).

Included species. The *E. poecilopterus* group includes 2 species: *E. poecilopterus* Buquet, and *E. macularius* Chevrolat.

Eurycoleus poecilopterus (Buquet)
Fig. 54A

Lebia paekiloptera Buquet 1834:675.
Lebia poecilopterus; Dejean 1836:11.
Eurycoleus poecilopterus; Chaudoir 1869b:238.

Nomenclatural note. For the specific epithet of this species, Dejean (1836:11) transliterated the original Greek *"paekiloptera"* to the Latin *"poeciloptera"*. The original spelling has not been used in any publications subsequent to Buquet (1834), though it was cited by Sherborn (1922-1933:5069).The emended spelling, though an invalid specific epithet in principle, has been used since it was first proposed, that is, for some164 years. With continued use of Dejean's emended spelling being supported by Article 33.2.3.1 of the ICZN (1999:42), a change to Buquet's original spelling seems unnecessary, if not undesirable.

Type locality. Near the source of the Jari River, either in northeastern Brazil or the adjacent part of French Guiana (Reichardt 1972:240).

Elytral markings. See Fig. 54A

Habitat. Tropical lowland forest, from near sea level to at least 220 m.

Geographical distribution. The range of this species extends in cis-Andean South America from northern Argentina westward to Amazonian Bolivia

Table 17. Pattern of dark marks on elytra of adults of the *Eurycoleus tredecimpunctatus* species group.

Species	Dark marks a	b	c	d	e[1]	f	g[2]
E. ornatus Bates	blotch	blotch	blotch	transverse[3]	1	blotch	complete
E. erwini, new species	blotch[4]	blotch	———	blotch[4]	1	blotch	———
E. fofus Reichardt	blotch	blotch	vertical[3]	blotch	3	blotch	post.-lateral
E. tredecimpunctatus Chaudoir	blotch	blotch	vertical	transverse	2	———	post.-lateral
E. octosignatus Bates	blotch	blotch	———	blotch	1	blotch	apical
E. septemplagiatus Chaudoir	blotch	blotch	———	blotch	1	blotch	———

[1] Number of blotches in median group
[2] Extent and position of marginal linear mark
[3] Form and orientation of blotch
[4] Marks a and d joined by darkening of intervening area

and northeastward to Venezuela. The specimen recorded below from Argentina extends the range of the genus substantially southward. Previously it was known to occur only as far south as Rio de Janeiro, Brazil (Reichardt 1972:244).

Material examined. We have seen 25 specimens, from the following localities: **ARGENTINA. Misiones**. Male, Iguazu National Park, 200 m., forest, 23.XII.90-6.I.91, S. & J. Peck (CMNC). **BOLIVIA. Beni.** Male, Beni Station, Alto Bosque, BIOLAT SI/MAB, ex fungus, 3.VIII.1988, R.E. Brooks (SEMC). **La Paz.** Apolo-Mapiri, IX.1925, G.L. Harrington (USNM). **Santa Cruz.** Male, Camiri, 9.III.1949, J. Daguerre (USNM). Male, female, Ichilo, Buenavista, Martinez (ISNB). Male, 9 km. e. Bermejo, 26.XII.1993, D. Brozka (CASC). **BRAZIL. Minas Gerais**. 2 females, Brasilia (HNHM). **ECUADOR. Napo**. Male, female, Limoncocha, 9.VI.1977, W.E. Steiner (USNM). Female, Pastaza, 23 km. s. e. Puyo, 19.V.1977, W.E. Steiner (USNM). Male, Yaturi Lodge, Rio Napo, 0°32'54"S 76°21'18"W, 270 m., ex fungus covered log, 23.III.1999, R.E. Brooks (SEMC). **Sucumbios**. Sacha Lodge, 0°28'14"S 76°27'35"W, 270 m., ex fungus covered log, R.E. Brooks: male, 23.III.1999 (SEMC); male, 24.III.1999 (SEMC). **FRENCH GUIANA.** Female, Passoura, VI.1905, E. Le Molt (ISNB). Male, Roches de Kourou (ISNB). **PERU. Loreto.** Female, Cocha Shinguito, on fallen log, at night, Lot 71, 29.VIII.1991, ADP 50565, T.L. Erwin, M.G. Pogue (USNM). Male, 2 females, nr. jct. Rio Maranon & Ucayali, 73.5°W 4.8°S, 6-20.VIII.1994, P. Skelley (FSCA). Female, 1.5 km. n. Teniente Lopez, 2°35.66'S 76°06.92'W, 210-240 m., ex crusting fungus, 15.VII.1993, R. Leschen (SEMC). **Madre de Dios.** Female, Rio Tambopata Res., 30 km. (air) s.w. Puerto Maldonado, 290 m., 12°50'S, 69°20'W, on fungus, at night, 3.X.-15.XI, 1983, N.E. Stork (USNM). **VENEZUELA. Territorio Federal Amazonas**. 2 females, Cerro de Neblina base camp, 0°50'N, 66°10'W, 140 m., rain forest, under bark of cut timber, w/ bracket fungi, 1.II.1985, W.E. Steiner (USNM).

Months of collection. January-March, June-August, and December.

Eurycoleus macularius (Chevrolat)

Figs. 5C-D, 8O-V, 10C-E, and 54B-C

Lebia macularia Chevrolat 1835: no. 131.
Eurycoleus macularius; Chaudoir 1869b:237.

Type locality. Orizaba, State of Veracruz, México.

Description. A detailed description is not necessary here. Illustrated and characterized above and in Table 2 are the mouthparts: labrum (Figs. 5C-D); mandibles (Figs. 8O-V); and maxilla (Figs. 10C-E). Figs. 54B-C illustrate color pattern of the elytra.

Habitat. As indicated above, for the genus *Eurycoleus*, with altitudinal range extended from near sea level to at least 650 m.

Geographical distribution. Primarily Middle American, the range of this species extends from about the Tropic of Cancer in eastern México southward to cis-Andean Colombia, in northern South America.

Material examined. We have seen 55 specimens of this species from the following localities: **COLOMBIA. Cesar.** Male, Sierra de Parija Los Artizas, 650 m., 19.IX.1969, B. Malkin (EMEC). **Department?** Female, Bonneuil (ISNM). **COSTA RICA. Guanacaste.** Female, Palo Verde Research Station, 24.VII.1973, J. Doyen (EMEC). **Heredia**. Female, La Selva, 3 km. s. Puerto Viejo, 75 m., 17.X.1973, P.A. Opler (EMEC). **GUATEMALA. Izabel.** Female, 2 km. s.e. Mariscos, 250 m., 26.VI.1993, J.S. Ashe, R.E. Brooks (SEMC). **Sacatepequez**. Male, Duennas, Champion (ISNB). **HONDURAS. Atlantida**. Female, Tela, Lanceitilla Botanical Garden, 10 m., ex crustose fungi on log, 23.VI.1994, J.S. Ashe, R.E. Brooks (SEMC). **MEXICO.** Female, Bonneuil (ISNB). **Campeché**. Male, Chicanna, 10 km. w. Xpujil, 13.VII.1983, S. & J. Peck (UASM). **Chiapas.** Simojovel, J.A. Chemsak: 3 females, 18-31.VII.1958 (EMEC); male, female, 18-31.XII.1958 (CASC). **Tabasco**. Female, 95.6 km. s. Villahermosa, u-v light, 6-7.VI.1966, G.E. Ball, D.R. Whitehead (UASM). **VERACRUZ**. 5 males, 11 females, Lake Catemaco, lake shore, 4 km. n. Catemaco, 305 m., ex under loose bark on felled trees, 21.VIII.1967, G.E. Ball, T.L. Erwin, & R.E. Leech (UASM). Male, 2 females, Est. Biol. Los Tuxtlas, 26.IV-6.V.1989, E. Giesbert (FSCA). Male, female, 4 km. w. Sontecomapan, 30.5 m., 21.VIII.1967, G.E. Ball, T.L. Erwin, & R.E. Leech (UASM). **PANAMA. Darien**. 2 females, Cana Biological Station, 7°45'18"N 77°41'06"W, ex fungus-laden log, 03.VI.1996, J.S. Ashe, R.E. Brooks (SEMC). **Canal Zone.** Male, Gamboa-Pipeline road, Km. 7, flight intercept trap, 20.V-11.VI.1996, S. Lingafelter (SEMC). Female, Santa Fe, 25.V.1967, D.M. DeLong, C.A. Triplehorn (EMEC). **Chiriqui**. Male, 13.2 km. n.e. Caldera, 08°42'N 82°19'W, 360 m., ex polypore mushroom, 24.V.1995, J.S. Ashe (SEMC). **Colon.** Parque Nacional Soberania, Pipeline road, 09°07'N 79°45'W, 80 m., fungus-laden logs: 3 females, 16-20.V.1995, C. Chaboo, J. Jolly, G. Kidd, & B. Haylord (SEMC); 2 males, Km. 6.0, 29.V.1995, J.S. Ashe (SEMC); 2 males, female, Km. 6.1, 40 m., 2.VI.1995, J.S. Ashe, R.E. Brooks (SEMC); and male, 21.VI.1995, J.S. Ashe, R.E. Brooks (SEMC). **Panamá**. Female, 10.6 km. e. Cañita, 29.VI.1997, R.H. Turnbow (RHTC). Male, Chepo dist., Altos de Maje, 17.V.1975, Stockwell, Engelman (CASC). 2 males, female, 6.9 km. s. Gamboa, Old Plantation Road, 80 m., ex fungus-laden log, 22.VI.1995, J.S. Ashe, R.E. Brooks (SEMC). Female, Fort Kobbe, 08°54'0"N, 79°34'34"W, PAN 1AB96, 183B, 21.VI.1996, J.S.Ashe, R.E. Brooks (SEMC).

Months of collection. May-October, and December.

Eurycoleus tredecimpunctatus species group

Recognition. Members of this species group exhibit less than 10 rather large and spot-like dark marks on each elytron.

Elytral markings. The elytral color pattern is diagnostic for the species (Figs. 54D-I). The elements of the pattern (dark mark, or spots, or blotches) seem sufficiently constant in position to permit postulation of homology. Accordingly, each mark is designated, by a lower case letter. A mark is described as: "vertical", if the form is linear and is extended the long axis of the elytron; "transverse", if the form is more or less linear, with the long axis approximately perpendicular to the long axis of the elytron; and "blotch", spot-like.

Seven units are recognized, the lettering following a plan of 2 more or less discal columns, and the laterodorsal edge as a third column. Marks **a-c** are sutural; **d-f** are discal, or humeral and discal. Mark **e** of this series is more or less medial. It varies from being a single large blotch to tripartite. Mark **g** is marginal, and linear, varying in extent from complete to being confined to the preapical or apical margin, or absent. Marks **c** and **g** are absent from the elytra of some taxa, and marks **a** and **b** vary appreciably in size.

Table 17 summarizes some of the details of variation in marking pattern. Taxa are arranged in sequence from a maximum to a minimum of black markings, intended to represent a morphocline.

Classification and included species. Based on color pattern of the elytra, the 6 species of this group are considered to form 2 subgroups, as follows: the *E. tredecimpunctatus* subgroup Figs. 54D-G), including *E. ornatus* Bates, *E. erwini, new species, E. fofus* Reichardt, and *E. tredecimpunctatus* Chaudoir; and the *E. septemplagiatus* subgroup (Figs. 54H-I), including *E. septemplagiatus* Chaudoir and *E. octosignatus* Bates.

Eurycoleus ornatus Bates
Fig. 54D

Eurycoleus ornatus Bates 1883:186.
Type locality. Cordoba, State of Veracruz, México.

Elytral markings. See Fig. 54D

Habitat. As indicated above, for the genus *Eurycoleus*, with altitudinal range extended from near sea level to at least 740 m.

Geographical distribution. The range of *E. ornatus* extends from Honduras northward to eastern México.

Chorological affinities. The range of *E. ornatus* overlaps much of the Middle American range of *E. macularius*, and adults of both have been collected on the same logs at several localities.

Material examined. We have seen 30 specimens, as noted below. Specimens from Belize, Honduras, and Guatemala are new national records, and those from Campeche and Chiapas are new state records for México: **BELIZE. Cayo District.** Female, Mountain Pine Ridge, Hidden Valley Estate, trail to Butterfly Falls, 600 m., ex dead fronds of tree ferns, 20-25.II.1997, G.E. Ball (UASM). **Orange Walk District.** 7 males, Blue Creek Village, 9.VI.1981, Earthwatch Belize Exped., W.E. Steiner (USNM). **GUATEMALA. Izabal.** Female, 2 km. s.e. Mariscos, 250 m., ex fungus-covered log, 26.VI.1993, J.S. Ashe, R. Brooks (SEMC). **HONDURAS. Santa Barbara la Fe.** 6 males, 2 females, Finca La Roca, 5.3 km. s. Peña Blanca, 14°57'N 88°02'W, 740 m., ex *Favolus*, 19.VI.1994, J.S. Ashe, R.E. Brooks (SEMC). **Departamento?** Male, Progreso, ADP 08237, W.M. Mann (USNM). **MEXICO. Campeche.** Male, Chicanna, 10 km. w. Xpujil, 300 m., seasonal tropical forest, 13.VII.1983, S. & J. Peck (UASM). **Chiapas.** Female, Palenque ruins, 122 m., u-v light, 12.IV.1966, G.E. Ball, D.R. Whitehead (UASM). Female, Bonampak Rd., 100 km. s.e. Palenque, 230 m., ex woody fungus litter, 24.VII.1983, S. & J. Peck (UASM). **Veracruz.** Female, Fortin de las Flores, 1010 m., at light, 7-12.VII.1974, J.A. Chemsak, J. Powell (EMEC). Female, Hwy. 140, 1 km. n. Huatusco, 1200 m., on logs, at night, 14.VIII.1987, D.A. Millman, D.K. Liebherr (CUIC). Female, Estacion Biologica "Los Tuxtlas", 150-200m., under bark, 28.VII.1990, J.K. Liebherr (CUIC). 4 males, 2 females, 4 km. w. Sontecomapan, 30.5 m., 21.VIII.1967, G.E. Ball, T.L. Erwin, & R.E. Leech (UASM).

Months of collection. February, April, and June-August.

Eurycoleus erwini, new species

Figs. 52I-J, and 54E

Type material. One specimen, HOLOTYPE male, labelled: "Estación Sirena, Playa Sirena, Prov./ Punta, COSTA RICA. 1-100m. Jun/ 1995. G. Fonseca/ L_S_270500_508300#6162"; "COSTA RICA/ INBIO/ CR1002/ 353149" [also bar-code symbol] [INBC].

Type locality. Playa Sirena, Provincia Puntarenas, Costa Rica.

Specific epithet. A Latinized masculine genitive eponym, based on the surname of Terry L. Erwin (USNM), in recognition of his work that established what is probably the pattern of way of life of the members of the *Eurycoleus* genus group, and in appreciation for drawing this species to our attention.

Recognition. In addition to features noted in the key, the holotype is distinctive in its small size and markedly rounded lateral margins of the elytra (Fig. 54E).

Description. With character states of genus *Eurycoleus* and *E. tredecimpunctatus* species group, restricted or amplified as follows. SBL 6.59 mm., Hw/ Fw 1.77, and Hw/Pwm 0.70.

Color. Following pale (rufous to testaceous): head, antennae (antennomeres 1-11). mouthparts, and ventral surfaces of thorax and abdominal sterna II-III, most of sterna IV-VII, and coxae, trochanters, most of femora and tarsomeres 1-5. Following infuscated to black: marks on elytra (Fig. 54E), including extensive area on epipleuron, apical portions of femora, most of tibiae, and abdominal sterna IV-VII laterally. Pronotum rufotestaceous except lateral margins and median portion of posterior margin black. Each elytron (Fig. 54E) with 4 dark marks as follows: base, including humerus (blotches **a** + **d**); small mark (blotch **b**) in intervals 1-2 in posterior 2/3; small oval discal mark (blotch **e**) about in interval 5; and large mark (blotch **e**) toward lateral margin, most extensive in posterior 2/3, tapered anteriorly and posteriorly, more abruptly so posteriorly; blotches **c** and **g** absent, apical area uniformly pale.

Male genitalia (Figs. 52I-J). Median lobe: left pleuropic, basal bulb projected slightly ventrad; shaft slender, in left lateral aspect (Fig. 52J), ventral surface evenly curved; preapical orifice more than half length of shaft; apical portion moderately elongate, narrow in both dorsal and left lateral aspects, apex narrowly rounded. Internal sac with extensive field of microtrichia.

Habitat. Not specified; probably tropical lowland forest.

Geographical distribution. This species is known only from southwestern Costa Rica, on the Osa Perninsula.

Chorological affinities. The range of this species seems to be isolated from the known ranges of all other species.

Phylogenetic relationships. In dorsal color pattern, the single adult is most like *E. ornatus*. We postulate that the 2 are adelphotaxa.

Material examined. Holotype only. See above for details.

Month of collection. June.

Eurycoleus fofus Reichardt
Figs. 52K-L, and 54F

Eurycoleus fofus Reichardt 1976:107. HOLOTYPE female, labelled: "Leticia, Amazonas,/ 700', Colombia,/ July 11, 1970/ H. & A. Howden"; "HOLOTIPO" [printed, red paper with black borders]; "Eurycoleus/ fofus/ Reichardt, 1976" [handwritten]; "HOLOTYPE/ CNC No. 15687" [printed, except for number, red paper] (CNCI).

Type locality. Leticia, Amazonas, Colombia.

Recognition. See key to species, above, and Fig. 54E.

Description. With character states of the genus *Eurycoleus* and the *E. tredecimpunctatus* species group, restricted or amplified as follows. SBL males 9.50-9.73 (mm.); female, 8.96 mm. Hw/Fw, males, 1.67-1.69; female, 1.59; Hw/Pwm, males, 1.28-1.30; female, 1.30.

Color. Following pale (rufous to testaceous): Head, antennomere 1, labrum, mandibles, maxillae and labium (except palpi), prothorax, ventral surface of pterothorax and abdominal sterna II-VI, and most of VII, most of elytra, and coxae, trochanters, and femora. Following infuscated to black: antennomeres 2-11, most of palpomeres, marks on elytra, including apical part of epipleuron, tibiae and tarsi, and abdominal sternum VII laterally. Each elytron (Fig. 54F) with 8 or 9 dark marks as follows: suture with 3 marks, **a** and **b** blotches, **c** linear, vertically directed; mark **d** a blotch, humeral in position; mark **e** of 3 blotches, of various sizes and shapes; mark **f** a blotch, joined to mark **g** or not; and mark **g** marginal, linear, posterio-lateral in position, broadened more or less extensively anteriorly.

Male genitalia (Figs. 52K-L). Median lobe: left pleuropic, basal bulb projected slightly ventrad; shaft slender, in left lateral aspect (Fig. 52J), ventral surface slightly sinuate; preapical orifice more than half length of shaft; apical portion moderately elongate, narrow in both dorsal and left lateral aspects, apex narrowly rounded. Internal sac with extensive field of microtrichia.

Habitat. Tropical lowland forest. Adults were collected in association with white polypore fungi.

Geographical distribution. This species is known from Amazonian Colombia, Peru, Bolivia, and Brazil.

Chorological affinities. The geographical ranges of this species and of *E. poecilopterus* overlap, with a specimen of each having been collected at the same time at "Apolo-Mapiri", Bolivia, and at the Rio Tambopata Reserve, in Amazonian Peru. Also, *E. tredecimpunctatus* has been collected in Peru, not far from a locality where *E. fofus* was collected.

Phylogenetic relationships. In dorsal color pattern, adults of *E. fofus* are most like those of *E. tredecimpunctatus*. We postulate that these 2 are adelphotaxa.

Material examined. We have seen 10 specimens, as follows: **BOLIVIA. Beni.** Male, female, Cachuela Esperanza, Mulford Biological Exped. 1921-1922, III, W.M. Mann (USNM). **La Paz.** Female, Apolo-Mapiri, IX.1925, G.L. Harrington (USNM). **BRAZIL. Rondonia.** Female, 62 km sw Ariquemes, nr. Fzda. Ranco Grande, 4-6.XI.1997, J.E. Eger (FSCA). **PERU. Madre de Dios.** Pakitza, BIOLAT Biol. Station: male, Zone 03, 12°7'S 70°58'W, in rotten core of fallen dead tree, Trail Castanal/ 22, BIOLAT/ COLE, 000010894, 12.IX.1989, T.L. Erwin (USNM); male, 11°56'47"S 71°17'00"W, 356 m., UV light trap, Tr. Tachigali 10, Lot 149, BIOLAT/ COLE 000014327, 01.X.1991, M.G. Pogue (USNM). Rio Tambopata Reserve, 12°50'S 69°20'W, 290 m.: 2 males, female, ex/ large white polypore, 13 & 19.I.1987, J.V. McHugh, Q.D. Wheeler (CUIC); male, ex fungi, at night, 3.X-15.XI.1983, N.E. Stork (BMNH).

Months of collection. January, March, July, and September-November.

Eurycoleus tredecimpunctatus Chaudoir
Fig. 54G

Eurycoleus tredecimpunctatus Chaudoir 1869b:238.

Type locality. Tefé, State of Amazonas, Brazil.

Elytral markings. See Fig. 54G.

Habitat. As indicated above, for the genus *Eurycoleus*, with altitudinal range extended from near sea level to at least 950 m.

Geographical distribution. The range of this species extends from Amazonian Peru northward to eastern México, State of Veracruz.

Chorological affinities. The range of *E. tredecimpunctatus* overlaps those of *E. macularius* and *E. ornatus,* but not the range of *E. fofus*, the species to which it is most similar.

Material examined. We have seen 39 specimens, from the following localities. Those from El Salvador, Panamá, and Peru represent new national records: **COSTA RICA. Alajuela**. Female, Peñas Blancas, 9.VI.1987, E. Cruz (UASM). Female, Braulio, Carrillo National Park, 19.4 km. from park entrance, ex shelf fungus, 27.V.1992 (SEMC). **Cartago**. Female, Turrialba, ADP 08244 (CASC). **Heredia**. Male, female, La Selva Research Station, 15.VII.1973, J. Doyen (EMEC). Hamburg Farm, Rio Reventazon, nr. El Limon, F. Nevermann (USNM): male, ex fungus on dry wood, ADP 08238, 27.V.1934; male, under loose bark, 5.II.1928. **EL SALVADOR. San Salvador.** San Salvador (USNM): female, ADP 08242, 20-23.V.1958, O.L. Cartwright; male, ADP 08240, K.A. Salman. Quezaltepeque, 500 m., 5.VII.1963, D.Q. Cavagnaro, M.E. Erwin: male, (CASC); male, ADP 08245 (CASC). **GUATEMALA. Petén.** Female, Tikal (USNM). **Suchitépequez.** Female, Finca San Rafael, Olimpio, Cuyotenango, 25.VIII.1965, ADP 51527, J.M. Campbell (CNCI). **MEXICO. Guerrero**. 6 males, 4 females, Acahuizlotla, 17.XI.1946, Ross, Skinner (CASC). **PANAMA. Canal Zone.** Barro Colorado Island, 09°10'N 79°30'W: female, at light, ADP 08241, 13.VI.1972, R. Pine (USNM); male, running on logs or branches, ADP 133410, 30.VI.1973, T.L. & L.J. Erwin (USNM); 2 females, same as previous except ADP 2008477 & 18312 (USNM); female, at light, ADP 78837, 9.VI.1978, H. Wolda (USNM); and male, ADP 08243, 4.VII.1938, E.C. Williams, Jr. (CMNH). **Chiriqui**. 2 males, 3 females, 13.2 km. n.e. Caldera, 08°42'N 82°19'W, 360 m., ex polypore mushroom, 24.V.1995, J.S. & A. Ashe (SEMC). Male, 20.4 km. n. San Felix, 08°22'N 81°46'W, 950 m., 8.VI.1995, J.S. Ashe, R.E. Brooks (SEMC). **Colon**. 2 females, Parque Nacional Soberania, Pipeline Road, Km. 6.1, 09°07'N 79°45'W, 40 m., ex crustose polypore, 2.VI.1995, J.S. Ashe, R.E. Brooks (SEMC). **Darien**. Male, Cana Biological Station, 07°45'18"N 79°41'06"W, 500-550 m., PAN 1AB96 048, ex fungus-laden log, 06.VI.1996, J.S. Ashe, R.E. Brooks (SEMC). **Panamá.** Female, Parque Nacional Soberania, Old Gamboa Road, 11.VI.1993, M. Jameson (SEMC). **PERU. Cuzco**. Male, Marcapata (HNHM).

Months of collection. February, May-August, and November.

Eurycoleus octosignatus Bates
Fig. 54H

Eurycoleus octosignatus Bates 1883:186.

Type locality. Tehuantepec, State of Oaxaca, México.

Elytral markings. Fig. 54G

Habitat. Dry tropical lowland forest from near sea level to an altitude of at least 610 m. (Reichardt 1972:245).

Geographical distribution. This species is known only from the western part of México, from the Isthmus of Tehuantepec northward to about 23°11'N.

Material examined. We have seen only 1 specimen, as follows. It represents a new state record, but only a slight range extension. **MEXICO**. **Sinaloa.** Female, 12.9 km. e. Concordia, ca. 200 m., 23.VIII.1969, J. Doyen (EMEC).

Month of collection. August.

Eurycoleus septemplagiatus Chaudoir
Fig. 54I

Eurycoleus septemplagiatus Chaudoir 1877:202.

Type locality. "Rio de Janeiro", Brazil (could be the state of that name, or Rio de Janeiro, in the State of Guanabara, Reichardt 1972:244). The additional record reported below, from eastern Brazil, seems to make it more likely that the type locality is the eastern State of Rio de Janeiro.

Elytral markings. Fig. 54I

Habitat. Unknown.

Geographical distribution. This species is known only from eastern Brazil.

Material examined. One specimen, as follows: **BRAZIL. Santa Catarina.** Female, Corupa, XII.1946 (USNM).

Month of collection. December.

Pericalus genus-group

The following plesiotypic features are added to the characterization (Ball and Shpeley 1983:751-752, and Shpeley and Ball 1993:18) of the pericaloids: dorsal surface glabrous, impunctate, except standard fixed setae; males with adhesive vestiture of biseriate squamo-setae on fore tarsomeres 1-3 (Figs. 12A-C); mouthparts (see Table 2 for complete characterization) with labrum long and narrow, distinctly longer than

Table 18. Occurrence of species of *Coptodera* Dejean in lowland tropical evergreen forest at two localities in the Rio Napo Basin, Amazonian Ecuador.

Species	Locality	Number of Specimens On trees	At fruit fall	Total
C. megalops Bates	Yasuni	3	—-	3
C. versicolor Bates	Yasuni	8	—-	8
C. relucens Bates	Onkone Gare	—-	1	1
C. festiva Dejean	Onkone Gare	—-	2	2
C. cupreotincta Bates	Yasuni	1	—-	1
	Onkone Gare	4	—-	4
C. chalcites Bates	Yasuni	1	1	2
C. acutipennis (Buquet)	Yasuni	13	8	21
	Onkone Gare	3	40	43
C. nitidula (Buquet)	Onkone Gare	1	—-	1
			TOTAL EXX.	86

clypeus, row of 6 setae dorsally near anterior margin, mandibles not explanate, terebrae narrow, scrobes hardly visible in dorsal aspect, ventral grooves present, left mandible with supraterebral ridge complete, terebral ridge curved evenly into incisor tooth, galea slender, galeomeres 1 and 2 not partially fused, galeomere 2 shorter than 1, maxillary palpomere 4 distinctly longer than 3, labium with submentum separated from mentum by distinct mental suture, mentum edentate, lateral lobes prominent, epilobes widened preapically, prementum with glossal sclerite apically quadrisetose, labial palpomere 3 narrow, not securiform, and glossal sclerite ventrally without pair of setae preapically. Apotypic features, shared with members of the *Thyreopterus*, *Catascopellus*, and *Eurycoleus* species groups, are: left mandible without retinaculum, and terebral tooth, premolar and molar in form of a more or less composite complex.

Coptodera Dejean

Coptodera Dejean 1825:273.

The only genus of the *Pericalus* genus-group in the Western Hemisphere is *Coptodera* Dejean. Shpeley and Ball (1993) revised these species. We add here, for emphasis and clarification of Ball (1975a), the following notes.

Basilewsky (1984:542) proposed correctly that *Stenoglossa* Bates belonged in the pericaloid complex (his Pericalini) and not in the eurycoleoid complex where Ball had placed it. Shpeley and Ball (1993:19) went a step further and synonymized the names *Coptodera* Dejean and *Stenoglossa* Bates.

Reichardt (1977:446) stated that Ball had neglected in his 1975 study to treat *Haplocrepis* Jeannel (1949:926). Examination of the included species (1 from South America and 4 from Madagascar) led Shpeley and Ball (1993:19-20) to conclude that *Haplocrepis* is congeneric with *Coptodera*, and that the Neotropical species of the latter (*C. nubiculosa* Chaudoir) is conspecific with *C. nitidula* Buquet, and a member of the *C. aerata* species group, which is precinctive in the Western Hemisphere.

Habitat and natural history. According to Erwin (1990:49), adults of this genus "are dwellers on both standing and fallen tree trunks in tropical forests; ... they are nocturnal". The following comments are based on brief experience of the authors at Onkone Gare (1995), and of Kipling W. Will, at Yasuni Scientific Station (1998), in the Rio Napo Basin, Amazonian Ecuador. Data about the collections, made in tropical lowland forest, are presented in Table 18. Details are provided in the species treatments.

Most specimens were collected at night by active searching using head lamps. Of the 8 species (represented by 98 specimens) represented, the only specimen of *C. nitidula* (beaten from a clump of hanging dead leaves) and 1 of 2 specimens of C. *chalcites* (at a fruit fall) were taken in daylight. Specimens of 5 species (*C. megalops, C. versicolor, C. cupreotincta, C. acutipennis,* and *C. chalcites*) were collected on standing or fallen tree trunks. For *C. acutipennis*, 48 of 64 specimens were taken on the ground, at fruit falls, as was the only specimen of *C. relucens*, and the 2 specimens of C. *festiva*.

These data confirm Erwin's statement about time of activity of adults. They confirm generally his statement about association of the species with tree trunks. But adults of 4 species were found on the ground, at fruit falls. These occurrences probably indicate that these basically arboreal species are opportunistic, taking advantage of a nutritional source that attracts numerous prey items (such as dipterous larvae from eggs laid by female flies that are attracted to the decaying fruit).

Coptodera elongata Putzeys
Figs. 12A-C

Coptodera elongata Putzeys 1845:395.

Type locality. Orizaba, State of Veracruz, México (Shpeley and Ball, 1993:36).

Adhesive vestiture. See Figs. 12A-C.

Habitat. Tropical lowland and lower montane forest, from near sea level to at least 1520 m.

Geographical distribution. The range of this species extends north from Costa Rica to the Gulf Versant of México.

Material examined. One specimen from the following locality, which is additional to those reported by Shpeley and Ball (1993:36-38): **GUATEMALA. Quetzaltenango**. Male, 12.5 km. s.w. Zunil, 1520m, ex. pyrethrum fogging fungus-laden log, 21.VI.1993, J.S. Ashe, R.E. Brooks (SEMC).

Month of collection. June.

Coptodera schaumi Chaudoir

Coptodera schaumi Chaudoir 1861:123.

Type area. Costa Rica (Shpeley and Ball, 1993:38).

Habitat. Tropical lowland forest and tropical lower montane forest, at altitudes from near sea level to at least 700 m. (Shpeley and Ball 1993:40).

Geographical distribution. The range of this species extends north from the Amazon Basin of Brazil to Guatemala.

Material examined. 2 specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:40): **PANAMA. Canal Zone**. Female, 7 km. s.w. Paraiso, K10 Rd., 90 m., 16.VIII.1992, A.R. Gollogly (UASM). **Panamá**. Male, 09°05'N 79°40'W, Old Plantation Rd., 6.9 km. s. Gamboa, 80 m., ex. fungus-laden log, 22.VI.1995, J.S. Ashe, R.E. Brooks (SEMC).

Months of collection. June and August.

Coptodera megalops Bates

Coptodera megalops Bates 1869:77.

Type locality. Ega (=Tefé), State of Amazonas, Brazil (Shpeley and Ball, 1993:40).

Habitat. Tropical lowland forest and tropical lower montane forest, at altitudes from near sea level to at least 1200 m. (Shpeley and Ball, l.c.). Adults live on logs (Shpeley and Ball 1993:42), but rest in other places as well, such as rolled *Heliconia* leaves.

Geographical distribution. The range of this species extends over the upper and middle part of the Amazon Basin in South America north to Panamá. The specimens recorded from Panamá extend the previous known range northward into Middle America. The previous northernmost record was from south-central Colombia.

Material examined. Fourteen specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:42-44): **BOLIVIA. Cochabamba**. 2 females, Villa Tunari, Parque Machias, 16°58'20"S 65°24'42"W, 300 m., lowland rain forest, 12.II.1999, R.S. Anderson (CMNC). **ECUADOR. Napo**. 2 females, Yasuni Scientific Station, 00°39'14"S 76°27'12"W, 210 m., headlamp, 20.IV.1998, K.W. Will (CUIC). Vic. Yasuni Scientific Station, 00°40'36"S 76°24'02"W, 210 m., K.W. Will (CUIC): male, headlamp, 15.IV.1998; female, headlamp, 17.IV.1998; female, headlamp/cut trees, 17.IV.1998. 4 males, 2 females, Puerto Misahuali, 9.IX.1997, K.W. Will (CUIC). **PANAMA. Panamá**. Male, 09°05'N 79°40'W, Old Plantation Rd., 6.9 km. s. Gamboa, 80 m., rolled *Heliconia* leaves, 22.VI.1995, J.S. Ashe, R.E. Brooks (SEMC).

Months of collection. February, April, June, and September.

Coptodera championi Bates

Coptodera championi Bates 1883:180.

Type locality. Bugaba, Province of Chiriqui, Panamá (Shpeley and Ball 1993:45).

Habitat. Tropical lowland forest and tropical lower montane forest, at altitudes from near sea level to at least 1200 m.

Geographical distribution. This species is known only from trans-Andean Colombia and Panamá.

Material examined. One specimen from the following locality, which is additional to those reported by Shpeley and Ball (l.c.): **PANAMA. Canal Zone**. Male, Madden Forest, 9°05'N 79°37'W, 27.VI.1972, H.P. Stockwell (UASM).

Month of collection. June.

Coptodera versicolor Bates

Coptodera versicolor Bates 1869:76.

Type locality. Ega (=Tefé), State of Amazonas, Brazil (Shpeley and Ball, 1993:55).

Habitat. Tropical lowland forest, to an altitude of at least 400 m.

Geographical distribution. The range of this species is extensive in the Amazon Basin of cis-Andean South America.

Material examined. Ten specimens from the following locality, which is additional to those reported by Shpeley and Ball (1993:56): **ECUADOR. Napo**. 2 females, Yasuni Scientific Station, 00°39'14"S 76°27'12"W, 210 m., 20.IV.1998, K.W. Will (CUIC). 3 males, 5 females, vic. Yasuni Scientific Station, 00°39'14"S 76°27'12"W, 210 m., headlamp/cut trees, 17.IV.1998, K.W. Will (CUIC).

Month of collection. April.

Coptodera nigrostriata (Reiche)

Tetragonoderus nigrostriatus Reiche 1843:179.
Stenoglossa nigrostriata Chaudoir 1869b:203.
Coptodera nigrostriata; Shpeley and Ball 1993:62.

Type locality. Near Caracas, Venezuela (Shpeley and Ball, 1993:62).

Habitat. Tropical lowland forest and tropical lower montane forest from near sea level to an altitude of at least 609 m. (Shpeley and Ball 1993:64). In addition to information provided by Shpeley and Ball (l. c.), adults evidently conceal themselves in bunches of dry, hanging leaves and among vines on tree trunks.

Geographical distribution. This species is known only from the Amazon Basin of Brazil and Peru. The specimens recorded below extend the previous known range west along the Amazon into Peru.

Material examined. 5 specimens from the following locality, which is additional to those reported by Shpeley and Ball (1993:64): **PERU. Loreto**. Female, nr. Jct. Rio Maranon & Ucayali, 73.5°W 4.8°S, 6-20.VIII.1994, P. Skelley (FSCA). Cocha Shinguito, 05°08'S 74°45'W, Erwin et al (USNM): 2 males, female, ca. 350 m., insecticidal fogging of dry leaves, 18.VI.1990; male, insecticide fogging of big tree with vines, epiphytes, 19.VI.1990.

Month of collection. June.

Coptodera lineata (Bates)

Stenoglossa lineata Bates 1883:184.
Coptodera lineata; Shpeley and Ball 1993:64.

Type locality. Chacoj, State of Alto Verapaz, Guatemala (Shpeley and Ball, 1993:64).

Habitat. Tropical lowland forest and tropical lower montane forest from near sea level to an altitude of at least 800 m.

Geographical distribution. The range of this species extends through Middle America, from Panamá north to the Gulf and Pacific Versants of México. The specimen from Belize is the first record for that country.

Material examined. 2 specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:65): **BELIZE. Orange Walk District**. Female, Rio Bravo Conservation Area, La Milpa Field Station, 17°50'23.2"N 89°01'05.8"W, 1.V.1996, C.E. Carlton (LSUC). **COSTA RICA. Alajuela**. Female, Peñas Blancas, 800 m., ex. flight intercept, 19.V.1989, J.S. Ashe, R.E. Brooks, & R. Leschen (SEMC).

Month of collection. May.

Coptodera transversa (Reiche)

Tetragonoderus transversus Reiche 1843:179.
Stenoglossa transversa; Chaudoir 1869b:204.
Coptodera transversa; Shpeley and Ball 1993:68.

Type area. Colombia (Shpeley and Ball, 1993:68).

Habitat. Tropical lowland forest, and tropical montane forest, from near sea level to an an altitude of at least 2100 m. (Shpeley and Ball 1993:69). Adults have been collected in association with the fungal genus *Boletus*.

Geographical distribution. The range of this species extends from the South Atlantic forest zone of eastern Brazil to cis-Andean Bolivia and Paraguay, and northward through Middle America to the Gulf and Pacific Versants of tropical México. The specimen recorded from Venezuela below is a new record for that country.

Material examined. Sixty 3 specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:70): **MEXICO. Querétaro**. 2 males, 8.3 km. w. San Luis Potosi, Qualihorde, Hwy 120, 1560 m., ex. *Boletus*, fogging, 8.VII.1990, J.S. Ashe, K.J. Ahn, & R. Leschen (SEMC). Male, female, 26.5 km. [w.] San Luis Potosi-Querétaro border, Hwy. 120, 1270 m., under oak bark with *Hypoxylon*, 8.VII.1990, J.S. Ashe, K.J. Ahn, & R. Leschen (SEMC). **PANAMA. Darien**. Male, Cana ANCON Station, 07°45'N 77°41'W, 1200 m., blacklight, 5.VI.1996, S. Lingafelter (SEMC). **Panamá**. El Llano-Carti road: 2 males, female, Km. 7-9, 400 m., 6.VI.1995, R.S. Anderson (CMNC); male, Km. 8, 300 m., 31.V.1992, H.P. Stockwell (UASM); male, Km. 12, 27.VI.1997, R.H. Turnbow (RHTC). **VENEZUELA. Aragua**. Female, Rancho Grande Biol. Stn., Pico Periquitos, 10°21'N 67°41'W, 1250 m., ex. under bark, 27.II.1995, R.E. Brooks (SEMC). Rancho Grande Biol. Stn., 10°21'N 67°41'W, 1200-1300 m., 12.V.1998, J.S. Ashe, R.E. Brooks, & R. Hanley (SEMC): 6 males, 12 females, ex fungus-laden log; 14 males, 21 females, ex polypore on log.

Months of collection. February, and May-July.

Coptodera relucens Bates

Coptodera relucens Bates 1869:73.

Type locality. Ega (=Tefé), State of Amazonas, Brazil (Shpeley and Ball, 1993:77).

Habitat. Tropical lowland forest, to an altitude of at least 220 m. Adults probably are nocturnal; some occur at fruit falls.

Geographical distribution. This species is known only from the Amazon Basin of Brazil and Ecuador. The specimen recorded below is a new record for that country, and also represents a substantial increase in range to the west.

Material examined. One specimen from the following locality, which is additional to those reported by Shpeley and Ball (l.c.): **ECUADOR. Napo**. Female, Onkone Gare Camp, 00°39'10"S 76°26'00"W, 220 m., fruit fall at night, terra firme forest, 7-12.X.1995, G.E. Ball, D. Shpeley (USNM).

Month of collection. October.

Coptodera festiva Dejean

Coptodera festiva Dejean 1825:274.

Type area. Cuba (Shpeley and Ball, 1993:82).

Habitat. Tropical lowland forest and tropical lower montane forest, at altitudes between at least 30 m. and 1295 m. (Shpeley and Ball, l. c.). In addition to habitats noted by Shpeley and Ball (l.c.), adults also have been seen at a fruit fall, at night, in a terra firme forest.

Geographical distribution. The range of this species extends from the Amazon Basin of South America north through Middle America to the Gulf and Pacific Versants of México. The Belém locality in eastern Brazil was thought to be an accidental importation (Shpeley and Ball 1993:83), but all of the records below are new for the respective countries, and confirm that the range does include the Amazon Basin.

Material examined. 7 specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:83): **ECUADOR. Napo.** 2 males, Onkone Gare Camp, 00°39'10"S 76°26'00"W, 220 m., fruit fall at night, terra firme forest, 7-12.X.1995, G.E. Ball, D. Shpeley (USNM). **JAMAICA. St. Andrews**. Jack's Hill, Maya Cpgd., u-v light, 22-31.VII.1985, C.B. & H.V. Weems Jr., G.B. Edwards (FSCA). **PERU. Junín.** 2 males, female, Rio Toro (MNHB). **VENEZUELA. Aragua**. Male (MNHB).

Month of collection. October.

Coptodera aeneorufa Bates

Coptodera aeneorufa Bates 1869:76.

Type locality. Ega (=Tefé), State of Amazonas, Brazil (Shpeley and Ball, 1993:88).

Habitat. Tropical lowland forest to an altitude of at least 240 m. Adults occur at rotting fruit, as well as elsewhere (Shpeley and Ball, l.c.).

Geographical distribution. The range of this species includes the Amazon Basin and French Guiana in South America. Shpeley and Ball (l. c.) inadvertently listed the Saül locality, which is in French Guiana, as being in Surinam.

Material examined. One specimen from the following locality, which is additional to those reported by Shpeley and Ball (l.c.): **FRENCH GUIANA**. Female, Roura, 13.0 km. s.s.e., 4°38'38"N 52°17'56"W, 240 m., ex. rotting fruit, 10.VI.1997, J.S. Ashe, R.E. Brooks (SEMC).

Month of collection. June.

Coptodera tripartita Chaudoir

Coptodera tripartita Chaudoir 1869:180.

Type locality. Ega (=Tefé), State of Amazonas, Brazil (Shpeley and Ball, 1993:91).

Habitat. Tropical lowland forest and Atlantic Forest, to an altitude of at least 240 m. Adults occur on fungi *Favolus brasiliensis* as well as elsewhere Shpeley and Ball (l.c.).

Geographical distribution. The range of this species extends from southeastern Brazil westward and northward to the Amazon Basin regions of cis-Andean Bolivia, Brazil, Peru, and Venezuela.

Material examined. One specimen from the following locality, which is additional to those reported by Shpeley and Ball (1993:92): **PERU. Loreto**. Female, 1.5 km. n. Teniente Lopez, 2°35.66'S 76°06.92'W, 210-240 m., ex. *Favolus brasiliensis*, 19.VII.1993, R. Leschen (SEMC).

Month of collection. July.

Coptodera cupreotincta Bates

Coptodera cupreotincta Bates 1869:73.

Type locality. Ega (=Tefé), State of Amazonas, Brazil (Shpeley and Ball, 1993:92).

Habitat. Tropical lowland forest and tropical lower montane forest, to an altitude of at least 840 m.

Geographical distribution. The range of this species extends from southeastern Brazil northward through Middle America to the Gulf Versant of México. The specimens recorded below from Ecuador are a new record for that country.

Material examined. 5 specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:93-94): **ECUADOR. Napo**. 4 males, Onkone Gare Camp, 00°39'10"S 76°26'00"W, 220 m., on tree trunks at night, terra firme forest, 9&11.X.1995, G.E. Ball, D. Shpeley (UASM, USNM). Male, Yasuni Scientific Station, 00°40'36"S 76°24'02"W, 210 m., headlamp, 15.IV.1998, K.W. Will (CUIC).

Months of collection. April and October.

Coptodera chalcites Bates

Coptodera chalcites Bates 1869:75.

Type locality. Ega (=Tefé), State of Amazonas, Brazil (Shpeley and Ball, 1993:97).

Habitat. Tropical lowland forest, to an altitude of at least 290 m.

Geographical distribution. This species is recorded from cis-Andean South America in the western and central parts of the Amazon Basin.

Material examined. 6 specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:98): **ECUADOR. Napo**. Male, female, San Pablo Kantesiaya, 200 m., on downed tree trunk, 17.II.1985, P. Moret (PMCT). Male, Yasuni Scientific Station, 00°39'14"S 76°27'12"W, 210 m., leaf litter under fallen *Ficus*, 22.IV.1998, K.W. Will (CUIC). Female, Yasuni Scientific Station, 00°40'36"S 76°24'02"W, 200 m., headlamp, 16.IV.1998, K.W. Will (CUIC). Female, Yaturi Lodge, Rio Napo, 0°32'54"S 76°02'18"W, 270 m., ex fungus covered log, 21.III.1999, R.E. Brooks (SEMC). **Sucumbios**. Female, Sacha Lodge, 0°28'14"S 76°27'35"W, 270 m., ex fungus covered log, 23.III.1999, R.E. Brooks (SEMC).

Months of collection. February-April.

Coptodera acutipennis (Buquet)

Lebia acutipennis Buquet 1834:674.
Coptodera acutipennis; *Chaudoir 1869:176.*

Type locality. Headwaters of the Oyapock River, French Guiana (Shpeley and Ball, 1993:100).

Habitat. Tropical lowland forest, and tropical montane forest to an altitude of at least 1010 m. (Shpeley and Ball 1993:104).

Geographical distribution. The range of this species extends from southeastern Brazil north through the Amazon Basin and Middle America to the Gulf Versant of México.

Material examined. Eighty 3 specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:105-106). Dissected males were assigned morph designations according to previously illustrated genitalia (Shpeley and Ball 1993:102-103): **ECUADOR. Napo**. 10 males (morph F - 3; morph I - 1; and morph J - 6), 6 females, Aliñuai Camp, 01°02'56"S 77°36'07"W, headlamp/ rotten *Ficus* fruits, 29-30.IV.1998, K.W. Will (CUIC). 27 males (morph B - 1; morph F - 1; morph G - 4; morph I - 2; morph J - 18; and morph L - 1), 16 females, Onkone Gare Camp, 00°39'10"S 76°26'00"W, 220 m., fruit fall and on tree trunks at night, 7-12.X.1995, G.E. Ball, D. Shpeley (UASM, USNM). 3 males (morph B - 2 and morph H - 1), 3 females, Yasuni Scientific Station, 00°39'14"S 76°27'12"W, 210 m., headlamp/rotten *Ficus* fruits, 15-25.IV.1998, K.W. Will (CUIC). **PANAMA. Cocle**. Female, Altos de Campana, mv & bl, 13.V.1996, R.H. Turnbow (RHTC). **Panamá**. Male (morph M), El Llano-Carti Rd., km. mk. 13.6, mv & bl, 21.V.1996, R.H. Turnbow (RHTC). 2 males (morph C), Pipeline Rd., km 4.0-6.0, nr. Gamboa, 40 m., tropical lowland forest, 21.VI.1995, R.S. Anderson (CMNC). **PERU. Loreto**. Male (morph H), Campamento San Jacinto, 2°18.75'S 75°51.77'W, 175-215m., 9.VII.1993, R. Leschen, D. Webb (SEMC). Male (morph B), 2 females, 1.5 km. n. Teniente Lopez, 2°35.66'S 76°06.92'W, 210-240 m., ex. fruit fall, 17.VII.1993, R. Leschen (SEMC).

Months of collection. April-July.

Coptodera picea Dejean

Coptodera picea Dejean 1826:458.

Type area. Brazil (Shpeley and Ball, 1993:108).

Habitat. Tropical and subtropical lowland forest, and tropical lower montane forest, to an altitude of at least 1370 m. (Shpeley and Ball, l.c.).

Geographical distribution. The range of this species extends from southeastern Brazil north through Amazonia,and Middle America to the Gulf Versant of México, to Cuba and Dominican Republic in the West Indies, and to the tip of Florida in southeastern United States. The specimens recorded below from the Dominican Republic represent a new island record and an eastward range extension in the West Indies, and those from Ecuador, a new country record.

Material examined. Twenty one specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:109-110): **DOMINICAN REPUBLIC. La Vega**. 4 males, 3 females, Buena Vista, Hotel Montaña, unbaited Lindgren funnel trap, 19-21.VII.1996, M.C. Thomas (FSCA). Male, 2 km. n. Buena Vista, 21.VII.1996, R.H. Turnbow (RHTC). **ECUADOR. Sucumbios**. Male, Sacha Lodge, 0.5°S 76.5°W, ex. malaise, 12-22.II.1994, Hibbs (SEMC). Female, Sacha Lodge, 0.5°S 76.5°W, 3-13.IV.1994, Hibbs (SEMC). **HONDURAS. Santa Barbara**. Female, La Fe, Finca La Roca, 5.3 km. s. Peña Blanca, 14°57'N 88°02'W, 740 m., under bark, 21.VI.1994, Brooks, Ashe (SEMC). **PANAMA. Bayano**. Female, 10.6 km. e. Canita, 29.VI.1997, R.H. Turnbow (RHTC). **Panamá**. Male, Cerro Jefe, 11.V.1996, R.H. Turnbow (RHTC). 3 males, 3 females, 2.5 km. w. Ipeti 11&22.V.1996, R.H. Turnbow (RHTC).Male, 0.3 km. w. El Llano, 12.V.1996, R.H. Turnbow (RHTC).

Months of collection. February and April-July.

Coptodera nitidula (Buquet)

Lebia nitidula Buquet 1834:677.
Coptodera nitidula; Chaudoir 1869:185.

Type area. Brazil (Shpeley and Ball, 1993:112).

Habitat. Tropical lowland forest, tropical montane forest to at least an altitude of 2300 m., and dry subtropical woodland (Shpeley and Ball 1993:113). In addition to habitats noted by Shpeley and Ball (1993:113), adults rest in dry suspended leaves in terra firme forest and are attracted to hanging banana baits.

Geographical distribution. The range of this species extends from southeastern Brazil, cis-Andean parts of South American, Chacó region of trans-Andean Ecuador, through Middle America to Arizona and New Mexico in the southwestern United States.

Material examined. 3 specimens from the following localities, which are additional to those reported by Shpeley and Ball (1993:113-115): **ARGENTINA. Misiones**. 2 males, Iguazu Nat. Park, hanging banana baits, 1-4.I.1991, S. & J. Peck (CMNC). **ECUADOR. Napo**. Female, Onkone Gare Camp, 00°39'10"S 76°26'00"W, beating dry leaves above ground, terra firme forest, 220 m., 7-12.X.1995, G.E. Ball, D. Shpeley (USNM).

Months of collection. January and October.

Coptodera brunnea Shpeley and Ball

Coptodera brunnea Shpeley and Ball 1993:116.

Type locality. Guadalupe Canyon, Cochise county, State of Arizona, United States of America (Shpeley and Ball, 1993:117).

Habitat. Tropical lower montane forest and dry woodland, to an altitude of at least1800 m (Shpeley and Ball 1993:117).

Geographical distribution. The range of this species extends from Honduras and Belize of Middle America northward along the Gulf Versant of México to Arizona and New Mexico in the southwestern United States.

Material examined. One specimen from the following locality, which is additional to those reported by Shpeley and Ball (1993:116-117): **HONDURAS. Francisco Morazán**. Male, 30 km. e. Tegucigalpa, Cerro Uyuca Rd., 20.V.1994, H.F. & A.T. Howden (UASM).

Month of collection. May.

Eucheila genus-group

The following modifications are made to the characterization (Ball and Shpeley 1983:752) of the eucheiloids. Plesiotypic features are males with adhesive vestiture on fore tarsomeres 1-3 biseriate squamo-setae, mandibles moderately elongate, and labium with mental suture between submentum and mentum. Apotypic features are dorsal surface more or less extensively punctate, each puncture with short seta in bottom; mouthparts (see Table 2 for complete characterization) with labrum (Figs. 5E, G) distinctly longer than clypeus, row of 4 setae (**as**) dorsally, on or near anterior margin, 2 laterally and more posteriorly; epipharynx (Figs. 5F, H) with pedium (**ped**) broad at base, U-shaped, crepis (**cr**) short; mandibles (Figs. 9A-X) explanate, left or both with dorsal projections, terebrae broad, scrobes (**s**, Fig. 9A) partially visible in dorsal aspect, supraterebral ridge (**str**, Fig. 9A) complete, without ventral grooves (Figs. 9E, F), and left mandible with terebral ridge curved evenly into incisor tooth (**i** and **tr**, Fig. 9A), maxillae (Figs. 10F, G) with galeae enlarged, galeomere 1 longer than 2, galeomeres 1 and 2 partly fused; labium with glossal sclerite ventrally with pair of preapical setae (cf. Ball and Shpeley 1983: 761, Fig. 25). The following feature must be omitted from the list: "lateral margins of pronotum at least in part subcrenulate...".

Included taxa. This genus group is monogeneric, including *Eucheila* Dejean, only.

Eucheila Dejean

Eucheyla Dejean 1829:60, and 176-177. TYPE SPECIES: *Eucheyla flavilabris* Dejean 1829 (by monotypy).

Eucheila Dejean 1831:455-456.

Inna Putzeys 1863:71. (subgenus) TYPE SPECIES: *Inna punctata* Putzeys (= *Polystichus boyeri* Solier 1835) (by monotypy). **NEW STATUS**.

Periglossium Liebke 1929:246-247. TYPE SPECIES: *Periglossium nevermanni* Liebke 1929 (by monotypy). Reichardt 1966:13.

Hansus Ball and Shpeley 1983:753. (subgenus) TYPE SPECIES: *Hansus reichardti* Ball and Shpeley 1983 (by original designation). **NEW STATUS**.

Bordoniella Mateu 1989:62. (subgenus) TYPE SPECIES: *Bordoniella lucida* Mateu 1989 (by original designation). **NEW STATUS**.

Pseudoinna Mateu 1989: 67. (subgenus) TYPE SPECIES: *Pseudoinna boliviana* Mateu 1989 (by original designation). **NEW STATUS**.

Notes about synonymy. See Ball and Shpeley (1983:780) for a discussion of the use of the spelling *Eucheila*, rather than *Eucheyla*, as supported by Article 33.2.3.1 of the ICZN (1999:42). Ball and Shpeley (1983), in their taxonomic treatment of the *Eucheila* genus-group, recognized 3 genera: *Hansus* Ball and Shpeley, *Inna* Putzeys, and *Eucheila*. Based on features regarded as synapotypic, they postulated that *Inna* and *Eucheila* were adelphotaxa, and that the ancestor of this pair was the adelphotaxon of *Hansus*, the latter removed by some striking autapotypic features, particularly the markedly depressed body and enlarged head. Various features of macrosculpture (absence of punctures from the dorsal surface of the head and elytra, lateral margins of the pronotum only partly serrulate), the mouthparts (completely membranous paraglossae, and relatively slender glossal sclerite) and male genitalia (median lobe anopic) postulated as plesiotypic, also contributed to the isolated and basal position of *Hansus*.

Mateu (1989) proposed a new subgenus *(Pseudoinna)* for a new species of the genus *Inna*, and for another new species from Venezuela, a new genus *(Bordoniella)*. The subgenus *Pseudoinna* was based primarily on a long flagellum of the internal sac of the male genitalia, a feature that Ball and Shpeley had overlooked in their earlier work. This feature strengthened the basis for postulating clade "E" (Ball and Shpeley, 1983:790, Fig. 80), and accordingly, did not require any serious modifications to the system proposed by Ball and Shpeley.

The discovery of *Bordoniella lucida*, and 2 new species treated below, *Hansus kiplingi* and *Bordoniella marginata*, has caused problems. The diagnostic features for *Bordoniella* were smooth margins of pronotum and only a single pair of lateral (mediolateral) setae of the pronotum. The type material of *H. kiplingi* is certainly *Hansus*-like in most details, but the dorsal surface is densely punctate, and the lateral margins of the pronotum are completely serrulate, as in *Inna*. The specimens identified as a new species of *Bordoniella* exhibit most of the features of that taxon, most notably the completely smooth lateral margins of the pronotum, but they also exhibit 2 pairs of lateral setae, the condition generally characteristic of pericalines. Together, these combinations of features weaken the distinctions among *Hansus, Bordoniella,* and *Inna*. Because of this, it seems reasonable to combine these 3 groups in a single genus, to be known as *Inna*, by virtue of the rule of priority. However, *Inna sensu stricto* (i.e., as it was known previously) as noted above, was postulated to be the adelphotaxon of *Eucheila*. If, indeed, this is correct, then, since the putative adelphotaxon of *Eucheila* + *Inna* (i.e., *Hansus)* is now included in the same genus as *Inna sensu stricto,* then it follows, at least from a phylogenetic perspective, that *Eucheila* should be included in the same genus. Of the generic names available, *Eucheila* is the oldest, so that name must be the name of the collective genus.

Recognition. With diagnostic features of Pericalina and of the *Eucheila* genus group, the most readily perceived of which are glossal sclerite ventrally with a pair of preapical setae, and terminal labial palpomeres more or less securiform (cf. Ball and Shpeley 1983:761, Fig. 25). Adults of most species exhibit as well a moderately to densely and coarsely punctate dorsal surface (Figs. 59A, B and 62A, B).

As explained above, the limits of the genus *Eucheila* have been expanded. Accordingly, a description of this genus, more inclusive than the one provided by Ball and Shpeley (1983:779-781), is provided, below.

Description. Body moderately elongate, rather deplanate to convex dorsally. SBL ca. 3.5-10 mm. Dorsal surface of head, pronotum and elytra very sparsely to densely punctate; each puncture with short seta (not visible at 50X). Ventral surface of head, thorax and abdominal sterna impunctate to coarsely and densely punctate; femora and dorsal surfaces of tarsomeres punctate and setose.

Color. Body testaceous to piceous, elytra piceous, metallic bronze, green, blue, or purple. Antennae, mouthparts and legs testaceous to piceous.

Microsculpture. Markedly varied, with microlines of various depths or absent; sculpticells flat (most species) to convex, not keeled. Mesh pattern of labrum, dorsal surface of head and elytra, isodiametric to not evident; mesh pattern of pronotum and ventral surface more or less transverse, or absent.

Luster. Dorsal surface variously glossy to dull; ventral surface glossy.

Chaetotaxy. Various. Labrum (Figs. 5E and G) with 6 long setae: 4 inserted dorsally near anterior margin or beneath it, 2 posteriad anterior margin laterally, or setae absent. Pronotum with 1 or 2 pairs of setae laterally (medially and posteriorly), Elytron with parascutellar seta and 2 discal setae in interval 3. Umbilicate series of about 10 to 16 setae, with or without large gaps. Abdominal sternum VII of males with 1 to 5 pairs of setae, of females with 2 to 4 pairs.

Head. Dorsal surface deplanate, frons and vertex slightly below plane of dorsal surface of eyes, or of normal convexity, and slightly above eyes. Clypeal anterior margin slightly biconvex. Supra-antennal areas straight to slightly bent or angulate, antennal fossae each side close to or distinctly in advance of anterior margins of eyes. Eyes large and prominent. Lateral rugulae indistinct, shallow to distinct, deep or shallow.

Antennae. Average for Pericalina, antennomeres 4-11 densely setose and 2 and 3 sparsely so; antennomere 1 apically with a single long seta, or with 2 setae, 1 shorter than the other.

Mouthparts. Details are provided in Table 2. Labral dorsal surface as in Figs. 5E and G; epipharynx as in Figs. 5F and H. Mandibles as in Figs. 9A-X. Maxillae as in Figs. 10F-G. Labium illustrated by Ball and Shpeley (1983: 758, Fig 9; 761, Fig. 25; and 782, Fig. 66).

Prothorax. Pronotum (Figs. 59A-B, and 62A-B) broad and disk deplanate, to more normally proportioned with disc of normal convexity. Broad, distinctly wider than head (including eyes) to narrow, subequal to width of head or slightly narrower; lateral margins smooth, partly crenulate, to completely crenulate (Fig. 59A). Anterior margin shallowly to deeply concave; posterior margin straight medially, sloped anteriad laterally; anteriolateral angles slightly to markedly projected; posteriolateral angles about right or acute; median longitudinal impression linear, sharp; lateral grooves narrow to broad, lateral margins elevated rather widely, or represented by narrow bead only; posteriolateral impressions one, each side, rather shallow, continuous laterally with lateral grooves. Propleura and prosterna average.

Pterothorax. Generally average, but mesepimeron strikingly narrowed medially; metepisternal lateral margin distinctly longer than width at base.

Elytra (Figs. 59A-B, and 62A-B). Each elytron oblong, humerus rounded, and apical margin obliquely truncate to markedly sinuate; dorsal surface deplanate and laterally explanate or convex. Basal ridge extended mediallt only to about level of interneur 3, terminated by deep notch. Interneurs shallow or deeper, relatively broad, uniseriately, biseriately, or irregularly punctate; parascutellar interneur evident; interneur 7 evident posteriorly only in most species; interneur 8 not evident. Intervals 1-6 subcostate, but costae terminated anteriad posterior margin, interval 7 costate only posteriorly; or surface flat, interneurs and intervals not distinguishable.

Hind wings (Ball and Shpeley 1983: 765, Figs. 48, 49; and 783, Fig. 71). Developed fully, with or without wedge cell.

Legs. Moderately long, posterior tarsus subequal in length to posterior tibia. Dorsal surfaces of middle and hind tibiae canaliculate. Front tibia with or without upper spur. Middle tibia of males with ventral surface smooth, or with 2 to 13 denticles, or with deep preapical notch. Tarsal claws pectinate (denticulate) or smooth.
Abdominal sterna. Sterna II-VI average for Pericalina; sternum VII of males average, or with posterior margin broadly notched medially (Ball and Shpeley 1983:783, Fig. 72).

Male genitalia (cf. Ball and Shpeley 1983:766, Figs. 50-59; and 783, Figs. 73-75). Median lobe slender tube, anopic or left pleuropic, apical portion longer or shorter. Internal sac with armature of spines, or long flagellum, or unarmed.

Ovipositor (Ball and Shpeley 1983:750, Figs. 6-7). Valvifers and stylomere 1 average for Pericalina. Stylomere 2 short and triangular, with only 2 ensiform setae; nematiform setae short.

Habitat. Species of *Eucheila (sensu lato)* occupy tropical lowland forests in South America and in Middle America. In the latter area, ranges of some species extend into tropical lower montane forest (maximum known altitude of 900 m.).

Geographical distribution (Figs. 56-58, and 64). The range of this genus extends from northern Argentina, in cis-Andean South America, northward to southernmost United States (southeastern Texas).

Classification. Although because of recently discovered species, the distinctions among the erstwhile eucheiloid genera have become blurred, 5 reasonably distinct groups of species remain. These are ranked as subgenera, and are treated below.

Included taxa (Table 19). With the new species, this newly defined genus with 5 subgenera, includes 24 species, 1 with 2 subspecies.

Key to the subgenera, species groups, species, and subspecies of *Eucheila (sensu lato)*, based on adult character states

1 Labral dorsal surface convex, very large; apices of mandibles covered. Pronotum with only pair of posteriolateral setae, anteriolateral setae absent *Eucheila* (*sensu stricto* Dejean) 5

1' Labrum plane, average for Pericalina. Pronotum with 1 or 2 pairs of lateral setae 2

2(1') Antennomere 1 (scape) with 2 long setae near apex. Labium with glossal sclerite narrowed apically; paraglossae membranous throughout length; mental tooth pointed apically *E.* (*Hansus* Ball and Shpeley) 10

2' Antennomere 1 with single long seta near apex. Labium with glossal sclerite broadly rounded or truncate apically; paraglossae sclerotized hyaline, at least apically; mental tooth broad apically 3

Table 19. Classification of the subgenera, species groups, species and subspecies of the genus *Eucheila (sensu novo).*

Subgenus *Hansus* Ball and Shpeley
- *E. reichardti* Ball and Shpeley
- *E. kiplingi*, **new species**

Subgenus *Bordoniella* Mateu
- *E. lucida* (Mateu)
- *E. marginata*, **new species**

Subgenus *Pseudoinna* Mateu
- *E. inpa* (Ball and Shpeley)
- *E. mateui*, **new species**
- [*E. palpalis* (Ball and Shpeley)][1]
- *E. surinamensis*, **new species**
- *E. boliviana* (Mateu)
- [*E. atrata* (Dejean)
  - *E. a. atrata* (Dejean)
  - *E. a. arbor* (Ball and Shpeley)]

Subgenus *Inna* Putzeys
- *E. purpurea* (Ball and Shpeley)
- *E. breviformis* (Chaudoir)
- *E. splendens* (Ball and Shpeley)
- *E. costulata* (Chaudoir)
- *E. boyeri* (Solier)
- *E. nevermanni* (Liebke)
- *E. megala* (Reichardti)
- *E. planipennis* (Bates)

Subgenus *Eucheila (sensu stricto)*
- *E. strandi* species group
  - *E. strandi* (Liebke)
- *E. flavilabris* species group
  - *E. adisi* Ball and Shpeley
  - [*E. flavilabris* Dejean]
  - *E. cordova* Ball and Shpeley
- *E. erwini* species group
  - *E. erwini,* **new species**
  - *E. pilosa*, **new species**

[1] Square brackets indicate taxa not treated in this paper.

3(2') Pronotal lateral margins smooth, *E.* (*Bordoniella* Mateu) 11
3' Pronotal lateral margins serrulate 4

4(3') Size smaller (SBL 3.52-4.36 mm.). Labial palpomere 2 small, less than half length of 3; palpomere 3 markedly widened apically, most specimens with ratio L3l/L3w less than 1.00. Color piceous, some specimens with faint bronze luster. Dorsum of head with coarse punctures, *E.* (*Pseudoinna* Mateu) 12
4' Size larger, SBL 4.80-9.68 mm. Labial palpomere 2 longer, more than half length of 3; palpomere 3 less widened apically, ratio L3l/L3w more than 1.00. Color piceous, metallic green or blue, or purple. Dorsum of head with fine, moderately coarse, or coarse punctures, *E.* (*Inna* Putzeys) 18

5(1) Pronotal lateral margins serrulate. Elytron with dorsal surface costulate, intervals 1-6 distinctly elevated, interneurs more or less biseriately punctate, *E. strandi* species group .... *E. strandi* (Liebke), p. 168
5' Pronotal lateral margins smooth. Elytral dorsal surface various 6

6(5') Head with center of frons and vertex impunctate, lateral areas relatively finely and sparsely punctate compared to elytra. Elytral dorsal surface not tuberculate, relatively even or slightly costulate. Pronotal margins relatively broad laterad lateral grooves, *E. flavilabris* species group ... 7
6' Head with dorsal surface of frons and vertex as densely, coarsely punctate as pronotum and elytra. Elytral dorsal surface with at least 2 tubercles. Pronotal margins very narrow laterad lateral grooves, *E. erwini* species group 9

7(6') Dorsal surface piceous, with faint bronze luster. Elytral dorsal surface costulate, intervals elevated slightly but distinctly. Specimen from México ...... *E. cordova* Ball and Shpeley, p. 169
7' Dorsal surface partly (elytra only) or completely metallic green. Elytral dorsal surface not costulate, smooth except for irregular columns of setigerous punctures. Specimen from South America 8

8(7') Elytra metallic green, head and pronotum dark piceous .... *E. adisi* Ball and Shpeley, p. 169
8' Entire dorsal surface metallic green .... *E. flavilabris* Dejean

9(6') Dorsal surface glabrous. Elytral disc with several rows of elongate tubercles; apical margin markedly concave. Pronotal lateral margin slightly wider than lateral bead .... *E. erwini,* new species, p. 170
9' Dorsal surface pilose. Disc of elytron with surface irregular but not tuberculate; apical margin slightly sinuate, not markedly and broadly concave. Pronotal lateral margin no wider than lateral bead .... *E. pilosa*, new species, p. 171

10 (02) Dorsal surface dull brunneo-rufous. Elytron: intervals subcostate, interneurs each with single row of fine punctures; umbilical series with 16 or more setae, row of punctures continuous .... *E. reichardti* (Ball and Shpeley), p. 155
10' Dorsal surface bronze, shining. Elytron: with dorsal surface flat, with longitudinal rows of easily seen punctures; umbilical series fewer than 16 setae, row of punctures interrupted .... *E. kiplingi,* new species, p. 154

11(3) Pronotum with mediolateral pair of setae only (posteriolateral pair absent) .... *E. lucida* (Mateu), p. 155
11' Pronotum with both mediolateral and posteriolateral pairs of setae .... *E. marginata*, new species, p. 156

12(4) Head punctate ventrally 13
12' Head impunctate ventrally 15

13(12) Pronotum wider, ratio Pl/Pwm 0.800; from Brazil .... *E. palpalis* (Ball and Shpeley)
13' Pronotum narrower, ratio Pl/Pwm greater than 0.819 14

14(13') Pronotum moderately wide, ratio Pl/Pwm 0.820-0.910; from Bolivia, Ecuador, or Peru .... *E. boliviana* (Mateu), p. 166
14' Pronotum narrow, ratio Pl/Pwm 0.952; from Surinam .... *E. surinamensis* new species, p. 167

15 (12') Pronotum narrow, sides angulate; male with or without small denticles on inner surface of middle tibia 16
15' Pronotum wider, sides rounded; male with preapical notch on ventral surface of middle tibia .. 17

16(15') Punctures on dorsal surface of head closer together, area between punctures carinulate; pronotum shorter, ratio Pl/Pwm 0.800-0.870; males with 3-4 small denticles on ventral surface of middle tibia .... *E. inpa* (Ball and Shpeley), p. 163
16' Punctures on dorsal surface of head further apart, area between punctures smooth; pronotum longer, ratio Pl/Pwm 0.905-0.958; males with ventral surface of middle tibia smooth .... *E. mateui*, new species, p. 164

17(15') Dorsal surface of head with coarse punctures; color piceous with faint bronze luster .... *E. atrata arbor* (Ball and Shpeley)
17' Dorsal surface of head with coarser punctures; color piceous .... *E. atrata atrata* (Dejean)

18(4) Dorsal surface metallic green, metallic blue, or purple 19
18' Dorsal surface brown, with or without faint bronze luster 24
19(18) Elytra metallic green 20
19' Elytra metallic blue or purple 22

20(19) Dorsal surface of head with few, fine punctures. Lateral margin of elytron not explanate; elytral humerus smooth .... *E. splendens* (Ball and Shpeley), p. 161
20' Dorsum of head moderately to coarsely punctate 21

21(20') Size smaller, SBL 4.80-5.44 mm.; dorsum of head moderately to coarsely punctate; males with 3 to 4 small denticles on ventral surface of middle tibia .... *E. breviformis* (Chaudoir), p. 159
21' Size larger, SBL 5.68-7.08 mm.; dorsum of head moderately punctate; males with 6 to 7 small denticles on ventral surface of middle tibia .... *E. costulata* (Chaudoir), in part, p. 161

22(19') Tarsal claws denticulate (visible at 50X); males with 7 small denticles on ventral surface of middle tibia .... *E. purpurea* (Ball and Shpeley), p. 159
22' Tarsal claws smooth 23

23(22') Head, pronotum and elytra metallic blue; male with 11 prominent denticles on ventral surface of middle tibia; tarsal claws smooth .... *E. nevermanni* (Liebke), p. 162
23' Head and pronotum faint metallic green, elytra metallic purple; male with 6 to 9 small denticles on ventral surface of middle tibia .... *E. costulata* (Chaudoir), in part, p. 161

24(18') Dorsal surface of head with fine punctures .... *E. planipennis* (Bates), p. 163
24' Dorsal surface of head moderately to coarsely punctate 25

25(24') Dorsal surface of head coarsely punctate; lateral margin of elytron explanate .... *E. megala* (Reichardt), p. 162
25' Dorsal surface of head moderately to coarsely punctate; lateral margin of elytron not explanate .... *E. boyeri* (Solier), p. 162

Subgenus *Hansus* Ball and Shpeley, new status

Hansus Ball and Shpeley 1983:753.

Recognition. See key above, to taxa of *Eucheila (s. lat.)*. Ball and Shpeley (1983:752) recorded that specimens of *Hansus* could be distinguished on the basis of nearly smooth lateral margins of the pronotum, and elytra with few punctures (each discal interneur with a single row). These features distinguish adults of *Eucheila reichardti*, but not those of the new species described below.

Habitat. The species of this subgenus live in tropical lowland forest, at altitudes of 200 m. or less. Evidently, adults inhabit living trees, living on the bark surface, where they are active at night.

Geographical distribution (Fig. 56). This subgenus is known only from northern cis-Andean South America, including the type area in Guyana, and Amazonian Ecuador and Peru.

Phylogenetic relationships. This subgenus is postulated to be the adelphotaxon of *Bordoniella +(Inna + Pseudoinna) + Eucheila [s. str.])*

Included species. This subgenus includes 2 species: *E. reichardti* Ball and Shpeley, and *E. kiplingi*, new species, described below.

Eucheila (Hansus) kiplingi, new species

Figs. 55A, C-D and 56

Type material. Thirteen specimens, as follows. HOLOTYPE male, labelled: "01°02'03"S 77°39'49"W/ Ecuador,Napo Prov./ Puerto Misahuali/ 11:IX:1997/ Col. K.Will" [CUIC]. ALLOTYPE female, labelled same as holotype [CUIC]. 11 additional PARATYPES, sex and label data as follows: 2 males and 3 females same as holotype [CUIC]. 3 males: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 7 Oct94/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terre firme forest At trans 8 Sta 7 Project MAXUS Lot #0906" [USNM]. 1 male: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 13 Feb96/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terre firme forest At trans 10 Sta 6 Project MAXUS Lot #1496" [USNM]. 1 male: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 8 Feb96/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terre firme forest At trans 8 Sta 9 Project MAXUS Lot #1479" [USNM]. 1 female: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 21 June 94/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terre firme forest At trans 8 Sta 9 Project MAXUS Lot #0708" [USNM].

Type locality. Puerto Misahuali, Napo Province, Ecuador.

Specific epithet. A Latinized genitive eponym, based on the first name of Kipling W. Will, Cornell University, who collected the first specimens of this species.

Recognition. Both this species and *E. (Bordoniella) marginata* exhibit fine punctures on the dorsum of the head. The former has crenulate lateral pronotal margins and the latter has smooth margins.

Description. With character states of subgenus *Hansus,* restricted or amplified as follows. Average SBL of males 4.55 mm. (4.36-4.84 mm.) and females 4.84 mm. (4.28-5.16 mm.).

Color. Head and pronotum brunneous with aeneous to bronze reflection, pronotal lateral margins paler; elytra dark brunneous with pronounced aeneous to bronze reflection, lateral margin testaceous; ventrally pale rufo-testaceous to slightly darker, in particular metepisternum and sternum VII laterally. Antennae, mouthparts, and legs pale rufo-testaceous, femora paler.

Luster. Shiny.

Head. Frons with a few, scattered, fine punctures; remaining dorsum of head moderately punctate posteriad to hind supraorbital setae.

Prothorax. Pronotum (Fig. 35A): disc slightly convex and punctate; lateral grooves wide; lateral margins crenulate.

Elytra. Elytron: entire surface punctate; intervals nearly flat; humerus serrate; lateral margin explanate.

Hind wings. Fully developed but without wedge cell.

Legs. Males with adhesive vestiture on fore tarsomeres 2 and 3, only.

Abdominal sterna. Sternum VII of male and female with 1 pair and 2 pairs of preapical setae respectively.

Male genitalia (Figs. 55C-D). Apical portion of median lobe short. Internal sac with 2 short spines.

Habitat. See this topic for subgenus *Hansus*, above.

Geographical distribution (Fig. 56). This species is known only from the type locality in east central Ecuador.

Chorological affinities. Although this species and its putative closest relative, *E. reichardti*, have not been collected together, it seems likely that their ranges overlap. The less closely related species *E. (Inna) costulata* Chaudoir, *E. (Pseudoinna) boliviana* Mateu and *E. (Bordoniella) marginata*, new species, are recorded from Napo Province in Ecuador, thus near to the type locality of *E. kiplingi*, and possibly sympatric with this species.

Phylogenetic relationships. This species is the putative adelphotaxon of *E. reichardti* Ball and Shpeley. Although adults exhibit the recognition features of the subgenus *Hansus*, it is important to realize that they are *Inna*-like in the punctation of the dorsal surface and crenulation of the lateral margins of the pronotum.

Material examined. Type specimens only. For details, see above.

Months of collection. February, June, and October-November.

Eucheila (Hansus) reichardti (Ball and Shpeley), new combination

Fig. 56

Hansus reichardti Ball and Shpeley 1983:753.

Type locality. Essequibo River, banks of Morrabali Creek, Guyana.

Habitat. The Peruvian specimens noted below were collected in old alluvial terrace forest (without bamboo), "at night on roughened reddish bark of large trees", the beetles beneath vine stems attached to the tree trunks (Erwin 1990: 8 and 49). Erwin suggested that the reddish color of the specimens matched their background, the beetles being "...difficult to see even with light". Further, he suggested that the flattened body form might be explained as an adaptation to squeezing into narrow spaces, such as those between a tree trunk and the attached vines.

Geographical distribution (Fig. 56). Known previously only from Guyana, the record noted below extends the range of this species to cis-Andean Peru, in the Upper Amazon Basin.

Material examined. We have seen 4 specimens, from the following locality, which are additional to the 1 reported by Ball and Shpeley (1983:756): **PERU. Madre de Dios**. 3 males, female, Rio Manu, BIOLAT Biol. Sta., Pakitza 11°56'47"S 071°17'00"W, 356 m., Tr. Tachigali, ex trees at night, 29.X.1990, T.L. Erwin (USNM).

Month of collection. October.

Subgenus *Bordoniella* Mateu, new status

Inna (Bordoniella) Mateu 1989:62.

Recognition. See key above, to taxa of *Eucheila (s. lat.)*.

Morphological notes. To the original description of *Bordoniella* (Mateu 1989:62) we add: hind wing without wedge cell.

Habitat. The species of this subgenus occupy tropical lowland forest, at altitudes between at least 220 m. and 356 m., where adults live on standing tree trunks. Geographical distribution (Fig. 57). This subgenus is known from northern cis-Andean South America, in Venezuela and in the upper reaches of the Amazon Basin: the Napo River drainage in Ecuador; and the Rio Madre de Dios drainage in Peru.

Phylogenetic relationships. This subgenus is the putative adelphotaxon of *Inna* + *Pseudoinna* + *Eucheila (s. str.)*, based on a combination of shared derived features (broad, rather densely punctate elytral interneurs and hyline premental paraglossae). The plesiotypic smooth pronotal lateral margins place *Bordoniella* in a basal position within this complex of 4 subgenera.

Included species. 2 species are included: *E. lucida* Mateu, and *E. marginata*, new species.

Eucheila (Bordoniella) lucida (Mateu), new combination

Fig. 57

Bordoniella lucida Mateu 1989:65.

Type locality. Cerro El Café, La Entrada, State of Carabobo, Venezuela (Mateu 1989:65).

Habitat. See this topic for subgenus *Bordoniella,* above.

Geographical distribution (Fig. 37). This species is known only from the type locality.

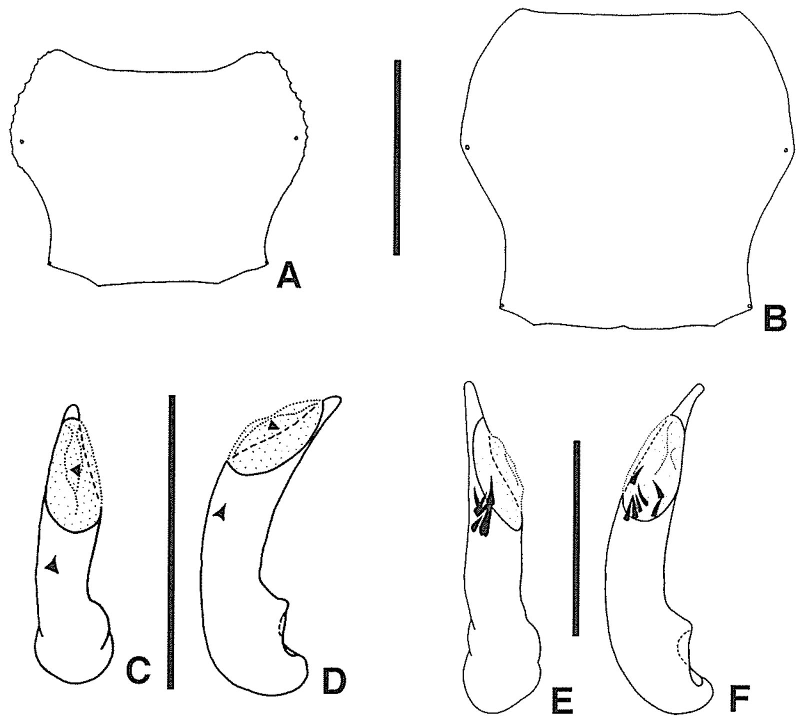

Figure 55. Line drawings of pronota and male genitalia of species of *Eucheila (sensu lato)*. **A-B**, pronotum, dorsal aspect, of **A**, *E. (Hansus) kiplingi*, new species, and **B**, *E. (Bordoniella) marginata*, new species. **C-F**, male genitalia, median lobe, **C**, **E**, dorsal aspect, and **D**, **F**, left lateral aspect, of respectively: **C-D**, *E. kiplingi*; and **E-F**, *E. marginata*. Scale bars = 1.0 mm.

Eucheila (Bordoniella) marginata, new species

Figs. 5E-F, 9A-H, 10F, 55B, E-F, and 57

Type material. Five specimens, as follows. HOLOTYPE male, labelled: "PERU Madre de Dios/ Rio Tambopata Res./ 30km (air) sw Pto./ Maldonato, 290m/ 12°50'S 069°20'W"; "Smithsonian Institution/ Canopy Fogging Project/ T.L.Erwin et al. colls./ 28Feb84 01/01/043"; "FOGGING/ 00002995" [USNM]. ALLOTYPE female, labelled: "PERU: MADRE DE DIOS/ Rio Manu, BIOLAT Biol.Sta./ Pakitza, 356m. 20 Sep 1991/ 11°56"47"S 071°17'00"W/ T.L. Erwin"; "Insecticidal fog of tree with many/ vines and accumulated debris, Tr./ Tachigali /15.8, dissected alluvial/ terrace forest Lot 89"; "BIOLAT/COLE/ 000011843" [USNM]. 3 additional PARATYPES, sex and label data as follows: 1 female: "01°02'56"S 77°36'07"/ Ecuador,Napo Prov./ Cabanas Alinahui/ 7:IX:1997/ Col. K.Will" [CUIC]. 1 male: "PERU: MADRE DE DIOS/ Pakitza T.L.Erwin/ 29-Oct - 01Nov90/ 12° 07'S 70° 58'W "; "Forest type #12, on/ trunks along trail at/ Tr. Tachigali /42"; "BIOLAT/ COLE/ 000008384" [USNM]. 1 male: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 21 June 94/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terre firme forest At trans 9 Sta 3 Project MAXUS Lot #0712" [USNM].

Type locality. Rio Tambopata Reserve (12°50'S 069°20'W), Departamento Madre de Dios, Peru.

Specific epithet. The Latin adjectival form of "margo", meaning margin, in allusion to the smooth lateral margins of the pronotum.

Recognition. Adults of this species have 2 pairs of lateral setae on the pronotum. The only other known species of subgenus *Bordoniella, E. lucida,* is characterized by a single pair of pronotal (mediolateral) setae.

Description. With character states of subgenus *Bordoniella,* restricted or amplified as follows. Average SBL of males 7.07 mm. (6.96-7.20) and females 7.10 mm. (6.56-7.64).

Color. Brunneous, with antennae, mouthparts, lateral edge of elytra, and legs paler. Elytra moderately bronzed.

Luster. Shiny.

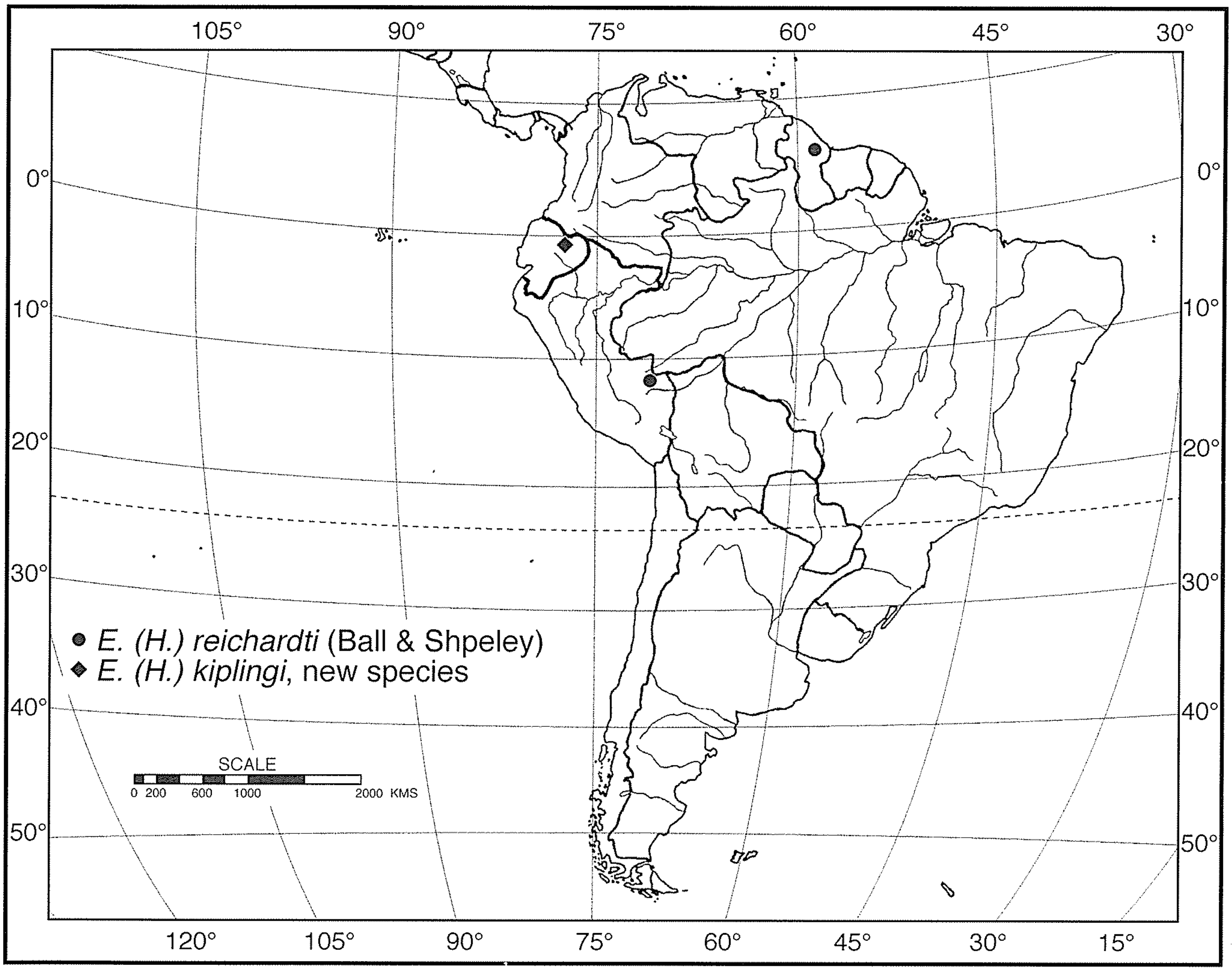

Figure 56. Map of southern Middle America and South America showing positions of known localities for species of *Eucheila (Hansus* Ball and Shpeley).

Head. Frons with a few, scattered fine punctures; remaining dorsum of head moderately punctate posteriad posterior pair of supraorbital setae.

Mouthparts. Labral form and dorsal surface as in Fig. 5E; epipharynx as in Fig. 5F. Mandibles as in Figs. 9A-H. Maxillae as in Fig. 10F.

Prothorax. Pronotum with disc moderately convex and punctate; lateral grooves narrow; lateral margins angulate and smooth.

Elytra. Elytron: entire surface punctate; intervals 3-7 moderately raised, nearly costate; humerus finely serrate; lateral margin explanate.

Hind wings. Fully developed, but without wedge cell. Abdominal sterna. Sternum VII of male and female with 1 pair and 2 pairs of preapical setae respectively.

Male genitalia (Figs. 55E-F). Apical portion of median lobe moderately long, finely tapered. Internal sac with 7 spines.

Habitat. See this topic for subgenus *Bordoniella,* above.

Geographical distribution (Fig. 57). This species is known from the upper Amazon Basin: type locality and vicinity in southeastern Peru, and east central Ecuador.

Chorological affinities. This species is widely separated from its putatively closest relative, *E. lucida* (Fig. 57). The ranges of the less closely related *E. (Inna) breviformis* Chaudoir, and *E. (Inna) costulata* Chaudoir, *E. (Pseudoinna) inpa* Ball and Shpeley,and *E. (Pseudoinna) mateui,* new species, overlap the range of this species.

Phylogenetic relationships. This species and *E. lucida*, the only other member of the subgenus

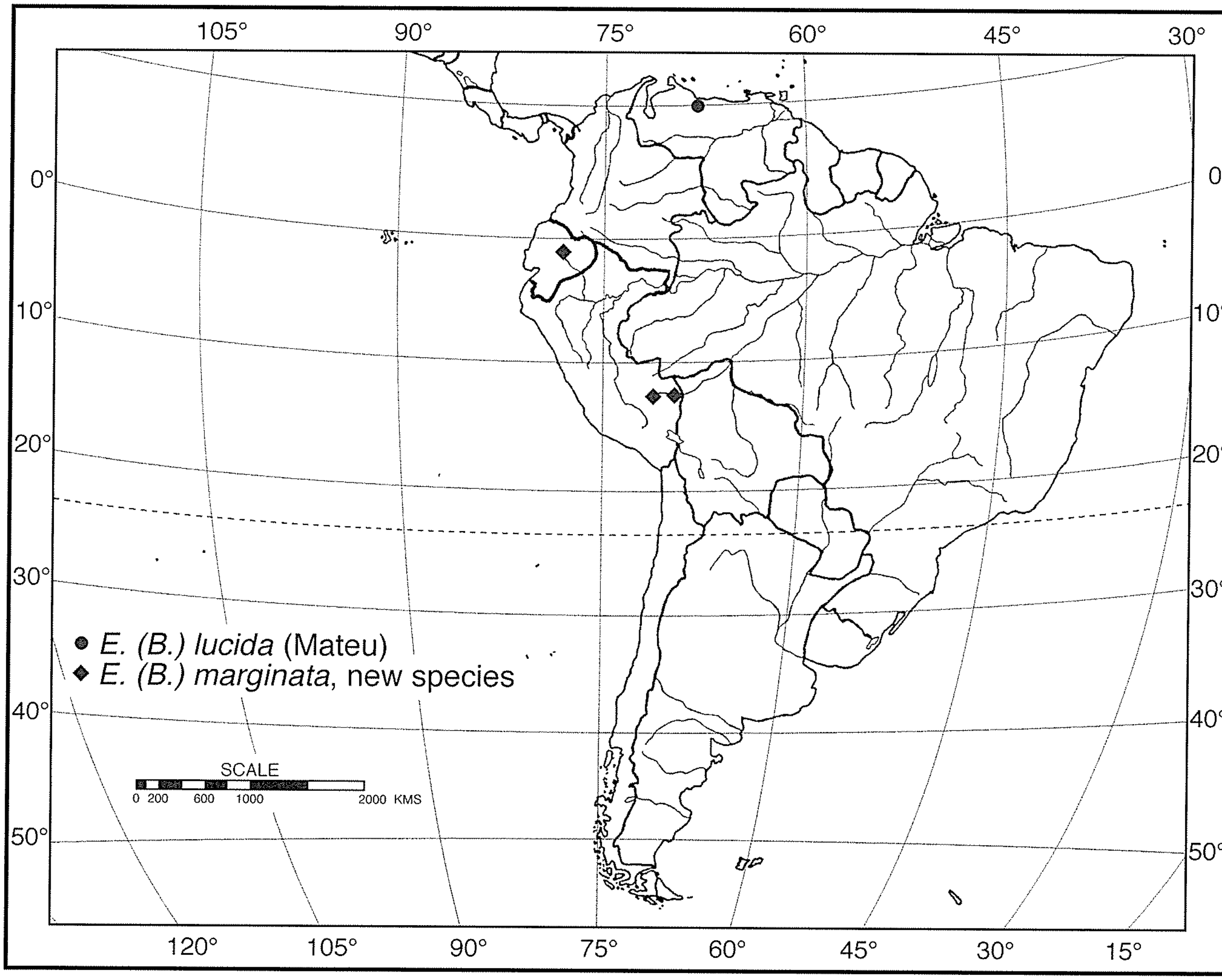

Figure 57. Map of southern Middle America and South America showing positions of known localities for species of *Eucheila* (*Bordoniella* Mateu).

Bordoniella, are postulated to be adelphotaxa, based on the diagnostic features of this subgenus.

Material examined. Type specimens only, as indicated above.

Months of collection. February, June, and September-November.

Subgenus *Inna* Putzeys, new status

Inna Putzeys 1863:71.

Recognition. See key, above. With the recognition of the subgenus *Pseudoinna*, and thus the exclusion of its species from *Inna*, the diagnostic combination of structural features is: pericaline and *Eucheila* genus-group characteristics, size intermediate (SBL 4.5-6.3 mm.), body not distinctly deplanate, dorsal surface more or less extensively punctate, punctures setose, lateral margins clearly serrulate (or crenulate), labial palpomere 3 only slightly securiform, labial palpomere 2 of moderate length, elytral interneurs broad, and apical portion of median lobe rather long. Relative to *Pseudoinna*, except for the width of interneurs, these features are plesiotypic.

Habitat. The species of this subgenus live in tropical lowland and tropical lower montane forest, at altitudes of 900 m. or less. Evidently, adults inhabit living trees, living on the bark surface, where they are active at night.

Geographical distribution. The range of subgenus *Inna* is co-extensive with the range of the genus

Eucheila, in cis-Andean South America from northern Argentina to Colombia and Venezuela, and northward on the North American continent through Middle America to southeastern Texas, in the United States.

Phylogenetic relationships. This subgenus is postulated to be the adelphotaxon of subgenus *Pseudoinna*.

Included taxa. This subgenus includes 8 species.

Eucheila (Inna) purpurea (Ball and Shpeley), new combination
Fig. 58

Inna purpurea Ball and Shpeley 1983:771.

Type locality. Campinas field station, 60 km. n. Manaus, Amazonas, Brazil (Ball and Shpeley 1983:771).

Habitat. Canopy of tropical lowland (terra firme) forest, to an altitude of at least 220 m.

Geographical distribution (Fig. 58). This species is known from the Upper Amazon Basin in Brazil and in the Amazonian subsidiary Napo drainage (Madre de Dios drainage basin).

Material examined. We have seen 4 specimens of this species, not reported previously by Ball and Shpeley (1983:771): **ECUADOR Napo**. Reserva Ethnica Waorani, 1 km s. Onkone Gare Camp, 00°39'10"S 076°26'W, 220m, Project MAXUS, insecticidal fogging of mostly bare green leaves, some with covering of lichenous or bryophic plants in terra firme forest, T.L. Erwin et al (USNM): male, CARA Lot 595; male, Lot 1218; male, Lot 1446. **PERU. Loreto**. Male, Cocha Shinguito, 05°08'S 74°45'W, insecticidal fogging of dry leaves, 18.VI.1990, Erwin et al (USNM).

Month of collection. June.

Eucheila (Inna) breviformis (Chaudoir), new combination
Figs. 9I-P and 58

Inna breviformis Chaudoir 1872:243. Ball and Shpeley 1983:772.

Type locality. Tefé (= Ega), state of Amazonas, Brazil (Ball and Shpeley 1983:772).

Morphological features. Illustrated are the mandibles (Figs. 9E-P) which are similar in most respects to those of the subgenus *Bordoniella*, except that the anterior retinacular tooth of the right mandible (**art**, Fig. 9N) is present, whereas it is absent from the *Bordoniella* specimen.

Habitat. Canopies of tropical lowland (white water and mixed water inundation forests and terra firme) forests, at altitudes between at least 100 and 356 m., in association with vines and epiphytes.

Geographical distribution (Fig. 58). Known previously from the Amazon system in Brazil and eastern Peru (Madre de Dios drainage basin), this species occurs also in the Rio Marañon drainage basin (Peru), and in Ecuador (Rio Napo drainage basin).

Material examined. Locality data for 90 specimens not reported previously by Ball and Shpeley (1983: 773) are presented below: **BRAZIL. Maranhão**. Female, Grajau, ADP100376, 25.II.1978, R.B. Neto (USNM). **ECUADOR Napo**. 21 males, 18 females, Reserva Ethnica Waorani, 1 km s. Onkone Gare Camp, 00°39'10"S 076°26'W, 220m, Project MAXUS, insecticidal fogging of mostly bare green leaves, some with covering of lichenous or bryophic plants in terra firme forest T.L. Erwin et al [USNM]: Lot #575, 616, 629, 635, 686, 702, 761, 859, 897, 935, 953, 1063, 1150, 1181, 1206, 1229, 1243, 1248, 1411, 1413, 1420, 1432, 1440, 1444, 1486, 1488, 1532, 1559, 1607, 1670, 1673, 1678, 1679, 1680, 1705, 1708, 1724, and 1745. **PERU Loreto**. Following specimens in USNM, collected by T. L. Erwin and associates, principally by insecticidal fogging of the canopy, or specific parts thereof, at various heights in m., above ground or river surface: 2 males, Boca Rio Samiria 04°39'S 74°21'W, ex dry leaves of vine, under dense canopy, at 1-4 m., 8.VI.1990. Male, Cmp. S. Branch 05°12'S 75°20'W, igapo forest, ex Lethidaceae and vines, to 20 m., 12.V.1990. Male, female, Cmp. S. Branch 05°12'S 75°20'W, 40 m., secondary flood plain, swamp forest, *Ficus* and bromeliads, insecticidal fog, ADP86769, 13.V.1990, T.L. Erwin (USNM). 3 males, 2 females, Cmp. Terry 05°07'S 75°28'W, on secondary flood plain, ex huge tree with vines and epiphytes, 15.V.1990. Male, same locality, ex 3 huge leguminose trees, with vines and epiphytes, ADP 02734, 16.V.1990. 17 specimens, Cocha Shinguito 05°08'S 74°45'W: ex dry leaves in under canopy, at 3 m., male, 26.V.1990, male, 26.V.1990, ADP 67082; ex tree with vines, male, ADP 94244, 11.VI.1990, male, ADP 100372, 13.VI.1990; ex dry leaves, 2 females, 18.VI.1990, ADP 92260 and ADP 92096, male, 12.VI.1990; ex tree stump with leafy vines, 18.VI.1990, female, ADP 94539 and male, ADP 94538; ex big tree with vines and epiphytes, 19.VI.1990, male, ADP 94046, male, ADP 94042, female, ADP67206, female, ADP

Figure 58. Map of southern U.S.A., Middle America and South America showing positions of known localities for species of *Eucheila* (*Inna* Putzeys).

94070, male, ADP94090, 2 females, 22.V.1990; male, ex tree with vines, dry leaves, ADP 71143, 27.VIII.1991. Female, Hamburgo 05°08'S 75°11'W, secondary flood plain, ex *Scheelea* palms and understory leaves, 10.V.1990. Female, Rio Explomapo Camp, Rio Sucusari, 03°15'S 072°55'W, ex dry *Astrocaryum* leaves, at edge of Igapo forest, ADP 52120, 3.VI.1992, and male, ex tree with green leaves and epiphytes, in terra firme forest, ADP 52029, 4.VI.1992. **Madre de Dios**. Female, Pakitza cmpgrd., 12°07'S 70°58'W, ex trail at night, running on ground, BIOLAT/COLE 000011638, 09.X.1989. 3 specimens, Pakitza, Zone 02, 12°07'S 70°58'W: female, ex canopy, *Celtis*, BIOLAT 02132511, BIOLAT/COLE 000008474, 16.IX.1988, and male, *Celtis* BIOLAT 0213152, BIOLAT/COLE 000008464, 16.IX.1988; male, ex *Matisia* 02180812 *Hirtella* 02180813, BIOLAT/COLE

000010887, 28.II.1990. 9 specimens, Pakitza, Zone 03 12°07'S 70°58'W: male, ex tree with vines, BIOLAT/ COLE 000002801, and male, BIOLAT/COLE 000002799, 11.X.1989; male, ex tree with vines, BIOLAT/COLE 000002802, male, BIOLAT/COLE 000002800, male, BIOLAT/COLE 000010087, and male, BIOLAT/COLE 000010078, 13.X.1989; male, Tr. Castanal 42, ex tree with vines, BIOLAT/COLE 000011630, 13.X.1989. 5 specimens, Rio Manu, BIOLAT Biol. Sta., Pakitza 11°56'47"S 071°17'00"W, 356 m.: female, Tachigale Trail/ 15.8, dissected alluvial terrace forest, ex tree with many vines, BIOLAT/COLE 000011816, 20 IX.1991, and male, Tachigali Trail/ 9, alluvial terrace forest, BIOLAT/ COLE 000012702; male, ex *Guadua* green dense cover, with dry leaves (broad and bamboo), 11.X.1991, Lot 242, BIOLAT/COLE 000013897; male, Tr. Cast,/ 25, BIOLAT/ COLE 000017403, 6.X.1992; male, ex complex canopy of 4 close trees, without vines and little dry material, Lot 258, 26.VI.1993. 6 specimens, Rio Tambopata Res., 30 km. (air) s.w. Pto Maldonado 12°50'S 069°20'W 290 m.: male, FOGGING 00002126, 10.XI.1983; female, FOGGING 00009219, 02.III.1984; male, FOGGING 00016545, 30.IV.1984; male, FOGGING 00016819, 30.IV.1984; male, FOGGING 0032840, 08.IX.1984; female, FOGGING 0061018, 12.IX.1984.

Months of collection. February–June and August-November.

Eucheila (Inna) splendens (Ball and Shpeley), new combination

Inna splendens Ball and Shpeley 1983:773.

Type locality. Rancho Grande, Aragua, Venezuela (Ball and Shpeley 1983:773).

Habitat. Probably tropical lower montane forest, at altitudes from at least 800 to 1100 m. (Ball and Shpeley, l. c.).

Geographical distribution. This species is known from the type locality, only, in northern Venezuela (Ball and Shpeley 1983:768, Fig. 61).

Material examined. In addition to the type specimens reported by Ball and Shpeley (1983:773), we have seen 3 additional specimen, as follows: **VENEZUELA. Aragua.** Male, Rancho Grande Biological Station, Maracay, 1100 m., at light, 27.II.1989, J.K. Liebherr (CUIC). Rancho Grande (USNM): female, MV lamp, ADP 100374, 14-21.II.1969, P. & P. Spangler; female, 1100 m., cloud forest, 16-20.VII.1981, J. Heppner.

Months of collection. February and July.

Eucheila (Inna) costulata (Chaudoir), new combination
Fig. 58

Inna costulata Chaudoir 1872:242. Ball and Shpeley 1983:774.

Type locality. The type area is Colombia. A more restricted type locality has not been selected (Ball and Shpeley, 1983:774).

Habitat. Tropical lowland (terra firme) forest, at altitudes from sea level to at least 400 m. (in Panamá). Evidently, adults are active throughout the year, though the limited light trap data from Panamá suggest that flight activity is maximal there during the period April-early June.

Geographical distribution (Fig. 58). The range of this species extends from the Amazon system of Brazil, Bolivia, Peru (Madre de Dios drainage basin) and Ecuador (Rio Napo drainage basin), eastward to Trinidad, and northward in Middle America, to Panamá.

Material examined. Locality data for 34 specimens, not reported previously by Ball and Shpeley (1983:775), are presented below: **BOLIVIA. Santa Cruz**. Male, Ichilo Province, Buena Vista, 400 m., 3.X.1994, R. Ward (CMNH). **BRAZIL. Pará**. Male, Mun. Benevides, 1°22'S 48°15'W, nr. Belem, 04.IX.1980, W.L. Overal (MPEG). **ECUADOR. Napo**. Female, Jatun Sacha Biol. Station, 21 km. e. Puerto Napo, tropical lowland rain forest, 8-11.VII.1994, F. Genier (CMNC). Male, female, Reserva Ethnica Waorani, 1 km s. Onkone Gare Camp, 00°39'10"S 076°26'W, 220m., Project MAXUS, insecticidal fogging of mostly bare green leaves, some with covering of lichenous or bryophic plants in terra firme forest T.L. Erwin et al (USNM): Lot No. 863 and 1083. **PERÜ. Junin**. Female, Utcuyacu, Tarma, 1600-3000 m., 4.IV.1948, F. Waytkowski (AMNH). **Loreto**. Female, Cmp. S. Branch 05°12'S 75°20'W, igapo forest, on muddy bank of Rio Samiria, running at night, ADP 02736, 11.V.1990, T.L. Erwin (USNM). Male, Cocha Shinguito 05°08'S 74°45'W, ex big trees with vines, epiphytes, 25.V.1990, T.L. Erwin (USNM). **Madre de Dios**. Female, Rio Manu, BIOLAT Biol. Sta., Pakitza 11°56'47"S 071°17'00"W, 356 m., ex *Astrocaryum*, BIOLAT/COLE 00004742, 16.X.1991, T.L. Erwin, M.G. Pogue (USNM). 5 specimens, Rio Tambopata Res., 30 km. (air) s.w. Pto. Maldonado 12°50'S 069°20'W, 290 m., Smithsonian Institution Canopy Fogging Project, T.L. Erwin (USNM): female, FOGGING 00002118, 10.XI.1983; female, FOGGING 00000115; male, FOGGING 00002111; female, FOGGING 00009340, 26.III.1984; male, FOGGING 00019250. **PANAMA. Canal Zone**. Barro Colorado Is., 1978, unless otherwise noted, H. Wolda, light traps (USNM): female, 18.I., ADP 84658; male, 13.IV., ADP 62060; female, 14.IV., ADP 62081; female, 17.IV., ADP 61912; male, 20.IV.; female, 25.IV.1977, ADP 83796; male, 27.IV., ADP 84395; female, 16.V., ADP 62459; female, 17.V., ADP 62548; female, 17.V., ADP 62543; female, 6.VI., ADP 84112; male, 10.VI., ADP 78918; male, 29.VI., ADP 61820; female, 15.VIII.1977, ADP 82179; female, 9.X.1977, ADP 77194; female, 5.XI., ADP 90134; female, 12.XI., ADP 66085; female, 12.XII.1977, ADP 91880.

Months of collection. January-July and September-December.

Eucheila (Inna) boyeri (Solier), new combination

Fig. 58

Inna boyeri Solier 1835:111. Ball and Shpeley 1983:775.

Type locality. The type area is Colombia. A more restricted type locality has not been selected (Ball and Shpeley 1983:775).

Habitat. Data are not available for the southern part of the range of this species. In México, the species inhabits vegetation in tropical deciduous and thorn forest, at altitudes from near sea level to at least 750 m. (Ball and Shpeley 1983:776).

Geographical distribution (Fig. 58). The range of this species extends in South America from northeastern Brazil (state of Bahia) to Colombia and Venezuela, and the Dutch Antilles, and northward through Middle America to extreme southeastern United States. The record from Aruba indicates that *E. boyeri* is the second known member of the genus to be in the islands of the Caribbean, the first being *E. costulata*.

Material examined. Locality data for 8 specimens not reported previously by Ball and Shpeley (1983: 776) are presented below: **BRAZIL. Bahia**. Female, Encruzilhada, 960 m. (J. Nègre, MNHP). **COLOMBIA. Magdalena**. Male, 19.4 km. w. Sta. Marta, 29.IV.1973, Howden, Campbell (CNCI). **Norte de Santander**. Male, 30 km. s. Cucuta, Qbd. Honda, 700 m., 15.V.1974, H. Howden (UASM). **COSTA RICA. Guanacaste**. Female, P.N. Guancaste, AC Guana, 240 m., LN317150-361800, #3025, ADP100380, 20-30.V.1994, E. Araya (USNM). Female, Finca Jenny, 30 km. n. Liberia, 240 m., L_317150_363700, #4795, 2-16.IV.1995, E. Araya (INBC). **DUTCH ANTILLES. Aruba Island**. Female, Hummelinck, 10.X.1948, P. Wagenaar (ZMAN). **MEXICO. San Luis Potosi**. Female, 4-5 km. e. Agua Zara, 2.VI.1982, J.E. Wappes (USNM). **UNITED STATES. Texas**. Female, Karnes Co., Ecleto, Metz Ranch, 14.IV.1997, J.E. Wappes (JEWC).

Months of collection. April-May and October.

Eucheila (Inna) nevermanni (Liebke), new combination

Fig. 58

Periglossium nevermanni Liebke 1929:261.
Inna nevermanni Reichardt 1966:13. Ball and Shpeley 1983:777.

Type locality. Reventazon, Costa Rica (Ball and Shpeley 1983:777).

Habitat. Tropical lowland forest.

Geographical distribution (Fig. 58). This species is known from Costa Rica and Panamá, only. The Panamanian record extends the range of this species appreciably.

Material examined. Locality data for 2 specimens not reported previously by Ball and Shpeley (l.c.) are presented below: **COSTA RICA. Limón**. Amubri, 70 m., XI.1994, 385500-578100, #3337, XI.1994, G. Gallardo (USNM). **PANAMA Panamá**. Male, El Llano-Carti Rd, Km. 8-12, 12.V.1996, R.H. Turnbow (RHTC).

Months of collection. May and November.

Eucheila (Inna) megala (Reichardt), new combination

Fig. 58

Inna megala Reichardt 1966:15. Ball and Shpeley 1983:778.

Type locality. Villarica, Paraguay.

Habitat. Unknown, but probably Atlantic Forest and tropical lowland dry forest (Shpeley and Ball 1993:159, Zone B).

Geographical distribution (Fig. 58). The known range of this species is primarily southeastern (south of the Tropic of Capricorn), in cis-Andean South America.

Material examined. Locality data for 2 specimens, not reported previously by Ball and Shpeley (1983:778), are presented below.
PARAGUAY. Departamento Central. Male and female, San Lorenzo, u-v light, 30.XII.1987, J.A. Kochalka (CMNH).

Month of collection. December.

Eucheila (Inna) planipennis (Bates), new combination

Inna planipennis Bates 1891:267. Ball and Shpeley 1983:778.

Type locality. Temax, Yucatan, México.

Habitat. Tropical lowland to tropical lower montane forest, and dry thorn forest, at altitudes from near sea level to at least 900 m.

Geographical distribution. Known only from Middle America and southeastern United States, it ranges from Costa Rica northward to southern Texas (Ball and Shpeley 1983:769, Fig. 62). The new localities reported below are the first records of this species for Guatemala and western Mexico.

Material examined. Locality data for 3 specimens not reported previously by Ball and Shpeley (1983: 779) are presented below. **BELIZE. Orange Walk District**. Female, Rio Bravo Conservation Area, La Milpa Field Station, Arch. site, 17°50'N 89°01'W, U-V light, 24.V.1996, D. Murray (LSUC). **GUATEMALA. Alta Verapaz**. Female, San Cristobal Quixal (HFRE). **MEXICO. Sinaloa**. Male, confluence of Rio Panuco & Rio Magistral, 18.VIII.1985, W. Opitz (CASC).

Months of collection. May and August.

Subgenus *Pseudoinna* Mateu, new status

Recognition. See key, above.

Included taxa. With the 2 new species described below, this subgenus includes 5 species.

Notes. Mateu (1989:67) proposed a separate subgenus for *Inna boliviana* based primarily on the long flagellum of the internal sac of the male. This feature, however, was found by us in the male internal sacs of the previously described *E. palpalis* Ball and Shpeley (Figs. 60F-G) and *E. atrata arbor* Ball and Shpeley (Figs. 60H-I), and *E. surinamensis* (Fig. 60J-K), described below. But we include in *Pseudoinna* 2 additional species, *E. inpa* and *E. mateui*, new species, whose males do not exhibit a flagellum. In their putative synapotypic features, these 2 species are like those with the flagellum, and we infer accordingly that they represent a primitive lineage of *Pseudoinna*.

Eucheila (Pseudoinna) inpa (Ball and Shpeley), new combination

Figs. 60B-C and 61

Inna inpa Ball and Shpeley 1983:771.
Inna impa Mateu, 1989:67 [misspelling]

Type locality. Ilha de Curari, Manaus, Amazonas, Brazil (Ball and Shpeley 1983:771).

Structural features. Male genitalia with median lobe as in Figs. 60B and C; internal sac without flagellum, but with long column of microtrichia in infolded position (60C).

Habitat. Tropical lowland (terra firme and inundation) forest, in canopy vegetation.

Geographical distribution (Fig. 61). Known previously from the Amazon Basin in Peru (Madre de Dios drainage) and Brazil (main valley of the Amazon River), the data below show that this species occurs also in the drainage of the Rio Marañon (Peru) and in the Rio Napo drainage in Ecuador. Thus, the range of this species is extended from the Central to the Upper Amazon Basin.

Material examined. Locality data for 14 specimens, not reported previously by Ball and Shpeley (1983:771), are presented below: **ECUADOR Napo**. 7 specimens, Reserva Ethnica Waorani, 1 km. s. Onkone Gare Camp, 00°39'10"S 076°26'W, 220m., Project MAXUS, insecticidal fogging of mostly bare green leaves, some with covering of lichenous or bryophic plants in terra firme forest, T.L. Erwin et al (USNM): male, CARA 091, Lot 616; male, Lot 632; female, Lot 1413; male, Lot 1463; female, Lot 1717; male, Lot 1720; female, Lot 1734. **PERU Madre de Dios**. Male, Pakitza, Zone 02, 12°07'S 70°58'W, ex canopy, Spondias, BIOLAT 02130716, 07.IX.1989, T.L. Erwin, B.D. Farrell (USNM). 6 specimens, Rio Tambopata Res., 30 km. (air) s.w. Pto.

Maldonado, 290 m., Smithsonian Institution Fogging Project, T.L. Erwin (USNM): female, FOGGING 0041633, 09.III.1984; female, FOGGING 0032040, 12.IX.1984; female, FOGGING 00016174, 02.V.1984; male, FOGGING 0022068, 14.IX.1984; male, FOGGING 0063190, 08.IX.1984; male, FOGGING 00002121, 10.XI.1983.

Months of collection. March, May, September, and November.

Eucheila (Pseudoinna) mateui, new species

Figs. 60D-E, and 61

Type material. Nineteen specimens, as follows. HOLOTYPE male, labelled: "PERU: MADRE DE DIOS/ Rio Manu, BIOLAT Biol.Sta.,/ Pakitza, 356m 21 Sep 1991/ 11°56'47"S 071°17'00"W/ T.L. Erwin"; "Insecticidal fog of large tree with/ many lianas and accumulated/ debris, Tr. Tachigali /9, alluvial/ terrace forest Lot 91"; "BIOLAT/COLE/ 000012728" [USNM]. ALLOTYPE female, labelled: "PERU: MADRE DE DIOS, Rio/ Manu, BIOLAT Biol. Sta.,/ Pakitza, 356 m 6 Oct 1992/ 11°56"47"S 071°17'W/ T.L.Erwin Tr. Cast. /25"; "BIOLAT/COLE/ 000017401" [USNM]. 17 additional PARATYPES, sex and label data as follows: 1 male: "PERU: MADRE DE DIOS/ Pakitza, Zone 03/ 1 3 O c t 8 9/ Erwin/Servat/ 12°07'S 70°58'W"; "Insecticidal Fog/ Tr. Castanal 42/ tree with vines"; "BIOLAT/COLE/ 000010070" [USNM]. 1 female: "PERU: MADRE DE DIOS/ Pakitza, Zone 03/ 11 Oct 8 9/ Erwin/Servat/ 12°07'S 70°58'W"; "Insecticidal Fog/ Tr. Castanal 21/22/ tree with vines"; "BIOLAT/COLE/ 000015258" [USNM]. 1 male: "PERU Madre de Dios/ Rio Tambopata Res./ 30km (air) sw Pto./ Maldonato, 290m/ 12°50'S 069°20'W"; "Smithsonian Institution/ Canopy Fogging Project/ T.L.Erwin et al. colls./ 04May84 01/01/010"; "FOGGING/ 00012178" [USNM]. 1 male: "PERU Madre de Dios/ Rio Tambopata Res./ 30km (air) sw Pto./ Maldonato, 290m/ 12°50'S 069°20'W "; "Smithsonian Institution/ Canopy Fogging Project/ T.L.Erwin et al. colls./ 10Nov83 03/01/017"; "FOGGING/ 00002114 [USNM]. 1 female: "PERU Madre de Dios/ Rio Tambopata Res./ 30km (air) sw Pto./ Maldonato, 290m/ 12°50'S 069°20'W"; "Smithsonian Institution/ Canopy Fogging Project/ T.L.Erwin et al. colls./ 09Mar84 04/02/067"; "FOGGING/ 0042357" [USNM]. 1 female: "PERU: LORETO, Cmp./ Terry 15May90/ 75°28'W 05°07'S/ T.L. Erwin Coll."; "Secondary fldplain/ insecticidal fog/ huge tree with/ vines and epiphytes" [USNM]. 1 female: "PERU: LORETO Rio Napo/ Explomapo Camp, Rio Sucusari/ 100m, 4 June 1992/ 03°15'S 072°55'W/ T.L. Erwin, E.&F. Pfuno S."; "Insecticidal fogging of tree w/green/ leaves (6 sheets at 25m high)/ slope, 500m from camp on Tr./ Secreto in terra firme forest, w// epiphytes among green Lot 322"; "ADP/ 50913" [USNM]. 1 female: "PERU: LORETO, Cocha/ Shinguito 11June90/ 74°45'W 05°08'S/ Erwin et al Colls"; "TShs/3; insecticide/ fogging of trees/ with vines"; "ADP/ 94220" [USNM]. 1 male: "PERU:Loreto, Cocha/ Shinguito 22May90/ 74°45'W 05°08'S/ Erwin et al Colls"; "TSn/2: Insecticidal/ fogging of big tree/ with vines,/ epiphytes Tree/ label "Fog 2 TLE""; "ADP 86922" [USNM]. 1 male same as previous except: "ADP 86943" [USNM]. 1 female: "PERU LORETO, Cocha/ Shinguito 19June90/ 74°45'W 05°08'S/ Erwin et al Colls."; "TSn/1; insecticide/ fogging of big tree/ with vines,/ epiphytes Tree/ label "Fog 2 TLE""; "ADP/ 67210" [USNM]. 1 female same as previous except: "ADP/ 94027" [USNM]. 1 male: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 12 Feb95/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terra firme forest At trans 5 Sta 6/ Project MAXUS Lot #1045" [USNM]. 1 male: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 7 Oct95/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terra firme forest At trans 7 Sta 2/ Project MAXUS Lot #1232" [USNM]. 1 male: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 7 Oct94/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terre firme forest At trans 8 Sta 7/ Project MAXUS Lot #1253" [USNM]. 1 male: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 7Feb96/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terre firme forest At trans 6 Sta 1/ Project MAXUS Lot #1451" [USNM]. 1 female: "ECUADOR Napo. Res. Ethnica/ Waorani, 1km S. Onkone Gare/ Camp Trans-Ent 4 Feb96/ 220m 00°39'10"S 076°26'W/ T.L. Erwin, et al"; "Insecticidal fogging of mostly bare/ green leaves, some with covering/ of lichenous or bryophic plants in/ terre firme forest At trans 2 Sta 5/ Project MAXUS Lot #1415" [USNM].

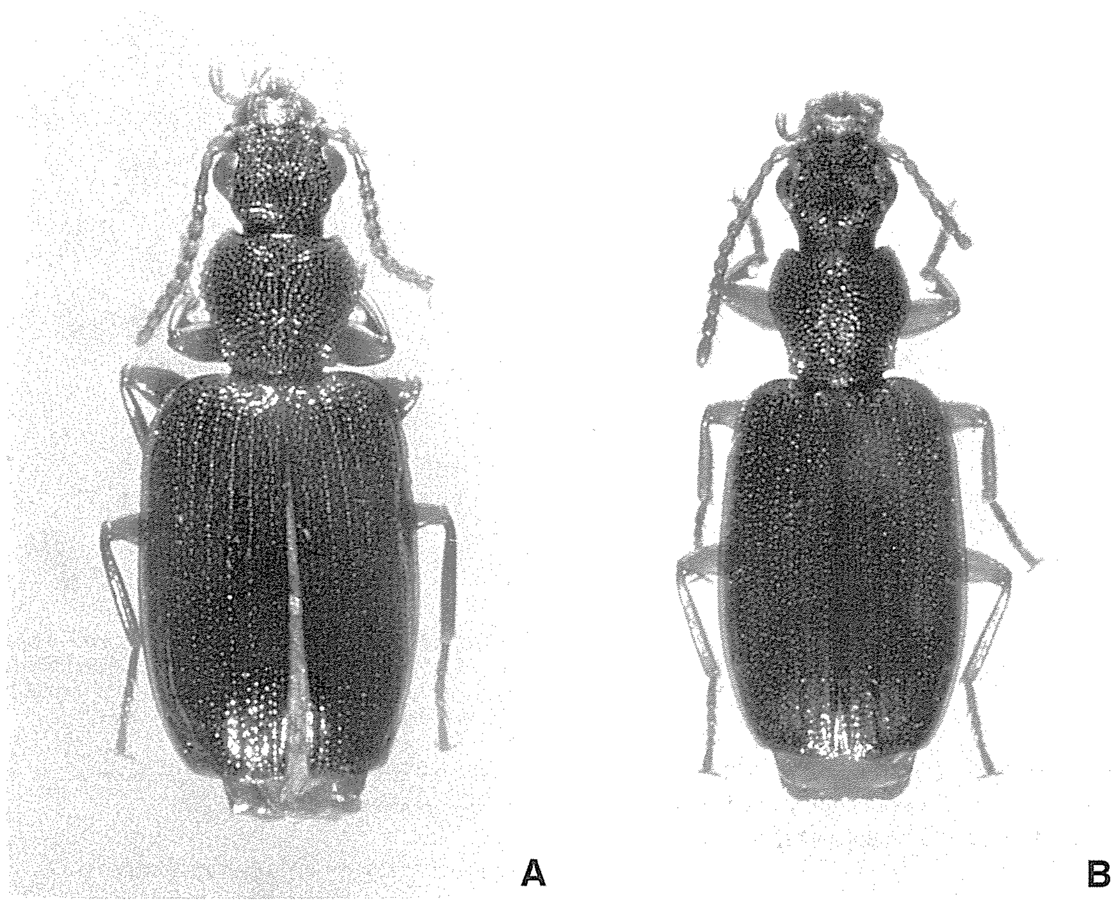

Figure 59. Photographs of habitus, dorsal aspect, of: **A**, *Eucheila (Pseudoinna) boliviana* (Mateu), female, SBL = 3.68 mm, Madre de Dios, Peru (USNM); **B**, *Eucheila (Pseudoinna) surinamensis,* new species, holotype male, SBL = 3.56 mm, Rainville, Surinam [RMNH].

Type locality. Pakitza, Departmento Madre de Dios, Peru.

Specific epithet. A Latinized genitive eponym, based on the surname of Joaquin Mateu, who described the subgenus *Pseudoinna*, and in recognition of his many important contributions to Neotropical carabidology.

Recognition. This species is readily separated from the other small *Inna* species, with impunctate ventral surface of head, by the angulate, nearly smooth lateral margins of the pronotum, and additionally, males lacking denticles on ventral surface of middle tibia.

Description. With character states of the subgenus *Pseudoinna,* restricted or amplified as follows. Average SBL of males 3.88 mm. (3.64-4.16) and females 3.89 mm. (3.44-4.40).

Color. Brunneous, with antennae, mouthparts, lateral margin of elytra and legs testaceous. Elytra moderately bronzed.

Luster. Shiny.

Head. Dorsal surface moderately densely punctate.

Mouthparts. Average for subgenus.

Prothorax. Pronotum: disc moderately convex and punctate; lateral grooves narrow; lateral margins angulate and nearly smooth.

Elytra. Entire surface punctate; humerus finely serrate; lateral margin explanate.

Hind wings. Fully developed, but without wedge cell.

Abdominal sterna. Sternum VII of male and female respectively with 1 pair and 2 pairs of preapical setae.

Male genitalia (Figs. 60D-E). Apical portion of median lobe moderately long, finely tapered. Internal sac with distinct microtrichial fields, without flagellum.

Habitat. Adults of this species lives in the canopy of tropical lowland (terra firme) forest to an altitude of at least 356 m.

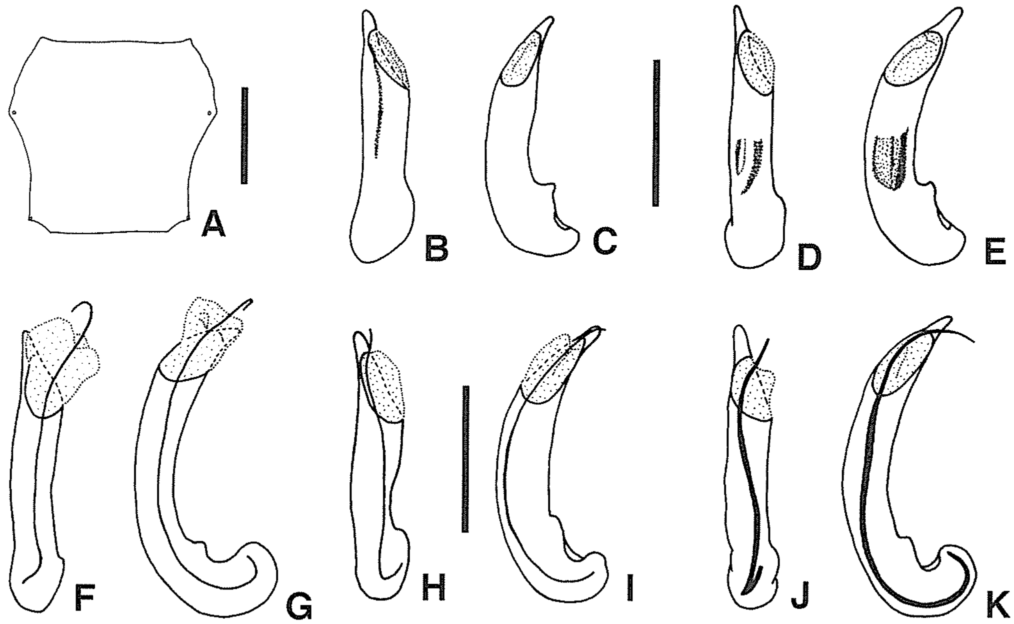

Figure 60. Line drawings of structural features of species of *Eucheila (Pseudoinna* Mateu). **A**, pronotum, dorsal aspect, of *E. boliviana* (Mateu). **B-K**, male genitalia, median lobe, **B**, **D**, **F**, **H**, and **J**, and **C**, **E**, **G**, **I**, and **K**, dorsal and left lateral aspects, respectively, of: **B-C**, *E. inpa* (Ball and Shpeley); **D-E**, *E. mateui*, new species; **F-G**, *E. palpalis* (Ball and Shpeley); **H-I**, *E. atrata arbor* (Ball and Shpeley); and **J-K**, *E. surinamensis*, new species. Scale bars: **A** = 1 mm.; **B-K** = 0.5 mm.

Geographical distribution (Fig. 61). This species is known only from the type locality and vicinity, in the Upper Amazon Basin of southeastern Peru.

Chorological affinities. The ranges of the putatively closely related *E inpa*, and more distantly related *E. breviformis*, *E costulata*, and *E. (Bordoniella) marginata,* new species overlap the range of this species.

Phylogenetic relationships. Probably *E. mateui* is the adelphotaxon of *I. inpa*, as suggested by overall similarity and by the probable synapotypic feature of absence (loss) of the wedge cell of the hind wing.

Material examined. Type specimens only, as indicated above.

Months of collection. February-March, May-June, and September-November.

Eucheila (Pseudoinna) boliviana (Mateu), new combination

Figs. 59A and 61

Inna boliviana Mateu 1989:65. HOLOTYPE male, labelled: "HOLOTYPE" [red paper]; Cochabamba/ BOLIVIA/ XII - 1968/ Zischka leg" [handwritten]; "Inna/ (Pseudoinna)/ boliviana n. sp./ J. Mateu det. 1989" (JMCA).

Type locality. Cochabamba, Bolivia.

Habitus. Dorsal aspect as in Fig. 59A.

Habitat. Tropical lowland forest, between at least 220m. and 290 m.

Geographical distribution (Fig. 61). Known previously from the type locality only, additional material has been collected in the upper Amazon Basin, in Peru, Madre de Dios drainage basin, and Ecuador, Rio Napo drainage basin.

Material examined. In addition to the holotype noted above, we have seen 11 specimens from the following localities: **ECUADOR Napo**. Female, Jatun Biological Station, 21 km. e. Puerto Napo, tropical lowland rain forest, 21.VII.1994, F. Genier (CMNC). Reserva Ethnica Waorani, 1 km. s. Onkone Gare Camp, 00°39'10"S 076°26'W, 220m., Project MAXUS, insecticidal fogging of mostly bare green leaves, some with covering of lichenous or bryophic plants in terra firme forest, T.L. Erwin et al (USNM): male, lot 885; male, 929; female, 1223; and female, 1412. **PERU Loreto**. Male, Cmp. Terry 05°07'S 75°28'W, secondary flood plain, ex 3 huge leguminous trees, with vines and epiphytes, ADP 02735, 16.V.1990, T.L. Erwin (USNM).

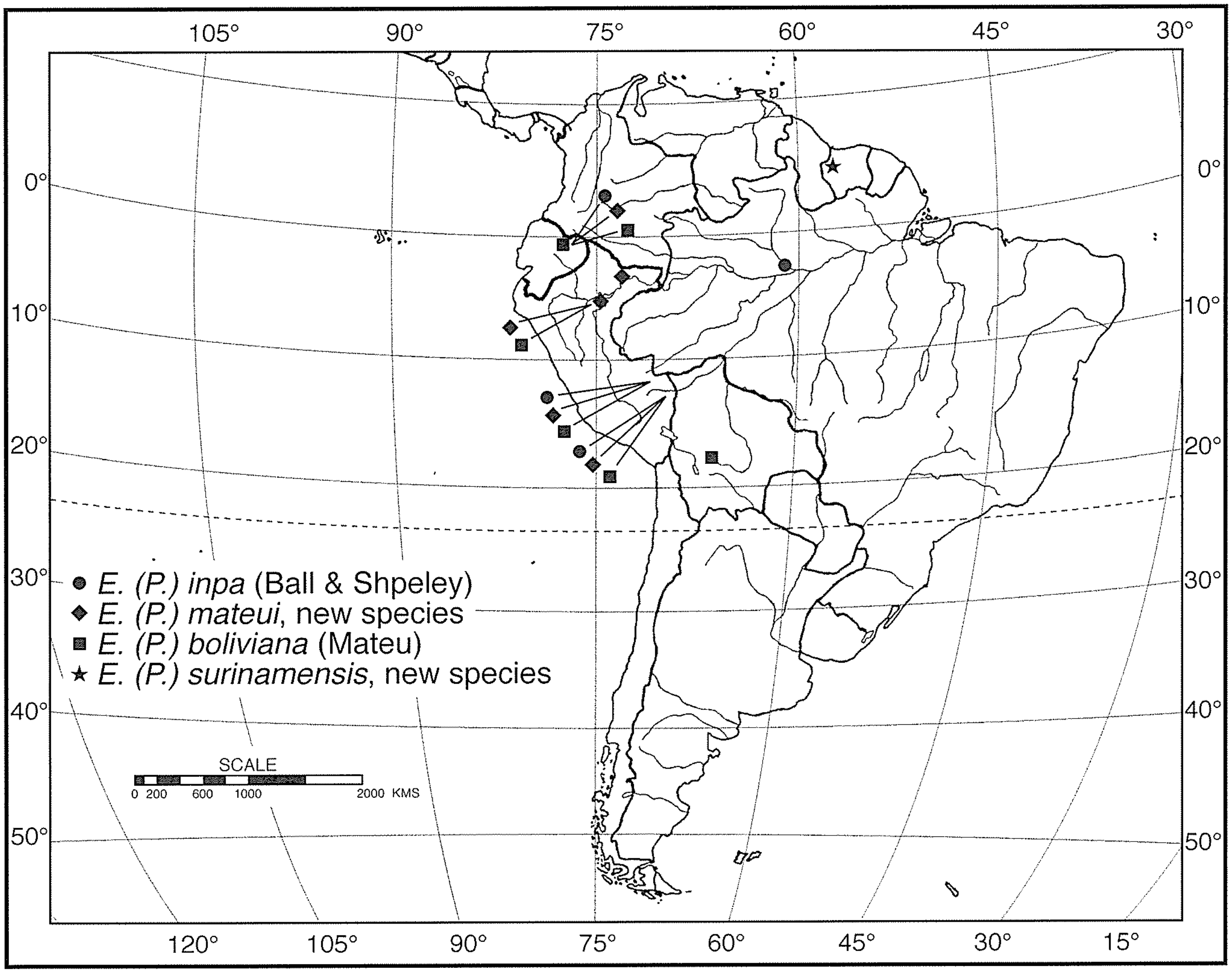

Figure 61. Map of southern Middle America and South America showing positions of known localities for the species of *Eucheila (Pseudoinna* Mateu).

Madre de Dios. Female, Pakitza, Zone 03, 11°55'48"S 71°35'18"W, ex fogged vegetation, BIOLAT 0312, 12.IX.1988, T.L. Erwin (USNM). 4 specimens, Rio Tambopata Res., 30 km. (air) s.w. Pto. Maldonado, 290 m., Smithsonian Institution Fogging Project, T.L. Erwin (USNM): female, 09.III.1992, FOGGING 00000071; female, 06.IX.1984, FOGGING 0034711; male, 06.IX.1984, FOGGING 0033249; male, 25.II.1984, FOGGING 0044068.

Months of collection. February-March, May, July, and September.

Eucheila (Pseudoinna) surinamensis, new species

Figs. 59B, 60J-K, and 61

Type material. One specimen, HOLOTYPE male, labelled: "Museum Leiden/ SURINAM: Rainville,/ 29-VII-1977/ A. van Assen"; "SWEPT FROM/ LOW PLANTS" [RMNH].

Type locality. Rainville, Suriname district, Surinam.

Specific epithet. A Latinized adjective, based on the name of the country in which this species is found.

Recognition. This species is readily separated from the other 2 species, which also have the ventral surface of the head punctate, by the narrow pronotum, and by its eastern-most range.

Description. With character states of the subgenus *Pseudoinna,* restricted or amplified as follows. Habitus as in Fig. 59B. SBL of male 3.56 mm.

Color. Brunneous, head slightly paler; antennae, mouthparts and legs brunneo-testaceous.

Luster. Shiny.

Head. Dorsal surface coarsely punctate (Fig. 59A); ventral surface not as coarsely punctate.

Mouthparts. Average for subgenus *Pseudoinna.*

Prothorax. Pronotum: disc moderately convex; dorsal surface coarsely punctate; lateral grooves narrow; lateral margins crenulate.

Elytra. Entire surface punctate; humeral and lateral angles finely serrate; lateral margins slightly explanate.

Hind wings. Fully developed.

Abdominal sterna. Sternum VII of male with 1 pair of subapical setae.

Male genitalia (Figs. 60J, K). Apical portion of median lobe moderately long, finely tapered. Internal sac with flagellum.

Habitat. Tropical lowland forest.

Geographical distribution (Fig. 61). This species is known only from the type locality in northwestern Surinam.

Chorological affinities. No other species of *Pseudoinna* are recorded from Surinam. Thus, within this subgenus, *E. surinamensis* is clearly isolated geographically.

Phylogenetic relationships. This species is most similar to, and thus postulated to be, closely related to *E. palpalis* and *E. boliviana.*

Material examined. Holotype only. For details, see above.

Month of collection. July.

Subgenus *Eucheila (s. str.),* new status

Eucheyla Dejean 1829:60

Recognition. See key, above.

Description. To the description in Ball and Shpeley (1983:780) we offer the following additions and corrections, specifically with reference to the mouthparts, based on study of *Eucheila adisi* Ball and Shpeley. Labrum (Fig. 5G) markedly widened, 4 anterior-most setae (**as**) smaller than in other subgenera of *Eucheila*, and inserted below anterior dorsal margin; 2 long dorsal setae distinctly posteriad anterior dorsal margin; short lateral setae numerous each side. Epipharynx (Fig. 5H) with parapedial setae (**ps**) few and widely spaced, and areas lateral to pedium sparsely setose. Mandibles (Figs. 9Q-X) each with dorsal projection (**dp**), and with occlusal margin comprised almost solely of terebral ridge (**tr**), occlusal grooves absent; left mandible in ventral aspect with retinacular ridge (**rr**) very short, markedly basad, and mandibular ridge (**mr**) remote from occlusal margin, straight, without occlusal portion; right mandible without retinaculum, molar tooth (**m**) small but distinct, and ventrally molar ridge (**mr**) very short. Maxilla (Fig. 10G) with galeomere 2 (**g2**) broad and setose.

Concerning the mandibles, the tooth designated as "premolar" by Ball and Shpeley (1983: 780) is here identified as terebral. The change is based on the more detailed study of pericaline mouthparts, the results of which were summarized in Table 2.

Classification. The 4 species described previously were arrayed in 2 species groups, the monobasic *strandi* group and the *flavilabris* group. The new species (below) are characterized by features in which they are similar to one another, but that do not permit inclusion in either of the described groups. Accordingly, we propose a new group for them, the *erwini* species group.

Included taxa. This subgenus includes 6 species, arrayed in 3 species groups.

Eucheila (s. str.) strandi species group

Recognition. See key, above. Additionally, adults exhibit a densely punctate dorsal surface of the head, and pronotum.

Geographical distribution (Fig. 64). The single species, *E. strandi* (Liebke) (type locality Jataí, State of Goiás, Brazil), is known from localities in cis-Andean South America south of the Amazon Basin, from Argentina, Paraguay, and Brazil (Ball and Shpeley 1983:782).

Eucheila (s. str.) strandi (Liebke)
Fig. 64

Inna strandi Liebke 1939:121.

Eucheila strandi; Reichardt 1966:10. Ball and Shpeley 1993:781.

Type locality. Jataí, State of Goiás, Brazil.

Habitat. Probably tropical lowland dry forest (Shpeley and Ball 1993:159, Zone B).

Geographical distribution. The range of this species is in eastern South America, south of the Amazon Basin (Ball and Shpeley 1983:785, Fig. 96).

Material examined. Locality data for 2 specimens, not reported previously by Ball and Shpeley (1983: 781), are presented below: **BRAZIL. Bahia**. Male, female, Encruzilhada, 960 m., XI.1972 (MNHP, coll. J. Nègre).

Month of collection. November.

Eucheila (s. str.) flavilabris species group

Recognition. See key, above.

Geographical distribution. The range of this species group extends in cis- Andean South America from southeastern Brazil (Rio de Janeiro) north and westward to Amazonian Peru and Ecuador, and northward in Middle America to southeastern México (Cordova, state of Veracruz).

Included taxa. This species group includes 3 species, for 2 of which new locality records are provided below.

Eucheila (s. str.) adisi Ball and Shpeley
Figs. 5G-H, 9Q-X, 10G, and 64

Eucheila adisi Ball and Shpeley 1983:785.

Type locality. 60 km. n. Manaus, State of Amazonas, Brazil (Ball and Shpeley 1983:788).

Morphological features. The labrum (Fig. 5G) and epipharynx (Fig. 5H), mandibles (Figs. 9Q-X), and maxilla (Fig. 10G) are referred to above, in treatment of subgenus *Eucheila*.

Habitat. Topical lowland (terra firme) forest.

Geographical distribution (Fig. 64). Known previously from the type locality only in the central part of the Amazon Basin, the specimens recorded below extend the range into the upper Amazon, in the Madre de Dios and Marañon drainage basin of Peru, and in the Rio Napo drainage basin of Ecuador.

Chorological affinities. The range of this species, in the central and upper Amazon Basin, overlaps that of its consubgener, *E. erwini*, new species, but it is otherwise remote from the known ranges of the other species of the subgenus *Eucheila*, and particularly from the ranges of the other members of the *E. flavilabris* species group. At a more general taxonomic level, the range of *Eucheila adisi* is overlapped by the ranges of the subgenera *Hansus* and *Bordoniella*, as well as by the ranges of several species of *Inna* and *Pseudoinna*.

Material examined. In addition to the holotype reported previously by Ball and Shpeley (1983:785), we have seen 21 specimens from the following localities, which are new distribution records: **ECUADOR. Napo**. 11 specimens, Reserva Ethnica Waorani, 1 km s. Onkone Gare Camp, 00°39'10"S 076°26'W, 220m., Project MAXUS, insecticidal fogging of mostly bare green leaves, some with covering of lichenous or bryophic plants in terra firme forest, T.L. Erwin et al (USNM): male, female, CARA Lot 632; female, Lot 869; female, Lot 1190; female, Lot 1536; male, Lot 1615; male, lot 1678; male, Lot 1697; male, Lot 1704; male, Lot 1708; male, Lot 1710. **Sucumbios**. Female, Sacha Lodge 0.5°S 76.5°W, ex Malaise trap, 4-14.III.1990, Hibbs (SEMC). **PERU. Loreto**. Female, boca Rio Samiria 04°39'S 74°21'W, ex bromeliads in *Ficus*, in swamp forest, 31.V.1990, T.L. Erwin (USNM). 2 males, Cocha Shinguito, 05°08'S 74°45'W, 11.VI.1990, T.L. Erwin (USNM). **Madre de Dios**. 3 males, Rio Tambopata Res., 30 km. (air) s.w. Pto Maldonado 12°50'S 069°20'W, 290 m., Smithsonian Institution Canopy Fogging Project, T.L. Erwin (USNM): FOGGING 0038936, 28.II.1984; FOGGING 00002962, 28.II.1984; FOGGING, 04.V.1984. **VENEZUELA. Amazonas**. Male, Cerro de Neblina base camp, 05°50'N 66°10'W, 140 m., malaise trap in rain forest, 10-20.II.1985, W.E. Steiner et al (USNM).

Months of collection. February-March and May-June.

Eucheila (sensu stricto) cordova Ball and Shpeley
Fig. 64

Eucheila cordova Ball and Shpeley 1983:788.

Type locality. Cordova, State of Veracruz, México (Ball and Shpeley 1983:788).

Habitat. The specimen noted below was collected by the eminent noctuid moth specialist, Morton S. Adams, probably at night at light. Thus, the beetle could have flown into the pine-oak savanna area (where it was collected) from the more tropical lower areas, fingers of which extend upward in the valleys, the origins of which are on the slopes of the plateau, where Hidden Valley Lodge is located, and where Dr. Adams stays during his visits to Belize.

Geographical distribution (Fig. 64). Known previously from the type locality in México only, the specimen recorded below demonstrates a range for the species that extends from Veracruz to Belize, in eastern tropical Middle America.

Habitat. Probably tropical lower montane forest.

Material examined. Locality data for a single specimen, not reported previously by Ball and Shpeley (l.c.), are presented below: **BELIZE. Cayo District**. Female, Mountain Pine Ridge, Hidden Valley 17°00'N 89°00'W, 650-700 m., pine- oak savanna, 24.V.1990, M.S. Adams, L.C. Dow (CMNH).

Month of collection. May.

Eucheila (s. str.) erwini species group

Recognition. See key, above.

Geographical distribution. Confined to northern South America, the range of the 2 species probably extends from the western part of the Amazon Basin eastward to the Guianas. However, the species are presently known only from the extremes of that postulated range.

Included taxa. 2 species, both described below.

Eucheila (sensu stricto) erwini, new species

Figs. 62A, 63A-B, and 64

Type material. 7 specimens, as follows. HOLOTYPE male, labelled: "PERU: LORETO Rio Napo/ Explomapo Camp, Rio Sucusari,/ 100m, 3 June 1992/ 03°15'S 072°55'W/ T.L. Erwin, E.& F. Pfuno S."; "Insecticidal fogging of suspended/ dry leaves (6m3 at 2-3m high) at/ edge of Igapo on slope, 50m from/ camp on Tr.Laboratorio, 10m3 of/ green above dry leaves Lot 315"; "ADP/ 52201" [USNM]. ALLOTYPE female and 5 male PARATYPES, labelled same as holotype, except "ADP/ 52199", "ADP/ 52185", "ADP/ 52186", "ADP/ 52200", "ADP/ 52202" and "ADP/ 52208", respectively [USNM].

Type locality. Rio Napo Explomapo camp (03°15'S 072°55'W), Loreto Department, Peru.

Specific epithet. A Latinized masculine eponym, based on the surname of Terry L. Erwin, Smithsonian Institution, who collected the type series.

Recognition. This is the only known species of *Eucheila* with the elytral surface tuberculate.

Description. With character states of subgenus *Eucheila,* restricted or amplified as follows. Habitus as in Fig. 62A. Average SBL of males 5.21 mm. (5.08-5.36) and SBL of female 5.28 mm.

Color. Dorsal surface brunneous with pronounced metallic green to slightly cupreous reflection; ventral surface brunneo-testaceous to brunneous, with faint metallic green reflection. Antennae, mouthparts, and appendages testaceous, palpi slightly darker.

Luster. Shiny.

Head. Dorsal surface moderately punctate.

Mouthparts. Not studied in detail, but evidently same as those described for subgenus.

Prothorax. Pronotum: disc moderately convex; lateral margins smooth; dorsal surface moderately punctate.

Elytra. Surface uneven, lateral preapical callus present, and 5 rows of longitudinal tubercles on each elytron.

Hind wings. Fully developed.

Abdominal sterna. Sternum VII of male and female, with one pair and 2 pairs of preapical setae, respectively.

Male genitalia (Figs. 63A-B). Apical portion of median lobe moderately long, rounded at apex.

Habitat. Tropical lowland forest, to an altitude of at least 100 m.

Geographical distribution (Fig. 64). This species is known only from the type locality in the Upper Amazon Basin of northeastern Peru.

Chorological affinities. No other species of the subgenus *Eucheila* are recorded from Peru, so *E. erwini* is geographically isolated from the known ranges of its more closely related congeners, and

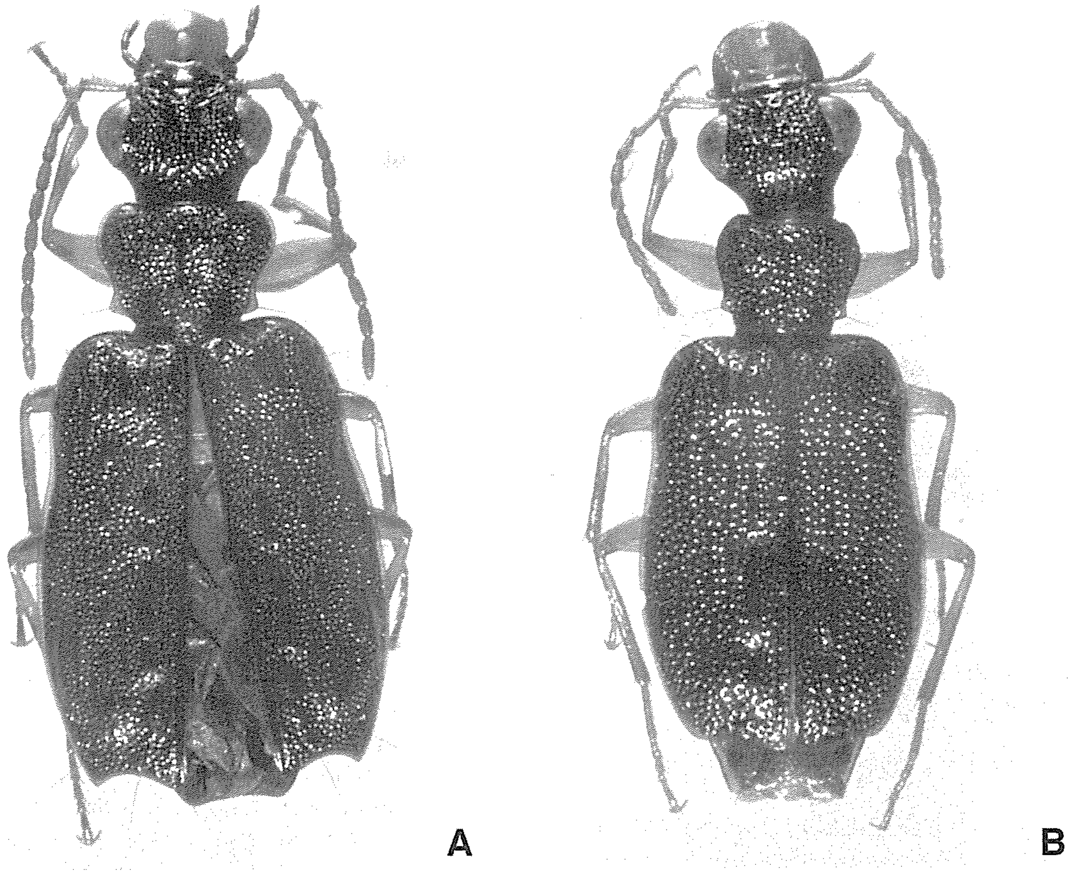

Figure 62. Photographs of habitus, dorsal aspect, of new species of *Eucheila (s. str.)*: **A**, *E. erwini*, new species, male, SBL 5.28 mm, Rio Napo, Loreto, Peru [USNM]; and **B**, *E. pilosa*, new species, holotype, female, SBL = 4.12 mm, Nickerie, Surinam [RMNH].

widely isolated from the range of its putative closest relative, *E. pilosa*, new species.

Phylogenetic relationships. This species is the putative adelphotaxon of *E. pilosa,* based on the derived features which characterize the *erwini* species group.

Material examined. Type specimens only. For details, see above.

Month of collection. June.

Eucheila (sensu stricto) pilosa, new species

Figs. 62B, 63C-D, and 64

Type material. One specimen, HOLOTYPE male, labelled: "Museum Leiden/ SURINAME:Nickerie/ KM 80.5 road to Amotopo/ 13.V.1981 HH 141/ J. Huijbregts"; "at light/ prim./ forest " [RMNH].

Type locality. About 75 kilometers south-southeast of Apoera, Nickerie district, Surinam.

Specific epithet. The Latinized form of the Greek noun "pilos", in allusion to the pilose dorsal surface.

Recognition. This is the only known species of *Eucheila* with a pilose dorsal surface.

Description. With character states of the subgenus *Eucheila (s. str.)* and of *erwini* species group, restricted or amplified as follows. Habitus as in Fig. 62B, SBL of male 4.12 mm.

Color. Dorsal surface brunneous with pronounced metallic green reflection; ventral surface with faint metallic green reflection.

Luster. Shiny.

Head. Dorsal surface coarsely punctate.

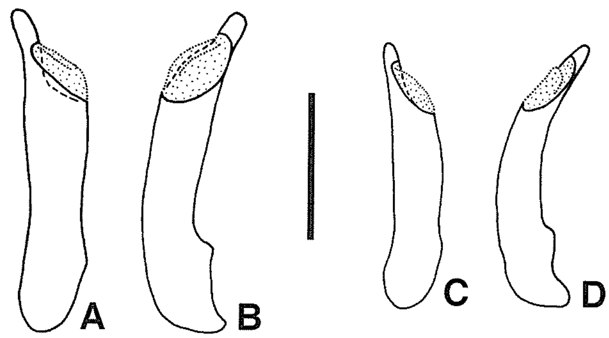

Figure 63 Line drawings of male genitalia, median lobes, of new species of *Eucheila (s. str.)*: dorsal and left lateral aspects, of, respectively: **A-B**, *E. erwini*; and **C-D**, *E. pilosa*. Scale bar = 0.5 mm.

Prothorax. Pronotum: disc moderately convex; lateral margins smooth; dorsal surface coarsely punctate.

Elytra. Surface uneven, middle portion somewhat depressed, lateral preapical callus present, and just visible longitudinal swellings in apical 0.4.

Hind wings. Fully developed.

Abdominal sterna. Sternum VII of male with 1 pair of preapical setae.

Male genitalia (63C-D). Apical portion of median lobe moderately long, rounded at apex.

Habitat. Tropical lowland ("primary") forest.

Geographical distribution (Fig. 64). This species is known only from the type locality in west central Surinam.

Chorological affinities. No other species of subgenus *Eucheila* are recorded from Surinam, and the known range of *E. pilosa* is widely separated from that of its putative closest relative, *E. erwini*.

Phylogenetic relationships. This species is the putative adelphotaxon of *E. erwini*.

Material examined. Holotype only. For details, see above.

Month of collection. May.

Somotrichus genus-group

The following features are added to the characterization (Ball and Shpeley 1983:751-752) of the somotrichoids. Plesiotypic features are glossal sclerite of labium without pair of preapical setae ventrally and ovipositor stylomere 2 with basal lobe. Apotypic features are labium with submentum and mentum fused, mental suture absent; and male fore tarsomeres 1-4 ventrally with adhesive vestiture of articulo-setae, in form of pads, not biseriate. To be omitted from the previous list of apotypic features is "stylomere 2 without basal lobe". This feature characterizes *Somotrichus* Seidlitz, only. Females of the other 2 genera of this group, *Paulianites* Jeannel and *Pephrica* Alluaud, exhibit a distinct basal lobe, as illustrated so clearly by Mateu (1963:137, Figs. 60 and 61).

Evolution of the mouthparts of subtribe Pericalina in the Western Hemisphere

Insect mouthparts comprise a labrum on the ventral surface of which is the epipharynx, paired mandibles and maxillae, and a labium which, developmentally like the labrum, is a paired structure, but the basal elements of which fuse during early stages of ontogeny. Mouthparts of adult pericalines exhibit marked divergence and striking modifications within the Lebiini. Here, we indicate general patterns based on study of the precinctive pericaline taxa in the Western Hemisphere.

The data in Table 2 are summarized with the arithmetic sum of putatively apotypic features for each taxon studied. Scores are relatively low for the members of the *Thyreopterus*, *Catascopellus*, and *Pericalus* genus-groups, ranging from 9 to 20. The *Eurycoleus* and *Eucheila genus*-groups exhibit substantially higher scores, with the maximum being characteristic of the *Eucheila* genus-group. These higher scores are taken to indicate the marked evolution that the mouthparts of the latter 2 groups have undergone, each in its own direction.

Within the Pericalina of the Western Hemisphere, 2 basic types of mouthparts are recognizable, designated for this discussion as Type A and Type B (Table 20). Type A is characteristic of the *Eucheila* genus-group, with Type B characteristic of the *Thyreopterus*, *Catascopellus*, *Pericalus*, and *Eurycoleus* genus-groups.

Within Type A, the apogee of evolution of mouthparts was reached in subgenus *Eucheila*, with principal features as follows: a markedly enlarged labrum with the 4 anterior-most setae reduced in size and on the anterior rather than the dorsal surface, the epipharynx with a reduced number and reduced size of parapedial setae, deepened pedium, numerous setae laterally, and a very short crepis; mandibles with occlusal surface occupied almost exclusively by the

Figure 64. Map of southern U.S.A., Middle America and South America showing positions of known localities for the species of *Eucheila* (s. str.).

terebral margin (molar area markedly reduced), and loss of the right retinaculum; maxilla with galeomeres markedly enlarged; and labium with markedly reduced mentum (tooth absent, lateral lobes each very narrow), and markedly enlarged and completely sclerotized ligula (paraglossae sclerotized and fused to lateral margin of the glossal sclerite) (see Ball and Shpeley 1983: 782, Fig. 66).

Type B mouthparts have undergone much less modification, which consisted primarily of loss of the retinaculum and consolidation of the basal occlusal area (fusion of terebral tooth, premolar, and molar teeth, loss of the posterior occlusal groove and

Table 20. Postulated changes in some structural features (including setation) of mouthparts of the Western Hemisphere Subtribe Pericalina (see Table 3 for details).

TYPE A[1]	TYPE B[2]
Labrum, setae: 4, near anterior margin; 2, moved posteriad	**Left mandible:** retinaculum lost
Epipharynx, parapedial setae: configuration U-shaped	**Left mandible:** ant. occl. groove shallow post. occl. groove shallow
Mandibles: ventral groove lost	**Left mandible:** terebral tooth, premolar & molar consolidate
Left mandible: premolar lost	**Right mandible**: premolar lost
Maxillary galea: galeomeres broadened, concave on medial face; galeomeres 1 &2 fused on lateral margin	
Labium, glossal sclerite: pair of setae developed preapically	
Labium, palpomere 3: became securiform	

[1] Basal characteristics of *Eucheila* genus-group.
[2] Basal characteristics of *Thyreopterus*, *Catascopellus*, *Pericalus*, and *Eurycoleus* genus-groups.

reduction of the molar ridge). Within the *Thyreopterus* genus-group, a narrow lateroventral groove evolved in the mandibles of the ancestral stock of *Phloeoxena*, a groove that is preserved in that form in subgenus *Tacana*, and became widened substantially in later-evolving stocks. In the *Catascopellus* genus-group, the scrobes and adjacent lateral areas of the mandibles became setose, but this feature is part of the development of short sparse pelage, generally.

Within the *Pericalus* genus-group, the labium was the principal element to be modified: mental tooth lost; apical setae of the glossal sclerite reduced from 4 to 2; and paraglossae markedly expanded apically (Shpeley and Ball 1993: 21, Fig. 6). Within the *Eurycoleus* genus-group, the mandibles became more or less explanate, with scrobes clearly evident in dorsal aspect, the terebrae were widened, the supraterebral ridge of the left mandible was reduced and the terebral ridge was straightened, and the mental tooth was lost from the labium.

In summary, evolution of the mouthparts has involved changes in form, reductions through loss or consolidation, and gains represented by additional setae. The functional significance of these changes remains to be investigated. The less derived forms, as seen, for example, in the thyreopteroid *Stenognathus onorei* or the eucheiloid *Eucheila marginata*, indicate general predaceous feeding, involving particulate matter.

The most striking modifications of the mouthparts, as seen in the subgenus *Eucheila*, suggest a profound change in food or feeding mechanisms. The mandibles with extended terebrae and other parts of the occlusal structures reduced, suggest structures intended solely to slice into tissue. Together, the enlarged labrum, with deepened epipharyngeal pedium, enlarged ligula ventrally and enlarged and strengthened galeae laterally form what appears to be a sucking apparatus. Assuming that these beetles are predators, perhaps digestion is external, in the body of the prey, with the mandibles being used to cause deep wounds, and the labral-galeal-labial complex functioning principally as an organ to hold the liquefied tissue of the prey, as it moves toward the gut.

Implications for inferring relationships

Structure of the mouthparts indicates a relatively isolated position for the *Eucheila* genus-group. Mandibular features, such as retention of the left retinacular ridge and right premolar, suggest a relatively basal position, in spite of the numerous apotypic features exhibited by this group. Similarly for the genus-groups exhibiting Type B mouthparts, structure of the mandibles suggests relationship based on loss of the left retinaculum, and a trend toward a basal consolidation of terebral tooth, premolar and molar. However, marked differences among these groups in other features of mandibles and labium, and in structure of the ovipositor (Ball and

Table 21. Latitudinal distribution of precinctive Western Hemisphere species and subspecies of Pericalina, grouped by genus.

Genera[1]	10° zones and number of species in each									
	30-40S	20-30S	10-20S	0-10S	0-10N	10-20N	20-30N	30-40N	40-50N	Total No. spp. & subspp
Catascopellus Straneo	1	0	0	0	0	0	0	0	0	1
Oreodicastes Maindron	0	5	0	0	0	0	0	0	0	5
Phloeoxena Chaudoir	0	0	0	0	10	26	10	1	0	39
Lelis Chaudoir	0	1	1	1	1	2	0	0	0	4
Stenognathus Chaudoir	0	4	7	8	11	3	0	0	0	19
Eurycoleus Chaudoir	0	2	2	3	3	4	3	0	0	7
Catascopus Kirby	0	1	1	1	3	3	1	0	0	4
Eucheila Dejean	1	4	9	13	10	3	1	0	0	25
Coptodera Dejean	1	16	23	20	21	16	11	3	1	44
Total No. spp. & subspp.	3	33	43	46	59	57	26	4	1	

[1] Sequence is primarily from less extensive to more extensive geographical ranges.

Table 22. Altitudinal distribution of precinctive Western Hemisphere species and subspecies of Pericalina, grouped by genus.

Genera[1]	500 m. zones and number of species in each							
	0-500	500-1000	1000-1500	1500-2000	2000-2500	2500-3000	Unknown	Total No. spp. + subspp.
Eurycoleus Chaudoir	8	4	0	0	0	0	0	8
Lelis Chaudoir	2	1	1	0	0	0	1	4
Catascopus Kirby	3	2	2	1	0	0	0	4
Eucheila Dejean	23	5	4	1	1	0	0	25
Coptodera Dejean	37	22	13	6	1	0	0	44
Stenognathus Chaudoir	11	8	4	4	1	0	4	19
Phloeoxena Chaudoir	6	11	22	17	10	2	3	39
Catascopellus Straneo	0	1	1	1	0	0	0	1
Oreodicastes Maindron	0	0	0	2	1	0	2	5
Total spp. + subspp. per altitudinal zone	90	54	47	32	14	2	10	

[1] Sequence reflects relative a gradient of extent of association with lower to higher altitudes.

Shpeley 1983: 746-750, Figs. 2-7) indicate heterogeneity in this assemblage of genus-groups, and thus the possibility that similarity in mouthparts, other than the clearly symplesiotypic features, might be the result of convergent evolution. This matter might be resolved satisfactorily following analysis of the much more diverse and divergent pericaline fauna of the Eastern Hemisphere, or Old World Tropics.

Zoogeographical aspects

Presented here is a general summary of the data about geographical distribution that is included above, with each taxon, as well as data about the previously treated precinctive species of Western Hemisphere pericalines (Ball 1975a; Ball and Shpeley 1983; and Shpeley and Ball 1993). The subject is addressed rather broadly and in a form that is more narrative than analytical, primarily to identify general patterns and processes that may be associated with those previously recognized (as summarized by Shpeley and Ball 1993:169-170. See also references included therein).

Patterns

Patterns include correlations of diversity with latitude, altitude, and continent, and correlation of reduced metathoracic wings with altitude. The units are species grouped in their respective genera.

Latitudinal zonation (Table 21), represented as a series of 9 zones, each of 10°, shows a subtraction pattern from equatorial areas both southward and northward, with the southern limit being set by *Catascopellus crassiceps* at about 38°S. A precinctive North American species of *Coptodera, C. aerata* Dejean, sets the northern limit, at about 41°N. So, the overall distribution of the Western Hemisphere Pericalina is about symmetrical, with northern and southern limits being approximately equidistant from the equator. Species are most numerous in the zones nearest to the equator (10°S to 20°N), the numbers decreased markedly in the 30°-40° zone, both north and south.

Altitudinal zonation (Table 22), represented as a series of 6 zones, each of 500 m., shows a subtraction pattern from low altitude with 60 percent of species in (but not necessarily restricted to) the 0-500 m. zone. In the 2500-3000 m. zone, this percentage decreases to 1.35. Thus, pericalines are primarily a group of the lowland tropics, and the altitudinal pattern is one of

Table 23. Geographical distribution of precinctive Western Hemisphere species and subspecies of Pericalina, grouped by genus, continent, and major island archipelago.

Genera[1]	Numbers of Species and Subspecies				
	S. Amer. Precinctive	Continental S. Amer + N. Amer.	N. Amer. precinctive	Islandic W. Indies precinctive	Total species & subspecies
Catascopellus Straneo	1	0	0	0	1
Oreodicastes Maindron	5	0	0	0	5
Eucheila Dejean	20	2	3	0	25
Stenognathus Chaudoir	14	2	3	0	19
Lelis Chaudoir	2	1	1	0	4
Eurycoleus Chaudoir	2	3	3	0	7
Coptodera Dejean	24	7	13	0	44
Catascopus Kirby	1	0[2]	3	0	4
Phloeoxena Chaudoir	1	0	31[3]	7	39
Total spp. & subspp.	70	15	57	7	148

[1] Sequence reflects relative extent of South American precinction, from 100 per cent for *Catascopellus* and *Oreodicastes* to 2.5 per cent for *Phloeoxena*.
[2] The species *C. brasiliensis* is shared intercontinentally, but it is represented on each continent by a different subspecies.
[3] The species *P. megalops* and *P. picta* are represented by three and four subspecies, respectively.

subtraction upward. However, the pattern is not a simple one, because the ranges of many of the higher altitude taxa do not extend into the lowlands (i.e., less than 500 m.), leading to the conclusion that some diversification has taken place along an altitudinal gradient.

Continentally (Table 23), of the 9 pericaline genera with precinctive Western Hemisphere species, 7 are shared between North America and South America. 2 genera *(Oreodicastes* and *Catascopellus)* are precinctive in South America. *Stenognathus, Lelis,* and *Coptodera* are preponderantly South American; *Eurycoleus* is about equally divided; and *Phloeoxena* and *Catascopus* are predominantly North American. Although these latter 2 genera are shared intercontinentally, each is represented on the southern land mass by a single precinctive species or subspecies.

Both continents have many precinctive species (Table 23), with South America being predominant. On the northern continent, the precinctive species are concentrated in Middle America (only one of these 57 taxa is in and confined to the eastern U.S.A.). The conclusion is that each continent has served as an important center for species-level diversification.

The Greater Antilles has been a minor center of diversification, with 7 precinctive species, all members of a single species group that is postulated to be monophyletic.

Species whose adults have reduced metathoracic flight wings are referred to as "brachypterous". They occur in 3 pericaline genera, and they are concentrated at altitudes between 1500 and 2500 m. (Table 24). Their numbers decline abruptly at higher elevation, and more gradually at lower elevation. They are absent from altitudes of 500 m., or less. Loss of ability to fly is a common feature of montane carabids. It is accepted as an indication of close adaptation to the environment occupied, relatively long residence therein, and relict status.

Processes

Shpeley and Ball (1993:169-170) described a seven-point model postulated as a series of enabling

Table 24. Altitudinal distribution of brachypterous precinctive Western Hemisphere species and subspecies of Pericalina, grouped by genus.

Genera[1]	500 m. zones and number of species in each							
	0-500	500-1000	1000-1500	1500-2000	2000-2500	2500-3000	Total No. Brachypt	Total No. spp. + subspp.
Stenognathus Chaudoir	0	0	0	1	1	0	2[2]	19
Phloeoxena Chaudoir	0	1	7	8	8	2	12[3]	39
Oreodicastes Maindron	0	0	0	2	1	0	5[4]	5
Total brachypterous species + subspecies per altitudinal zone	0	1	7	11	10	2	19	63

[1] Sequence reflects increasing proportion of brachyptery (from 10.5 per cent to 100 per cent).
[2] Total includes one species with brachypterous adults, but altitude of habitat is unknown.
[3] Total includes the four subspecies of *Phloeoxena picta* Chaudoir.
[4] Total includes two species with brachypterous adults, but altitude of habitat is unknown.

mechanisms for development of the general features of distribution of the tropical elements of the Neotropical fauna. Postulation of the origin of the extant South American fauna as primarily Gondwanan was based upon the writings of Jeannel (1942), Reichardt (1979), and Noonan (1985:336-337). To explain the distribution patterns of carabid species in South America, they relied upon refuge theory, as developed by Prance (1982) and others. An explanation of faunal connections between South America and the North American continent (by way of Middle America) was found in the writings of Stehli and Webb (1985), and others.

The points of the model are as follows.

1. Genus-level stocks in South America were either Gondwanan or isolates therefrom.
2. Dispersals to the North American continent were by way of Middle America: earlier dispersals were by means of island-hopping to Nuclear Middle America (Cretaceous to Pliocene); later dispersals were by means of a land bridge (Pliocene-recent). (For a different and important perspective on early (Cretaceous-Palaeocene) intercontiental dispersals, see Thomas 1993:386-387).
3. Indigenous Middle American genera were early isolates, with their ancestral stocks in South America.
4. Species-level differentiation in lowlands of both South and Middle America occurred through range disruption and resulting isolation of vicariads, followed by survival in refugia.
5. Movement of lowland stocks into highlands also occurred, with climatic change, etc.
6. Species-level differentiation of highland stocks was associated also with cyclic connections among highland biomes, and subsequent isolation as climate changed. Life in montane habitats was associated with reduction of metathoracic wings, and effective loss of flight.
7. Movement of some lowland Middle American stocks back into South America occurred also, but the primary direction was from south to north.

This model provides points of reference for consideration of the geographical distribution of the extant pericaline taxa.

We are unable to specify exactly the genera of Pericalina that occupied Gondwana, and whose ancestors gave rise to the present assemblage. However, it seems likely that the pan-tropical genera represented were *Catascopus* and *Coptodera.* Because of its isolated phylogenetic position, we believe that the ancestral stock of *Eucheila* must have been present, and that its adelphotaxon awaits discovery, in either the Afrotropical or Oriental Region. At least one more stock was present, as the thyreopteroid ancestor of the remaining genera, or perhaps the *Eurycoleus* genus-group was already isolated from the thyreopteroids and the catascopelloids. In total, we believe the original pericaline fauna in South America included at a minimum 4 stocks, and at maximum 6 stocks that gave rise to the extant fauna.

We accept the general patterns of faunal reduction (subtraction) associated with latitude and altitude as indicating a lowland equatorial origin of the pericalines, with subsequent spreading north and south and upward, going from tropical to temperate conditions.

We believe that the isolated positions of the South American precinctive genera *Catascopellus* (in south temperate Antarctic forest), and of *Oreodicastes* (in temperate Atlantic forest) to be evidence of relict status (i.e., each genus is a survivor of lineages that arose in the tropical lowlands, dispersed widely in South America, and then died out over most of the range of the respective groups). Evidently, the ancestral stock of *Oreodicastes* was able to spread over several mountain ranges, and to differentiate. There is no evidence that *Catascopellus* was able to do the same.

The eastern isolates *Stenognathus melanarius* and *Lelis obtusangula* we accept as providing additional evidence of the importance of the Atlantic forest as a refugium. Similarly, the brachypterous and seemingly phylogenetically isolated *Stenognathus onorei* and *S. dentifemoratus* we believe are montane survivors of stocks that were originally widespread, but have become extinct in the lowlands.

For the Middle American fauna, we interpret *Phloeoxena* as the survivor of a basically South American stock that became widespread, and then either became extinct in South America, or is represented today by the genus *Stenognathus*. *Phloeoxena* differentiated widely, altitudinally, latitudinally, and longitudinally, with older stocks surviving as montane isolates (in the Nuclear Middle American highlands, and in the West Indies).

Dispersals between Middle America and South America were several, occurring evidently at different times. The earliest pericaline dispersant we believe was the ancestral stock of *Phloeoxena*, which probably had to undertake short crossings of sea, making its way to Nuclear Middle America by means of a series of small islands that ultimately coalesced to form the present intercontinental land connection.

Another early invader was *Coptodera*, the first arrival being postulated as Palaeocene-Cretaceous, with 13 subsequent dispersals, extending to Holocene-Recent time (Shpeley and Ball 1993:168, Fig. 40).

With one to several precinctive Middle American species each, we postulate that the ancestral stocks of the precinctive Middle American species of *Eucheila,* subgenus *Stenognathus, Lelis,* and *Eurycoleus* arrived at about the same time, probably about the time that a land connection between Lower Middle America and South America was formed. And still more recently, subgenus *Pristolomus* arrived, as well as *Stenognathus (s. str.) batesi.*

The distribution pattern of *Catascopus* suggests an early dispersal into Middle America, an extinction of the ancestral stock in South America, and then re-invasion of South America by a descendant *C. brasiliensis*. We postulate immigration to South America by various Middle American lines, most such invasions comparatively recent: once by *Catascopus* and *Phloeoxena*; probably at least once by *Eurycoleus*; and at least 4 times by as many species of *Coptodera*.

Other aspects of the pattern could be considered, in particular the details of distribution of the montane species of *Phloeoxena*. But we leave the subject for now, noting that the evidence available indicates that pericalines have had a long and complex history in the tropics of the Western Hemisphere.

Concluding comments

Here, we offer a summary statement about the taxonomic aspects of this paper. We increased the number of genus-groups, recognizing the distinctness of the genus *Catascopellus*. However, based on discovery of new species with intermediate combinations of character states, the number of genera was decreased, with inclusion of *Eucheila, Hansus, Bordoniella*, and *Inna* in a single genus, and inclusion of *Ochropisus* with *Phloeoxena (s. lat.)*. The former combination renders monogeneric the *Eucheila* genus-group. Three of the 5 known indigenous genus-groups are monogeneric, and the *Eurycoleus* genus-group is virtually monogeneric because of the closeness of relationship of the 2 included genera. Considering the low level of diversity of these genus-groups, the utility of this informal hierarchical category in the Pericalina might be questioned. On a worldwide geographical scale, however, the genus-group category might be useful in indicating assemblages of closely related genera. Certainly, on that scale, the *Pericalus* and *Thyreopterus* assemblages are known to be far more diverse than they are in the Western Hemisphere.

Because we were able to place all of the species that we recognized as new in previously described genera, we believe that the asymptote for genera of Pericalina in the Western Hemisphere has been approached closely, if not reached. This view is reinforced by the general decline in rate of description of new pericaline genera in the Western Hemisphere that we recognize as valid. The last to be described, some 30 years ago, was *Catascopellus* Straneo, and the penultimate

Table 25. Data about new species of precinctive Western Hemisphere Pericalina.

Characteristics	Genus and Number of Species					Total
	Oreodicastes	*Stenognathus*	*Phloeoxena*	*Eurycoleus*	*Eucheila*	
Total Number n. spp.	3	4	12	1	6	26
No. specimens						
1	1	2	5	1	2	11
2-8	1	1	5	0	2	9
9-18	1	1	2	0	2	6
Number localities						
1	3	2	8	1	3	17
2	0	0	4	0	1	5
3-5	0	2	0	0	2	4
Altitude						
0-500 m.	0	1	0	1	6	8
500-1000	0	1	1	0	0	2
1000- 1500	3	0	1	0	0	4
1500-2500	0	1	8	0	0	9
Unknown	0	1	2	0	0	3
Flight wings						
Macropterous	0	2	8	1	6	17
Brachypterous	3	2	4	0	0	9

(currently recognized) to be described, *Lelis* Chaudoir, was described 130 years before now, and 100 years before *Catascopellus*. But we acknowledge the possibility of discovering a few more new, either monobasic or oligobasic, genera in the remains of the Atlantic Forest in Brazil, or in the montane forests on the slopes of the Andes. We do not believe that new genera of Pericalina will be discovered in Middle America.

We note that those supraspecific taxa described as new are, without exception, monobasic *(Catascopellus* genus-group; subgenera *Prostenognathus*, *Gnathostenus*, and *Oxephloena;* and the *Stenognathus procerus* species group). In some respects, monobasic taxa are redundant, but they serve to indicate lower ranking taxa that are more or less markedly distinctive compared to their putative relatives. Furthermore, groups that were monobasic at the time of their description may prove to be more diverse with further work. This is true, for example, of the subgenera *Hansus* and *Bordoniella*, as shown by the present study.

The few changes at the supraspecific level reported by this publication are in marked contrast to changes at the species level. Of 149 species and subspecies known of precinctive Western Hemisphere pericaline lebiines, 26 are described herein for the first time. This represents an increase of 16 percent.

The new species are distributed among 5 genera (Table 25). Of these 26 species, the type material of 5 was collected long ago, and was overlooked in extensive national collections. The type material of the other 21 species was acquired within the past 2 decades. Some new species were collected by coleopterists who were working in montane areas, at altitudes of 500 m. or more, primarily using sifts and Berlese funnels to assess the leaf litter fauna on the forest floor, or hand-held sprayers with pyrethrum, to assess the sub-cortical, fungus-associated fauna. Other new species were taken by coleopterists in the lowlands using fogging techniques to sample the higher canopy fauna, or by nocturnal searching with headlamps, in tropical forests, on the forest floor, but more particularly on tree trunks. These techniques have not been applied extensively previously, in the tropics of the Western Hemisphere.

About a third of the new species (9 of 26) are classified as brachypterous, a proportion similar to that exhibited by the 3 pericaline genera with brachypterous species (19 of 63, Table 24).

The new species are each represented by few specimens (11 of 26 by a single specimen; Table 25), and 17 of 26 are known from a single locality. Although the possibility of making an incorrect assessment increases with the fewer the specimens available, beginnings have to be made. Certainly, mistakes are less likely to occur when new taxa are recognized in the course of a broadly based taxonomic treatment rather than when one or a few new species form the primary subject matter of a short paper intended solely to make those species known. Proposing new taxa is a venture into the realm of hypothesis, with the test of a new species being rendered subsequently each time that name is considered for application to a specimen. Most of the taxonomic hypotheses we proposed in our previous work with pericalines (Ball 1975; Ball and

Shpeley 1983; and Shpeley and Ball 1993) have not been refuted. We hope that the hypotheses presented above will also stand the tests of time.

Acknowledgements

Most scientific publications in the current era are broadly cooperative ventures, though a by-line is occupied only by the name or names of the author(s). The authors, then, are responsible for ensuring that their cooperators receive due notice. Discharging this responsibility is especially welcome for us, in part because it marks the end of an endeavor that has occupied much of our entomological activity for the past 2 years, an endeavor that could not have been prosecuted successfully without substantial assistance. So, we are pleased to express our heartfelt gratitude to the following, many of whom are close personal friends, and have been, for many years.

We are indebted to the curators and other individuals noted above, in the "Materials" section of the paper, for loan of the specimens in their care that were vital to this study.

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As by-products of their biodiversity studies of the leaf litter fauna of montane Middle America, Robert S. Anderson (CMNC), and J. Stephen Ashe and Robert W. Brooks (SEMC) obtained and provided us with many fine pericalines, particularly in the genus *Phloeoxena*.

Over many years, Henry F. and Anne T. Howden have donated to the Strickland Museum many fine pericalines, and other carabids, too. As well, the intrepid cerambycid collectors, Robert H. Turnbow (RHTC) and James E. Wappes (JEWC) allowed us the privilege of studying the pericalines that came their way in the course of their field work in Middle America. In the course of 2 arduous field trips on the eastern slopes of the Ecuadoran Andes, Henry E. Frania (Royal Ontario Museum, Toronto) obtained fine collections of Carabidae, including the first specimens, of which we were aware, of *Stenognathus onorei*. As much as anything else that we had seen, these specimens caused us to focus our attention on the Neotropical Pericalina.

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References cited

Acorn, J. H., and G. E. Ball. 1991. The mandibles of some adult ground beetles: structure, function, and the evolution of herbivory. Canadian Journal of Zoology 69:638-650.

Allen, R. T., and G. E. Ball. 1980 (1979). Synopsis of Mexican taxa of the *Loxandrus* series (Coleoptera: Carabidae: Pterostichini). Transactions of the American Entomological Society 105:481-576.

Alluaud, C. 1935. Carabiques d'Afrique. Descriptions isolés. Afra 9:11-17.

Ax, P. 1987. The Phylogenetic System: The Systematization of Organisms on the Basis of Their Phylogenesis. John Wiley & Sons, Chichester/ New York/ Brisbane/ Toronto/ Singapore. xiii + 340 pp.

Ball, G. E. 1975a. Pericaline Lebiini: notes on classification, a synopsis of the New World genera, and a revision of the genus *Phloeoxena* Chaudoir (Coleoptera: Carabidae). Quaestiones Entomologicae 11:143-242.

Ball, G. E. 1975b. *Phloeoxena newtoni*, new species, and notes on *P. nigricollis* Ball and *P. geniculata* Chaudoir from Mexico (Coleoptera: Carabidae: Lebiini). Entomological News 86:151-156.

Ball, G. E. 1978. The species of the Neotropical genus *Trichopselaphus* Chaudoir (Coleoptera: Carabidae: Harpalini): classification, phylogeny, and zoogeography. Quaestiones Entomologicae 14:447-489.

Ball, G. E., D. H. Kavanaugh, and B. P. Moore. 1995. *Sugimotoa parallela* Habu (Coleoptera: Carabidae: Lebiini): redescription, geographical distribution, and relationships based on cladistic analysis of adult structural features. Japanese Journal of Coleopterology, Special Bulletin No. 4:275-311.

Ball, G. E., and D. Shpeley. 1983. The species of eucheiloid Pericalina: classification and evolutionary considerations (Coleoptera: Carabidae: Lebiini). Canadian Entomologist 115:743-806.

Basilewsky, P. 1953. Carabidae (Coleoptera Adephaga). Exploration du Parc National de l'Upemba. Mission G. F. de Witte [etc] (1946-1949). Fascicule 10. Institut du Parcs Nationaux du Congo belge. Bruxelles. Pp. 1-252.

Basilewsky, P. 1984. Essai d'une classification supragénérique naturelle des carabides lébiens d'Afrique et de Madagascar (Coleoptera: Carabidae: Lebiinae). Revue de Zoologie Africaine 98:525-559.

Bates, H. W. 1869. On *Coptodera* and the allied genera. Entomologists Monthly Magazine 6:69-80.

Bates, H. W. 1870. Note sur la synonymie des espèces de Coptodérides décrites par M. le Baron de Chaudoir et M. H. W. Bates. Comptes Rendus des Séances de la Société Entomologique de Belgique, 1870, pp. xvi-xvii.

Bates, H. W. 1878. On new genera and species of geodephagous Coleoptera from Central America. Proceedings of the Zoological Society of London, 1878, pp. 587-609.

Bates, H. W. 1883. Coleoptera. Carabidae. Vol. 1, part 1, pp. 153-256, plates vi-xii. In, Biologia Centrali-Americana (F. D. Godman and O. Salvin, Editors).

Bates, H. W. 1884. Coleoptera. Carabidae. Vol. 1, part 1, pp. 261-299, plate xiii. In, Biologia Centrali-Americana (F. D. Godman and O. Salvin, Editors).

Bates, H. W. 1891. Additions to the carabideous fauna of Mexico, with remarks on some of the species previously recorded. Transactions of the Royal Entomological Society of London 1891:223-278, pls. 13, 14.

Bates, H. W. 1892. List of the Carabidae. Viaggio di Leonardo Fea in Birmania e regioni vivine. Annali del Museo di Storia Naturale di Genova Series 2a 12(32):267-428.

Bils, W. 1976. Das abdomende weiblicher, terrestrich lebender Adephaga (Coleoptera) und seine Bedeutung für die Phylogenie. Zoomorphologie, 84(2):113-193.

Böving, A. G. 1942. A classification of larvae and adults of the genus *Phyllophaga* (Coleoptera: Scarabaeidae). Memoirs of the Entomological Society of Washington, Number 2. Entomological Society of Washington, Washington, D. C. 96 pp.

Brauer, F. 1870. Bericht über die Leistungen in der Naturgeschichte der Insekten während des Jahres 1869. Archiv für Naturgeschichte 36:45-220.

Buquet, J. B. L. 1834. Description de onze espèces nouvelles du genre *Lebia* par M. Lucien Buquet rapportées de Cayenne par M. Leprieur. Annales de la Société Entomologique de France (1) 3:673-681.

Buquet, J. B. L. 1835. De quelques Coléoptères nouveaux de la famille des Carabiques appartenant aux genres *Colliuris* Latr.; *Diaphorus*, Dejean; *Agra*, Fabr.; *Cymindis*, Latr.; *Calleida*, Dej.; *Lebia*, Latr.; *Coptodera*, Dej.; *Helluo* et *Anchomenus*, Bonelli. Annales de la Société Entomologique de France (1) 4:603-619.

Casale, A. 1998. Phylogeny and biogeography of Calleidina (Coleoptera: Carabidae: Lebiini): a preliminary survey, pp. 381-427. In, Phylogeny and classification of Caraboidea (Coleoptera: Adephaga), Proceedings of a Symposium (28 August, 1996, Florence, Italy), XX International Congress of Entomology (G. E. Ball, A. Casale, and Augusto Vigna-Taglianti, Editors). Atti, Museo Regionale di Scienze Naturali, Torino. 543 pp.

Chaudoir, M. de. 1843. Genres nouveaux de la famille des carabiques. Bulletin de la Société Impériale des naturalistes de Moscou 16:383-427.

Chaudoir, M. de. 1848. Mémoire sur la famille des carabiques (1e. partie). Bulletin de la Société Impériale des naturalistes de Moscou 21:3-134.

Chaudoir, M. de. 1852. Mémoire sur la famille des carabiques (3e partie). Bulletin de la Société Impériale des naturalistes de Moscou 25:3-104.

Chaudoir, M. de. 1854. Mémoire sur la famille des carabiques (4e partie). Bulletin de la Société Impériale des naturalistes de Moscou 27:112-144, 279-352.

Chaudoir, M. de. 1861. Beitrag sur Kenntniss einiger carabicinen-Gattungen. Berliner Entomologische Zeitschrift 5:116-131.

Chaudoir, M. de. 1869a. Mémoire sur les thyréoptérides. Annales de la Société Entomologique de Belgique 12:113-162.

Chaudoir, M. de. 1869b. Mémoire sur les coptoderides. Annales de la Société Entomologique de Belgique 12:163-256.

Chaudoir, M. de. 1872. Descriptions d'espèces nouvelles de carabiques de la tribu des troncatipennes, et remarques synonymiques. Revue et Magazin de Zoologie (2) 23:219-221, 241-244.

Chaudoir, M. de. 1877. Genres nouveaux et espèces inédites de la famille des carabiques. Bulletin de la Société Impériale des naturalistes de Moscou 52: 188-268.

Chevrolat, L. A. A. 1835. Coléoptères du Mexique, fascicule 5 (50 numbers.);fasc. 6 (48 numbers); fasc. 7 (50 numbers); and fasc. 8 (68 numbers). Strasbourg.

Csiki, E. 1930. Harpalinae IV, pars 112, pp. 529-737. In, Coleopterorum Catalogus (W. Junk and S. Schenkling, Editors). Berlin and 's-Gravenhage.

Csiki, E. 1932. *Ibid.,* Pars 124, pp. 1279-1598.

Darlington, P. J., Jr. 1934. New West Indian Carabidae, with a list of the Cuban species. Psyche 41:66-131.

Darlington, P. J., Jr. 1937. West Indian Carabidae III: new species and records from Cuba, with a brief discussion of the mountain fauna. Memorias de la Sociedad Cubana de Historia Natural 11:115-136.

Darlington, P. J., Jr. 1939. West Indian Carabidae V. New forms from the Dominican Republic and Puerto Rico. Memorias de la Sociedad Cubana de Historia Natural 13:79-101.

Darlington, P. J., Jr. 1968. The carabid beetles of New Guinea. Part III. Harpalinae (continued): Perigonini to Pseudomorphini. Bulletin of the Museum of Comparative Zoology 137:1-253.

Darlington, P. J., Jr. 1971. The carabid beetles of New Guinea. Part IV. General considerations; analysis and history of fauna; taxonomic supplement. Bulletin of the Museum of Comparative Zoology 142:129-337.

Dejean, P. F. M. A. 1825. Spécies général des coléoptères de la collection de M. le comte Dejean. Vol. 1. Crevot, Paris. xxx + 463 pp.

Dejean, P. F. M. A. 1826. Spécies général des coléoptères de la collection de M. le comte Dejean. Vol. 2. Crevot, Paris. viii + 501 pp.

Dejean, P. F. M. A. 1829. Spécies général des coléoptères de la collection de M. le comte Dejean. Vol. 4. Méquignon-Marvis. vii + 520 pp.

Dejean, P. F. M. A. 1831. Spécies général des coléoptères de la collection de M. le comte Dejean. Vol. 5. Méquignon-Marvis. viii + 883 pp.

Dejean, P. F. M. A. 1836-1837. Catalogue des Coléoptères de la collection de M. Le Comte Dejean, Troisième edition. Méquinon-Marvis, Père et fils, Paris. 503 pp.

Deuve, T. 1993. L'abdomen et les genitalia des femelles de Coléoptères Adephaga. Mémoires du Muséum national d' Histoire naturelle. 155:1-185. Paris.

Erwin, T. L. 1974. Studies on the subtribe Tachyina (Coleoptera: Carabidae: Bembidiini), Part II: a revision of the New World-Australian genus *Pericompsus* LeConte. Smithsonian Contributions to Zoology, No. 162:iii + 96 pp.

Erwin, T. L. 1975. Relationships of predaceous beetles to tropical forest wood decay. Part I. Descriptions of the immature stages of *Eurycoleus macularis (sic)* Chevrolat (Carabidae: Lebiini). Coleopterists Bulletin 29:297-300.

Erwin, T. L. 1979. A review of the natural history and evolution of ectoparasitoid relationships in carabid beetles, pp. 479-484. *In*. Carabid Beetles: Their Evolution, Natural History, and Classification (T. L. Erwin, D. R. Whitehead, G. E. Ball and A. L. Halpern, editors). Dr. W. Junk bv Publishers, The Hague-Boston-London. X + 635 pp.

Erwin, T. L. 1990. Natural history of the carabid beetles at the BIOLAT Biological Station, Rio Manu, Pakitza, Peru. Revista Peruana de Entomologia 33:1-85.

Erwin, T. L., and L. J. M. Erwin. 1976. Relationships of predaceous beetles to tropical forest wood decay. Part II. The natural history of *Eurycoleus* *macularis (sic)* Chevrolat (Carabidae: Lebiini) and its implications in the evolution of ectoparasitoidism. Biotropica 8:215-224.

Frank, J. H., and E. B. McCoy. 1990. Endemics and epidemics of shibboleths and other things causing chaos. Florida Entomologist 73:1-9.

Gemminger, M., and E. von Harold. 1868. Catalogus Coleopterorum hucusque Descriptorum Synonymicus et Systematicus. Tom. I Cicindelidae-Carabidae. Paris. E Deyrolle fils. XXXVI + 424 pp., index.

Habu, A. 1967. Fauna Japonica. Carabidae, Truncatipennes Group (Insecta: Coleoptera). Tokyo Electrical Engineering College Press, Tokyo, Japan. xiv + 338 pp and Plates I-XXVII.

Hueck, K. 1972. As Florestas da América do Sul. Editôria Polígono S.A.-São Paulo. XXIII + 466 pp.

International Commission of Zoological Nomenclature (ICZN). 1999. International Code of Zoological Nomenclature. Fourth edition adopted by the International Union of Biological Sciences. London. XXIX + 306 pp. (In French and English.)

Jeannel, R. 1949. Coléoptères carabiques de la région malgache (troisième partie). Faune de l'Empire français 11:767-1146.

Jedlicka, A. 1963. Monographie der Truncatipennen aus Ostasien. Entomologische Abhandlungen und Berichte aus dem Staatlichen Museum für Tierkunde in Dresden 28:269-580.

Kirby, W. 1825. A description of some insects which appear to exemplify Mr. William S. MacLeay's doctrine of affinity and analogy. Transactions of the Linnean Society of London 14:93-110.

Lacordaire, J. R. 1854. Histoire naturelle des insectes. Genera des Coléoptères. Vol. 1. Cicindelites-Palpicornes Paris. xx + 486 pp.

Liebherr, J. K. 1987. A taxonomic revision of the West Indian *Platynus* beetles (Coleoptera: Carabidae). Transactions of the American Entomological Society 112:289-368.

Liebke, M. 1929. Laufkäfer Studien VI. Entomologische Anzeiger 9:245-265, 297-298.

Liebke, M. 1939. Neue Laufkäfer. Festschrift zum 60 Geburstage von Professor Dr. Embrik Strand 5:91-130.

Madge, R. B. 1989. A catalogue of the family-group names in the Geodephaga, 1758-1985 (Coleoptera: Carabidae s. lat.). Entomologica Scandinavica 19:459-474.

Maindron, M. 1905. Notes synonymiques sur quelques coléoptères de la famille des Carabidae. Bulletin de la Société entomologique de France, 1905:94-95.

Maindron, M. 1906a. Matériaux pour servir à l'histoire des cicindélides et des carabiques. III. Notes sur divers Carabidae de l'Amérique du Sud. Annales de la Société entomologique de France 75:195-202.

Maindron, M. 1906b. Sur le genre *Phloeotherates* Bates. Bulletin de la Société entomologique de France, 1906:251.

Mateu, J. 1963. Notas sobre tres séries filéticas de Lebiidae (Lichnasthenini Thomson, Singilini Jeannel, Somotrichini nov.) (Coleoptera: Carabidae) y rectificaciones sinonìmicas. Annali del Museo Civico di Storia Naturale di Genova 74:122-139.

Mateu, J. 1975. Commentaires sur les Pericalinae et description d'une nouvelle espèce malgache du genre *Xenitenus* Péringuey (COL. CARABIDAE). Bulletin de la Société entomologique de France 80:206-211.

Mateu, J. 1989. Nuevos datos sobre los eucheiloidos sudamericanos (Coleoptera, Carabidae, Lebiinae). Elytron 3:61-67.

Moore, B. P., T. H. Weir, and J. E. Pyke. 1987. Rhysodidae and Carabidae, pp. 20-366. In, Zoological Catalogue of Australia, Vol. 4 (D. W. Walton, Ed.). Australian Government Publishing Service, Canberra. viii = 444 pp.

Murray, A. 1857. List fo Coleoptera received from Old-Malabar on the west coast of Africa. Annals and Magazine of Natural History (2) 19:313-326.

Noonan, G. R. 1973. The anisodactylines (Insecta: Coleoptera: Carabidae: Harpalini): classification, evolution, and zoogeography. Quaestiones Entomologicae 9:266-480.

Noonan, G. R. 1985. The influences of dispersal, vicariance, and refugia on patterns of biogeographical distributions of the beetle family Carabidae, pp. 322-349. *In,* Taxonomy, Phylogeny and Zoogeography of Beetles and Ants: a Volume Dedicated to the Memory of Philip Jackson Darlington, Jr. (1904-1983) (G. E. Ball, Editor). Dr. W. Junk Publishers, Dordrecht, Boston, Lancaster. xiv + 514 pp.

Péringuey, L. 1896. A Descriptive Catalogue of the Coleoptera of South Africa, part II, Cicindelidae Supplement, Carabidae. Transactions of the South African Philosophical Society 7: xiv + pp. 99-623, plates 3-10.

Prance, G. T. (Editor). 1982. Biological Diversification in the Tropics. Columbia University Press, New York. XVI + 714 pp.

Putzeys, J. A. A. H. 1845. Prémices entomologiques. Mémoires de la Société Royale des Sciences de Liège 2:353-417.

Putzeys, J. A. A. H. 1863. Postscriptum ad clivinidarum monographiam atque de quibusdam aliis. Mémoires de la Société Royale des Sciences de Liège 18. 78 pp.

Putzeys, J. A. A. H. 1878. Descriptions de Carabides nouveaux de la Nouvelle Grenade rapportés par Mr. E. Steinheil. Mittheilungen des Münchener Entomologischen Vereins 2:54-76.

Reichardt, H. 1966. Revisionary notes on the genera of Eucheilini (Coleoptera: Carabidae). Psyche 73:8-16.

Reichardt, H. 1972. A review of *Eurycoleus* Chaudoir (Coleoptera, Carabidae). Papéis Avulsos de Zoologia, São Paulo 25:237-249.

Reichardt, H. 1976. On Neotropical Carabidae (Coleoptera): new species and notes. Papéis Avulsos de Zoologia, São Paulo 30:107-111.

Reichardt, H. 1977. A synopsis of the genera of Neotropical Carabidae (Insecta: Coleoptera). Quaestiones Entomologicae 13:347-485.

Reichardt, H. 1979. [Chapter] 2.32. The South American carabid fauna: endemic tribes and tribes with African relationships, pp. 319-325. *In.*, Carabid Beetles: Their Evolution, Natural History, and Classification (T. L. Erwin, D. R. Whitehead, G. E. Ball and A. L. Halpern, editors). Dr. W. Junk bv Publishers, The Hague-Boston-London. X + 635 pp.

Reiche, L. 1843. Coleoptera colombiana. Revue Zoologique 1843, pp. 37-41, 75-79, 141-145, and 177-180.

Sherborn, C. D. 1922-1933. Index Animalium 1801-1850 32 parts, A-Z. 7056 pp. Additions and index 1096 pp. British Musum (Natural History), London.

Shpeley, D., and G. E. Ball. 1993. Classification, reconstructed phylogeny and geographical history of the New World species of *Coptodera* Dejean (Coleoptera: Carabidae: Lebiini). Proceedings of the Entomological Society of Ontario 124:3-182.

Solier, A. J. J. 1835. Description de quelques espèces nouvelles de la famille des carabiques. Annales de la Société entomologique de France 4:111-121.

Stehli, F. G., and S. D. Webb. 1985. The Great American Biotic Interchange. Plenum Press, New York and London. XVII + 532 pp.

Steinheil, E. 1875a. Beschreibung neuer Arten aus Columbia. Coleopterologische Hefte 13:95-103.

Steinheil, E. 1875b. Diagnoses neuer Arten. Coleopterologische Hefte 14:140-142.

Stork, N. E. 1980. A scanning electron microscope study of tarsal adhesive vestiture in the Coleoptera. Zoological Journal of the Linnean Society 68:173-306.

Straneo, S. L. 1969. Sui carabidi del Chili raccolti dal Dr. Holdgate della Royal Society Expedition (1958-1959) e dal Prof. Kuschel. Annales de la Société entomologique de France (N.S.) 5:951-974.

Straneo, S. L. 1994. Sulle specie orientali del genere *Catascopus* Kirby, 1825 (Coleoptera: Carabidae). Elytron 8:141-172.

Thomas, D. B. 1993. Scarabaeidae (Coleoptera) of the Chiapanecan forests: a faunal survey and chorographic analysis. The Coleopterists Bulletin 47:363-408.

Tuomikoski, R. 1967. Notes on some principles of phylogenetic systematics. Annales Entomologici Fennici 33:137-147.