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Synopsis of the Genera and Subgenera of the Tribe Peleciini, and Revision of the Neotropical and Oriental Species (Coleoptera: Carabidae)

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Synopsis of the Genera and Subgenera of the Tribe Peleciini, and Revision of the Neotropical and Oriental Species (Coleoptera: Carabidae)

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Abstract

Phylogenetic analysis of structural features of adults shows that the tribe Peleciini comprises eight genera, grouped in two subtribes: the southeastern Australian Agonicina (new status), including *Pseudagonica* Moore, 1960 (type species *P. nitida* Moore, 1960) and *Agonica* Sloane, 1920 (type species *A. simsoni* Sloane, 1920); and the Inabresian Peleciina (new status, with Peleciini and Disphaericini of authors), including the Neotropical *Eripus* Dejean, 1829 (type species *E. scydmaenoides* Dejean, 1829), *Pelecium* Kirby, 1817 (type species *P. cyanipes* Kirby, 1817), and *Stricteripus*, new genus (type species *Pelecium peruvianum* Straneo, 1953), the Oriental *Ardistomopsis*, new genus (type species *Disphaericus myrmex*, Andrewes, 1923), and the Afrotropical *Dyschiridium* Chaudoir, 1861 (type species *D. ebeninum* Chaudoir, 1861) and *Disphaericus* Waterhouse, 1842 (type species *D. gambianus* Waterhouse, 1842). A key is provided to distinguish among these genera, and the structural features of each genus are described and illustrated, with habitus and SEM photographs. For the genera *Eripus*, *Pelecium*, *Stricteripus*, and *Ardistomopsis*, the species are keyed and characterized in terms of structural features and geographical distribution, and illustrations of habitus and range maps are provided. Application of names is based on study of type material.

The genus *Eripus* includes nine species arrayed in two subgenera: the monobasic South American

Eripidius, new subgenus (type species, *Eripus franzi*, new species; type locality Peru, Sierra Garevito to Quillabamba) and the Nuclear Middle American *Eripus (sensu stricto)*. A neotype is selected for *Eripus aterrimus* (Chaudoir, 1854) (type locality México, Oaxaca, 0.5 mi. e. jct. Rtes. 190 and 125) because the original type could not be located and is presumed lost. The name *E. nitidus* (Chaudoir, 1861) is removed from synonymy with *E. aterrimus* because each name is associated with a different, specifically distinct group. New synonyms are: *E. scydmaenoides* Dejean, 1829 = *E. aterrimus* (Chaudoir, 1854) = *E. subdentatus* (Chaudoir, 1866). New species and subspecies are: *E. oaxacanus* (type locality México, Oaxaca, 1 km. e. jct. Rtes. 125 and 190); *E. globipennis whiteheadi* (type locality México, Morelos, 5.4 mi. E. Cuernavaca); *E. globipennis rotundicollis* (type locality México, Guerrero, Sierra Madre del Sur, 26.2 km. from jct. of road to Chichihualco on rd. to Filo de Caballo); and *E. breedlovei* (type locality México, Chiapas, Municipio Comitán, Laguna Chamula).

The 33 species of *Pelecium* are arrayed in two subgenera: the tribasic northern South American-Lower Central American *Pelecidium*, new subgenus (type species *Pelecium sulcatum* Guérin-Ménéville, 1843); and *Pelecium (sensu stricto)*. The 30 species of subgenus *Pelecium* are arranged in eight species groups, each based on a distinctive combination of color, sculpture, form of terminal palpomeres and setation of tarsi: *P. violaceum* group (eight species); *P. cyanipes* group (one species); *P. renati* group

(two species); *P. punctatostriatum* group (four species); *P. rotundipenne* group (four species); *P. refulgens* group (three species); *P. faldermanni* group (five species); and *P. laeve* group (three species). New synonyms are: *P. besckii* (Chaudoir, 1850) = *P. bisulcatum reichardti* Straneo, 1970; and *P. faldermanni* (Chaudoir, 1846) = *P. brevisulcis* Straneo, 1953. Removed from *Pelecium* and placed in *Stricteripus* are: *S. peruvianus* (Straneo, 1955); *S. impressus* (Straneo, 1955); and *S. banningeri* (Straneo, 1953), new combinations.

Seven new species and subspecies of *Pelecium* (*sensu stricto*) and the groups in which they are included are: *P. violaceum* group - *P. parallelum* (type locality probably Brazil, Assu), and *P. longicollis impunctatum* (type locality Paraguay, Dapucaí); *P. punctatostriatum* group - *P. bolivianum* (type locality Bolivia, Santa Cruz, El Cidral), *P. atroviolaceum* (type locality Brazil, Chapada), and *P. semistriatum* (type locality Brazil, Chapada Campo); and *P. rotundipenne* group - *P. paulae* (type area Brazil, state of Santa Catarina), and *P. helenae* (type locality Brazil, São Paulo, Jupurá).

Of the five species of *Ardistomopsis* recognized, two are new: *A. andrewesi* (type locality South India, Palni Hills, Kodaikanal); and *A. batesi* (type locality Central India, Jabalpur). Removed from *Disphaericus* and placed in *Ardistomopsis* are *A. marginicollis* (Schaum, 1864), *A. myrmex* (Andrewes, 1923), and *A. ovicollis* (Bates, 1886), new combinations.

The species of *Dyschiridium* and *Disphaericus* are not treated.

A reconstructed phylogeny of the genera and subgenera of Peleciini postulates the following relationships: the clade *Pseudagonica* + *Agonica* (= Agonicina) is the sister group of the remaining taxa (= Peleciina). Within the latter group, the New World Peleciina is the sister group of the Old World Peleciina. Of the Old World Peleciina, *Eripus* is the sister group of *Pelecium* + *Stricteripus*. In the Old World Peleciina, *Ardistomopsis* is sister group of *Dyschiridium* + *Disphaericus*.

A reconstructed geographical history of this Gondwanian tribe indicates that the ancestral stock of Agonicina was split from that of Peleciina when Australia + Antarctica separated from the more northern Inabresia. The latter stock was split into New World and Old World sister groups by the rifting apart of Africa and South America. The ancestral stock of *Ardistomopsis* is postulated to have reached India overseas, before the sub-continent was far separated from Africa. In the New

World, the *Eripus*-*Pelecium* + *Stricteripus* split is postulated to have resulted from an overseas dispersal, with the ancestral stock of *Eripus* eventually arriving in Nuclear Middle America. The split of *Eripus* (*s. lat.*) into *Eripidius* and *Eripus* (*s. str.*) is postulated to have resulted from an overseas dispersal from Lower Middle America back into South America.

The differentiation of the *Pelecium* + *Stricteripus* stock is postulated to have resulted from isolation of the ancestral stock respectively in the Atlantic Forest of Brazil and northern cis-Andean South America. Subsequently, the ancestral stock of *Pelecium* became more widespread and then divided into a northern vicar which gave rise to *Pelecidium*, and a southern one, which gave rise to *Pelecium* (*s. str.*).

Differentiation of the agonicine genera may have taken place in allopatry, with the ancestral stock of *Agonica* isolated in Tasmania, and that of *Pseudagonica* in the mountains of south-eastern Australia. Subsequently, possibly when the water gap between these two land masses disappeared, one stock of *Agonica* may have dispersed to south-eastern Australia.

Contents

Historical Aspects	76
Descriptions of Taxa	76
Affinities of the Peleciini (<i>sensu lato</i>)	77
Material and Methods	78
Material	78
Methods	79
Notes About Structural Features	80
Tribe Peleciini	81
Subtribe Agonicina, new rank	86
<i>Pseudagonica</i> Moore	87
<i>Agonica</i> Sloane	87
Subtribe Peleciina, new rank	87
Neotropical Peleciina	89
Notes about Features used in Identification of Species	89
<i>Eripus</i> Dejean	89
Key to <i>Eripus</i> Dejean	90
<i>Eripidius</i> , new subgenus	91
<i>Eripus</i> (<i>sensu stricto</i>)	92
<i>Pelecium</i> Kirby	100
Key to <i>Pelecium</i> Kirby	101
<i>Pelecidium</i> , new subgenus	103
<i>Pelecium</i> (<i>sensu stricto</i>)	105
<i>Stricteripus</i> , new genus	121
Key to <i>Stricteripus</i> , New Genus	122

Palaeotropical Peleciini	123
<i>Ardistomopsis</i> , New Genus	123
Key to <i>Ardistomopsis</i> , new genus	124
<i>Disphaericus</i> Waterhouse	127
Evolution of Peleciini	128
Methods	128
Out-group for the Peleciini	129
Monophyly of the Peleciini	129
Notes about characters	129
The reconstructed phylogeny	130
Chorological Aspects of Subtribes, Genera and Subgenera	132
Distribution pattern	132
Geographical history	132
Potential falsifiers	134
Predictions	134
Taxon Pulses and Peleciini	134
Concluding Remarks	135
Acknowledgements	135

Peleciine carabid adults range in overall length from a few mm. to 28 mm. Through the African tropics, India, Australia, and México, adults are black, and in that respect do not make much of a visual impact in collections. However, they are rather unusual in form, being sub-pedunculate, and the Afrotropical *Disphaericus* adults are distinctly myrmecoid in outline, with markedly vaulted prothorax and elytra. In the Neotropical genus *Pelecium* are found beetles that are visually striking: large, cychroid in body form with vaulted elytra, and the integument strikingly colored - from subdued blues to brilliant emerald green, shades of purple, and of red.

However, it was not such features that first caught the attention of the senior author, a half century ago. Rather, it was evidence about diversity of the group. In a shipment of South American carabids received from a commercial dealer in entomological supplies and specimens, he found four specimens of *Pelecium* from "Santa Catherina" (probably Hansa Humboldt) that, on detailed investigation, proved to represent four undescribed species. He named them (*P. renati*, *P. striatum*, *P. obtusum*, and *P. obscurum*), and at the same time began to seek out material of the genus from museums having holdings of Neotropical carabids. Over the years, he found many additional species that he described as time and circumstances permitted.

A strikingly brilliant specimen of one of these species, the then-recently described *P. nicki* Straneo, from a miscellaneous lot of carabids purchased from Fritz Plaumann of Hansa Humboldt, Santa

Catarina, Brazil, caught the attention of the junior author, but his interest in peleciines was piqued in quite another way. More than 20 years ago, he saw in a collection of Mexican carabids made by his friend, Donald R. Whitehead, a specimen of *Eripus* (then *Pelecium*) *suturalis* Chaudoir, and was told that this single specimen had been found in a day of intensive collecting in a tropical montane oak forest. In other words, it was something of a challenge to find peleciines. This was amply verified by subsequent extensive field experience in México. Many searches ended in failure, and more often than not, specimens were found by luck rather than by deliberate planning.

The challenge did not stop with finding specimens: the Mexican material proved to be inordinately difficult to sort to species - a very frustrating circumstance, because at least in theory, such a group of brachypterous species ought to have a marked potential for zoogeographic analysis - but only if the species can be determined and their relationships to one another established.

A few years ago, the time had come for the senior author to undertake a general synopsis of the New World peleciines. When he discovered the junior author's latent interest in the Mexican taxa, he suggested that a joint effort be launched to revise all of the Neotropical species. This publication is the result of that proposal.

We offer the first publication that provides a taxonomic treatment of the eight genera known to us, and of the species of the Neotropical and Oriental Regions. The original purpose was to revise only the Neotropical fauna, but a broader context was required to interpret phylogenetically the character states of these species. Consequently, representatives were obtained of described genera from the Afrotropical and Australian regions. After a preliminary study of this material, we thought it necessary to see specimens from the Oriental fauna, thinking that they might represent a phylogenetically important group, rather than simply additional members of the Afrotropical genus in which they had been included. We were not disappointed. The Oriental group was so small (including only three previously described species) that it was an easy task to treat it at the species level. Because of B.P. Moore's (1963) excellent review of the Australian fauna (species of *Pseudagonica* Moore, and *Agonica* Sloane), we chose to include only a generic-level treatment. The Afrotropical *Disphaericus* Waterhouse and *Dyschiridium* Chaudoir are sufficiently diverse, divergent, and complex that we leave revising these species

for another publication, either by us or by a specialist on tropical African carabids.

Although the Peleciini ought to be a group *par excellence* for phylogenetic and zoogeographic study, in fact because of difficulties in finding characters to relate species and in obtaining adequate material to accurately map ranges, the group has proven to be refractory for evolutionary interpretation at the species level. At the supraspecific level, reasonably clear evolutionary patterns were identified, and our efforts at evolutionary analyses were thus refocused.

Historical Aspects Descriptions of Taxa

Knowledge of the Neotropical pelecine assemblage began with the discovery of the eastern South American genus and species *Pelecium cyanipes* (Kirby, 1817: 318). Dejean (1829: 7) described *Eripus scydmaenoides* from México, and *E. laevissimus* from United States, placing the genus next to *Pelecium* in a separate section of his group Harpaliens. (In 1846, Chaudoir described the genus *Promecognathus* for *E. laevissimus*.)

In 1830, Guérin-Ménéville described *Pelecium refulgens*, and in 1843, from northern South America, *P. sulcatum* and *P. laevigatum*. In the latter year, Brullé described *P. violaceum*.

Chaudoir (1846) described *Augasmosomus faldermanni*. To this monobasic genus in 1850, he added *A. beschii* and *A. iridescens*, in 1854 synonymizing the latter name and *A. faldermanni*. In 1854, also, Chaudoir described *Pelecium laeve*, comparing it to *A. faldermanni*; and *P. aterrimum*, comparing to *A. faldermanni* and *A. beschii* - comparisons which suggest that he appreciated that *Augasmosomus* and *Pelecium* were congeneric. Since *P. aterrimum* is in fact a member of *Eripus*, Chaudoir apparently considered the latter genus and *Pelecium* as congeneric.

Schaum (1860) described three new species: *P. rotundipenne*, *P. tenellum*, and *P. politum*.

Chaudoir (1861) described four new species of *Pelecium*: *P. ovipenne*, *P. sulcipenne*, *P. nitidum*, and *P. suturale*. In the same work, he listed without comment previously described species formerly assigned to *Augasmosomus* and *Eripus*. In 1866, he described seven more species of *Pelecium*: *P. microphthalmum*, *P. humeratum*, *P. foveicolle*, *P. striatipenne*, *P. globipenne*, *P. subdentatum*, and *P. subcaecum*. Of Chaudoir's species of 1854, 1861, and 1866, seven (*P. aterrimum*, *P. nitidum*, *P. suturale*,

P. microphthalmum, *P. globipenne*, *P. subdentatum*, and *P. subcaecum*) belong to the genus *Eripus*.

Quedenfeldt (1890) described *Pelecium drakei*. Dupuis (1913) summarized what was known about *Pelecium (sensu lato)*, offering an extensive description of the Peleciinae and a list of the names of described species. Accompanying the text were excellent illustrations of habitus and various structural features.

During the period 1953-1970, Straneo described a series of new species, from South America: in 1953, *P. banningeri*, *P. brevisulcis*, *P. longicolle*, *P. obtusum*, *P. punctatum*, and *P. renati*; in 1955, *P. impressum*, *P. nicki*, *P. obscurum*, and *P. peruvianum*; in 1962, *P. brasiliense*, *P. fulgidum*, *P. purpureum*, *P. striatum*, and *P. negrei*; and in 1970, *P. bisulcatum*, *P. b. reichardti*, and *P. punctatostriatum*.

Thus, knowledge of the Neotropical fauna developed in piecemeal fashion, over a period of about 150 years. No attempts seem to have been made to establish a classification of the species, though the arrangement of material in the Oberthür-Chaudoir collection (Box 199 - MNHP) is in rough sequence in terms of reduction of elytral sculpture and size of eyes (beginning with the macrophthalmous completely striate *P. cyanipes* Kirby, and ending with the microphthalmous *P. subcaecum* Chaudoir, with unistriate elytra). Because keys were not published, identification of new material had to be made by comparisons with types or previously determined specimens, or by close study of the published descriptions and illustrations.

Development of knowledge of the Afrotropical-Indian peleciines seems to have been similar to that described above, though most of the species were described between 1880 and 1900 (Csiki, 1929: 400-401), and in the post-war years, there was not a spate of descriptions of new species to parallel the work of Straneo on the Neotropical peleciines. At most two genera have been recognized (*Disphaericus* Waterhouse; and *Dyschiridium* Chaudoir = *Spanus* Westwood), though various workers (Péringuey, for example) treated all of the species as being congeneric.

The Australian peleciines were not known until 1920, and then as only one genus, *Agonica*, and two species from Tasmania (Sloane, 1920). Extensive collecting in the late 1950's and early 1960's by P.J. Darlington, Jr. and B.P. Moore in the mountains of southeastern Australia yielded specimens of a third species of *Agonica* (Moore, 1963) and another genus, the monobasic *Pseudagonica* (Moore, 1960).

Affinities of the Peleciini (*sensu lato*)

Dejean (1829: 7) assigned *Pelecium* and *Eripus* to the Harpaliens, on the basis of adhesive vestiture on front and middle tarsomeres, but placed them in a special sub-group. Kirby (1817) in his description of *Pelecium*, indicated an affinity of the genus with *Cychnus* and *Panagaeus*, and the latter group was favored as a relative by many subsequent authors. Thus Castelnau and Brullé (1840: 134) placed *Pelecium* in the Panageites on the basis of the constricted neck and securiform terminal palpomeres. In turn, the panagaeines were included in the Patellimanes (with platynines, licinines, and callistines [including oodines]; subsequently, platynines were removed, leaving in the Patellimanes those taxa whose adult males have palette-like anterior tarsi, with adhesive vestiture described as a kind of brush [now known as the articulated type]). Location of peleciines in a group with the panagaeines in or near a more inclusive group of callistines, oodines and licinines was accepted by various subsequent authors, including more recently Kryzhanovsky (1983: 89), Erwin (1985: 468), and Moore *et. al.* (1987: 252).

Chaudoir (1846: 511) and Lacordaire (1854: 248) grouped *Pelecium* (*sensu lato*) and *Disphaericus* in the Stomides, along with glyptines, promecognathines, and the pterostichine genus *Stomis* Clairville, on the basis of prominent mandibles, and sub-pedunculate or pedunculate body form.

Although Schaum (1860: 128 and 193) was the first to state explicitly that peleciines belonged in a tribe by themselves, Horn (1881: 165) formally proposed the tribe Peleciini, including in it only the genus *Pelecium*, and locating this group in the *Harpalinae unisetosae*. Agreeing with Schaum (*l.c.*) that the Stomides were diagnosed by no fundamental characters, he stated: "I do not believe there can be much doubt of the relationships of the Peleciini with the Broscini through *Baripus* and *Zacotus*." He did not include *Disphaericus* in the Peleciini, and mentioned it (1881: 126) in his discussion of the Panagaeini, noting that it had been included in that group by Schaum, and that Chaudoir (1878) seemed to have excluded it from his revision of the panagaeines. Horn also noted that he had not seen specimens of *Disphaericus*. Considering the weight that he put on number of supraorbital setae, that *Disphaericus* adults were known to have two pairs, and *Pelecium* adults were believed to have only one pair, it seems most unlikely that he would have included both genera in one tribe.

Bates (1881: 39), who knew New World pelec-

iines as well as *Disphaericus*, included the latter genus in the Peleciini. He included the Peleciini and Broscini as the only members of the group that he proposed for their reception, the Diversimani, thus implicitly agreeing with Horn's views about relationships of these two tribes.

Sloane (1923: 244) erected the tribe Disphaericini for *Disphaericus*, stating that he did not believe that *Pelecium* and *Disphaericus* could be closely related, and without offering reasons, he stated further that these two genera were the most archaic of his major group *Carabidae Uniperforatae*, an assemblage now known to be paraphyletic and probably polyphyletic.

Previously, Sloane (1920: 129) erected the tribe Agonicini, also a member of *Carabidae Uniperforatae*, but he did not note the similarities linking peleciines and agonicines. Csiki (1929: 400-401, 1931: 1021-1022, and 1932: 1885-1287) also did not perceive any special affinities among these tribes, placing the Disphaericini (tribe XIV) near the Panagaeini; Agonicini (tribe XXIV) near the Oodini; and Peleciini (tribe XXIX) near the Amarini and Zacotini. The difference in numbers indicates how far apart (in the linear arrangement of numbered tribes) Csiki placed the groups in question.

Jeannel (1942: 299) combined the Peleciini and Disphaericini in the family Peleciidae, recognizing that these groups exhibited an "Inabresian" (from India + Africa + Bresil) distribution pattern. In 1948 (p. 376) he placed the Peleciidae in his supertribe Odacanthomorphi, on the basis of leg spination and structure of the basal part of the male median lobe. Basilewsky (1953: 113) accepted Jeannel's classification, but ranked the group as a subfamily (as Bates had done, some 70 years earlier).

Moore (1963: 21) suggested a close relationship between agonicines and peleciines, and especially *Pelecium*. Reichardt (1977: 429) agreed with Moore's assertion, and as well, specifically included *Pelecium* and *Disphaericus* in the Peleciini.

Ball (1979: 95) and Erwin (1979c: 590 and 1985: 468) accepted that agonicines, peleciines and disphaericines were closely related, maintaining each group as a separate tribe in close association with the panagaeines.

In summary, previous authors did not achieve unanimity in locating the peleciines within the classification of the Carabidae.

By implication, there is agreement that this complex does not belong with the structurally more primitive carabine stocks (Carabinae of Horn), and is one of the harpaline stocks (as Horn diagnosed

the subfamily Harpalinae). Sloane, whose *Carabidae conjunctae* was about the equivalent of Horn's subfamily Harpalinae, and included the *Carabidae Uniperforatae*, thought that pelecines and disphaericines were in a basal position in the latter group. Because the *Carabidae Uniperforatae* includes the broscines and many other quite primitive tribes (see Erwin, 1985), Sloane believed that *Pelecium* and *Disphaericus* were indeed primitive. Bates' views were similar, since he placed the Inabresian pelecines near the Broscini, and Horn and Csiki placed at least *Pelecium* near the Broscini. Chaudoir and Lacordaire also implicitly placed the pelecines in a primitive position.

Other authors, who have recognized the relationships of at least the Inabresian pelecine stocks, have placed them differently: Jeannel and Basilewsky, with the Odacanthini (Odacanthomorphi of Jeannel; Lebiitae of Erwin), whereas Kryzhanovskiy, Ball, Erwin, and Moore placed them near the panagaeines, as did authors in the first half of the 19th Century.

On the other hand, Csiki did not accept the unity of the Inabresian pelecines, locating *Disphaericus* near more derived stocks (the old and polyphyletic Truncatipennes), *Agonica* near moderately derived callistomorph groups, and *Pelecium* (*sensu lato*) near comparatively primitive groups (amarines and broscines [in part]).

Emerging from this historical review are the tasks that we have set for ourselves.

1. Seek for and establish taxonomic structure within the continentally defined assemblages of pelecines. We have attempted this for the Neotropical and Oriental assemblages, only.
2. Make possible identification by others of species of Neotropical and Oriental pelecines, without recourse to comparative material or types.
3. Establish the monophyly of the pelecine assemblage.
4. Establish the relationships of the pelecine assemblage. This can be done only very generally, because the relationships of most of the carabid tribes are not yet resolved. However, at least we ought to be able to determine if the pelecine affinities are odacanthomorphi, panagaeite, or with a more basal harpaline (*sensu* Horn) stock.

Material and Methods

Material

We have examined 610 adults of Peleciini, from our own collections and from those of other institutions and individuals noted below. Following the name and address of each institution is the name of the Director, or Curator who made the loan of material possible.

BMNH	Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD, (N.E. Stork)
CAS	Department of Entomology, California Academy of Sciences, Golden Gate Park, San Francisco, California, U.S.A. 94118 (D.H. Kavanaugh);
CN	Collection Nègre (J. Nègre, 9 Boulevard de Lesseps, Versailles, France);
CNC	Biosystematics Research Centre, Agriculture Canada, K.W. Neathy Building, CEF, Ottawa, Ontario, Canada K1A 0C6 (J.M. Campbell, A. Smetana);
CNHM	Section of Insects and Spiders, Carnegie Museum of Natural History, 900 Forbes Avenue, Pittsburgh, Pennsylvania, U.S.A. 15213 (R. Davidson);
CS	Collection Straneo (S.L. Straneo, Viale Romagna 10, 20133 Milano, Italia);
CSIRO	Division of Entomology, GPO Box 1700, Canberra ACT 2601, Australia;
CUIC	Department of Entomology Insect Collection, Comstock Hall, Cornell University, Ithaca, New York, U.S.A. 14853;
FMLT	Fundacion e Instituto Miguel Lillo, Universidad Nacional de Tucuman, Miguel Lillo 251, Tucuman, Argentina (D.A. de Toledo);
IRSNB	Collections nationales belges d'insectes et d'arachnides, Institut Royal des Sciences Naturelles de Belgique, 29, Rue Vautier, B1040 Brussels, Belgique (R. Damoiseau);
MACN	Division Entomologia, Museo Argentino de Ciencias Naturales, Av. Angel Gallardo, 470 (C.P. 220, Suc. 5), 1405 Buenos Aires, Argentina (Axel Backman);
MCZ	Department of Entomology, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A. 02138 (E.O. Wilson);
MNHP	Entomologie, Museum National d'Histoire Naturelle, 45, rue de Buffon, Paris 75005, France (H. Perrin);
MNMB	Zoological Department, Hungarian Natural History Museum, Baross Utca 13, H-1088 Budapest, Hungary (Z. Kazab);
MRSNT	Museo Regionale Scienze Naturali, via Maria Vittoria 18, Torino 10123, Italia (A. Casale);
MSNG	Museo Civico da Storia Naturale "Giacoma Doria", via. Brigata Liguria 9, I-16121 Genova, Italia (Roberto Poggi);
MUB	Museum für Naturkunde der Humboldt Universität zu Berlin, Bereich Zoologisches Museum, Invalidenstrasse 43, DDR-1040 (F. Hieke);
MZSP	Museu de Zoologia da Universidade de São Paulo, Avenida Nazare, 481, C.P. 7172, 01.051 São Paulo, SP Brazil (C. Costa);
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Methods

Taxonomic principles and general working methods used were the same as those reported previously (Ball, 1975 and 1978; Allen and Ball, 1980), and are not repeated here.

Ranks and criteria for ranking. We accept the general convention of carabid workers for the past hundred or so years that clearly diagnosed groups exhibiting the amount of divergence and diversity of the pelecini are ranked at the level of tribe. Additionally, such groups must be inferred to be monophyletic. The mandatory, less inclusive ranks of genus and species are supplemented for specialists by use of intermediate level ranks of subtribe, subgenus, species group, and subspecies. All taxa are grouped into subtribes, but optional ranks of less than genus are used only for New World taxa, because of level of analysis and diversity of the latter taxa.

Secondarily, usefulness in terms of diversity and divergence and tradition are considered in ranking. Tradition, based on acceptance of previous classifications, confers stability from generation to generation. Stability is a desirable property of a taxonomic system, but is overruled as a criterion of ranking when a group previously ranked at a particular level is shown to be non-monophyletic at that rank, or more divergent than usual for that rank. These considerations influenced us in supraspecific ranking of pelecini.

Species level work was confined to the Oriental and Neotropical pelecini assemblages. For the Australian and Afrotropical assemblages, emphasis was on ensuring that features believed to be diagnostic for genera were appropriately distributed to fulfill this function.

We regard species generally as distinct holomorphological forms that can be characterized clearly (if not easily) in terms of one or more structural features (including color, setation, body form, proportions, etc.). Such differences must characterize population samples, though some "samples" consist of single individuals.

These criteria are applied with difficulty to pelecini because specimens are few, intra-population size variation seems to be extensive, and one can expect appreciable intra-specific variation because adults are brachypterous and populations therefore can become sharply isolated from their nearest neighbors, even though they might be very close. Geographically, ecological differences reflected by life in different forest types, or different activity cycles can help in deciding how to classify close

geographical isolates, but if such isolates are widely separated geographically, the value of ecological differences is accordingly reduced.

The species of *Eripus* proved especially difficult. Because genera with brachypterous montane-adapted members tend to be especially speciose, with geographically closely circumscribed species, and because many samples of *Eripus* are from mountain forests, we began with the hypothesis that species of this genus were quite numerous (ca. 20), and most tightly circumscribed geographically. One easily distinguishable species, *E. suturalis* (Chaudoir), proved to be, in fact, quite wide-ranging in terms of longitude and latitude (Map 2), altitude, and forest type where different samples were collected. These observations suggested to us that other species of *Eripus* also might be widely distributed, and therefore that we must be very cautious in interpreting slight differences in morphological features.

In the genus *Eripus*, we accorded the rank of species to recognizable sympatric forms, on the assumption that the differences observed were maintained by reproductive isolation. To deal with allopatric groups that had structurally similar members, we asked ourselves if we thought we could distinguish between them if we had samples from geographically intermediate localities. If the answer was "no", we treated these forms as conspecific variants. The rank of subspecies was used for conspecific allopatric variants that seemed to differ consistently and clearly from one another.

Characters. Extensively surveyed were external features of body form, sculpture, color, fixed setae, mouthparts, thoracic sclerites and sutures, and legs (in particular, tarsal adhesive vestiture). The male genitalia were used only to diagnose species of *Ardistomopsis*, and details of the ovipositor were useful only at the level of subtribe.

Measurements. Most measurements were made with a Wild M5 stereobinocular microscope, at 25X or 50X. HL- length of head measured on the left side, from anterior margin of clypeus to post-ocular transverse groove; EyeL- length of compound eye measured from anterior to posterior margin PL- length of pronotum, measured from anterior to posterior margin, along mid-line; EL- length of elytra, from basal ridge (or indication of where it ought to be) to apex. If the elytra of a single individual differed in length, the longer elytron was measured; EW- maximum width of elytra, used to express maximum body width.

The ratio EyeL/HL was used to express quantitatively variation in eye size in the genus *Eripus*.

Body length was expressed in two ways for adults of *Eripus*, *Pelecium* and *Stricteripus*: overall length (designated simply "length", measured with a millimeter ruler, from tip of mandibles to posterior margin of elytra); and as Standardized Body Length (SBL), the sum of HL, PL, and EL, as described above. For *Eripus* and *Ardistomopsis*, only SBL was determined. Overall length gives an imprecise, but for the purposes of our work a sufficient, indication of body size. The more precise SBL is more easily duplicated, but is less than overall length because mandibles and posterior part of the head are excluded. For detailed analysis, however, this type of measurement is required.

Illustrations. Because of the importance of body form in recognition of the species of Neotropical peleciniines, line drawings of habitus are provided for adults of most species. Habitus is illustrated for the other genera by photographs. Palpomeres of Neotropical peleciniines are illustrated with line drawings. Photographs of structures were taken using a Scanning Electron Microscope, Cambridge Model S150 or S250. Specimens were cleaned in a sonicator, and were gold-coated.

Notes About Structural Features

Attention is drawn to those taxonomically useful features illustrated with photographs taken with a scanning electron microscope.

Head. The fronto-clypeal suture is more or less developed, and is completely lacking from members of some taxa (cf. Fig. 1). Other features of note are the pronounced supra-antennal ridges (sar), long supra-antennal grooves (sag), prominent frontal impressions (fi) which vary from deep punctiform to long grooves extended from the labral margin to the postocular transverse groove (potg).

Mouthparts. Sclerites associated with food capture and eating provide characters useful at a variety of supraspecific levels. The labrum (Figs. 1-4) of peleciniines is bilobed, with the anterior margin shallowly (Figs. 1 and 3), or deeply emarginate - broadly (Fig. 2) or more narrowly (Fig. 4) so. Setal number varies from four (Fig. 3) to six (one seta was broken from the labra illustrated in Figs. 2 and 4).

The mandibles exhibit striking variation. The simplest are those of *Agonica* (Figs. 11A-H) and

Pseudagonica. They are slender and falcate in dorsal aspect (Figs. 11A and B), and the occlusal margin is simple, with a single projection, interpreted as the posterior retinacular tooth (prt). This projection marks the posterior limit of a long, slender terebra. The terebral margin is continuous with the posterior retinacular ridge and the basal ridge of the molar (or basal area Figs. 11E and F). No teeth are evident, and the basal lobe is glabrous dorsally. The ventral groove is long and densely setose (Figs. 11C and D). Laterally, the mandibles are widened slightly basally (Figs. 11G and H).

The mandibles of the other peleciniine genera differ from those of *Agonica* and *Pseudagonica* as follows. Dorsally, they are broader and the occlusal margins are variously toothed or notched. Laterally, the mandibles are broader basally, moderately (Figs. 17G and H) or markedly, with or without a prebasal notch in the ventral margin (bln) (Figs. 15C, D, E and F). A single, rather small, terebral tooth (tt) is on the terebral margin of the mandibles of *Pelecium* (Figs. 14A and B, and 15A and B) and *Stricteripus* (Figs. 16A and B), but not in the mandibles of *Eripus* (Figs. 12A and B). In *Ardistomopsis* (Figs. 17A and B), *Dyschiridium* (Figs. 18A and B), and most species of *Disphaericus* the occlusal margin exhibits three prominent projections: a terebral tooth (tt), and an anterior (art) and posterior retinacular tooth (prt); the latter two either distinctly separated from one another (Figs. 17A and B), or slightly so (Figs. 18A and B). The basal area has two notches (bn) in the mandibles of *Eripus* and *Pelecium*, which marks off an area interpreted to be a premolar tooth. The basal area has a series of parallel grooves in *Stricteripus* (Figs. 16A and B), a single notch, groove, and row of setae in *Ardistomopsis* (Figs. 17A, B, and I, bs), and a series of short notches in *Dyschiridium* and *Disphaericus* (Figs. 18A and B, and 19A). Posteriorly, on the dorsal surface at base of the right and left mandibles of *Eripus*, *Pelecium*, and *Stricteripus* is a dense patch of short setae. A small patch is on the left mandible of *Dyschiridium* and *Disphaericus* but not on the right mandible (Figs. 18B and 19A). Anteriorly, the occlusal ridge is either single (Figs. 13C and D) or double (Figs. 12C and 14F), with the anterior portion of the retinacular ridge (arr) extended beneath the terebral margin (tm). The incisor is markedly prolonged medially (Figs. 17A and B, 18A and B, and 19A and B), or not (Figs. 12A and B, 13A and B, 14A and B, 15A and B, and 16A and B).

The maxilla (Fig. 5) is average in appearance, but in detail the occlusal margin of the lacinia is

densely setose, and terminates as a rounded lobe (Fig. 6B), rather than as a sharp hook as in most carabid adults. The stipes has a single basal seta (Figs. 5 and 6A), a cluster of about 10 setae (Fig. 7), or is asetose. The galeomeres are either parallel-sided (Fig. 5) or galeomere 1 is sub-clavate and 2 is slightly sinuate (Figs. 6A and B, g1 and g2). Palpomere 4 varies in proportions from sub-fusiform, with apex pointed, to broadly securiform. The specimen illustrated by Fig. 5 is toward the lower limit of variation, while Fig. 6A illustrates an intermediate condition.

The pelecine labium is characterized by a mentum with short lateral lobes (ll) (Figs. 8A, 9A, and 10A), a tooth (mt), and transverse groove (tg). Mentum and submentum have each a pair of setae, or are asetose. The glossal sclerite has two apical setae (gs), and the paraglossae (pg) are short and broadly joined to the glossal sclerite (Fig. 8B), or they are longer and free from the glossal sclerite (Figs. 9B and 10B). Labial palpomere 2 is trisetose (Fig. 8A), with palpomere 3 narrowly triangular or ovate to broadly securiform (cf. Fig. 41).

Elytral striation. The longitudinal grooves (Fig. 87) are interneurs (Erwin, 1974: 3-4) and spaces between are intervals. Striation is the term for the system of elytral grooves, and interneurs are the expression of the system. The dorsal surfaces of pelecine elytra exhibit a remarkable range of striation, from nearly complete, with eight interneurs, to non-striate or virtually so, and with a wide variety of intermediate states including several more or less complete interneurs. The preapical part of interneur 7 persists in most taxa, even in those from which the vestiges of all other discal interneurs have disappeared. The basal part of interneur 1 (sloped laterally and terminated at the puncture of the parascutellar seta) is lacking from all pelecine elytra, and the parascutellar interneur is joined to interneur 1. Evidence that the basal part of interneur 1 is lacking is provided by the fact that the parascutellar setigerous puncture, when present, is not in contact with any interneur. On the ventral surface of the elytra, a nearly complete pattern of striation is evident, regardless of degree of development of interneurs on the dorsal surface; only the basal part of interneur 1 is not evident.

Legs. The legs have a few interesting taxonomic features. Both males and females have adhesive vestiture on the tarsomeres, of various types. Stork (1980) designated three major types of adhesive setae in carabids as: simple adhesive setae; squamo-

setae; and articulo-setae. Simple setae are flattened (thus expanded slightly) and bent preapically. Articulo-setae are broadened apically, and the short apical portion is modified to seem as if it were articulated with the long basal stem. Squamo-setae are markedly broadened apically, and arranged in two rows extended parallel to or obliquely to the long axes of the tarsomeres. Simple adhesive setae and articulo-setae occur in more or less dense groups, giving the ventral surface of the tarsomere bearing them a pad-like appearance.

Pelecine adults exhibit simple adhesive setae, squamo-setae and as well setae that are superficially like articulo-setae, but without indication of a hinge-like joint between expanded apical portion and stem. This type seems to be derivable from the simple type. For use in description and discussion, a distinctive designation is required. We designate this non-articulate seta as Type II simple adhesive seta (or Type II setae) and the adhesive setae with apical portion flattened and bent as Type I simple adhesive setae. In the text, we refer to these setae simply as Type I and Type II adhesive setae.

In males of *Agonica* and *Pseudagonica*, the front tarsomeres have biseriate squamo-setae (Fig. 20, ss), with middle and hind tarsomeres having a few Type I adhesive setae (Fig. 21). Females of these genera have Type I adhesive setae (Fig. 22). Males and females of the other genera have thickly packed groups of Type II adhesive setae (Figs. 23 and 24, as) on tarsomeres 1 - 4 of the front and middle legs, and on various tarsomeres of the hind legs.

The corbels of the front and middle tibiae are either about perpendicular to the long axis (Fig. 25, c), or are markedly sloped (Fig. 26) in the genus *Stricteripus*. Also the middle tibiae of adults of this genus have a prominent pre-apical spine, projected laterally (Fig. 27, ts). The notch of the antennal cleaner (Fig. 29A, ac) is either near mid-length in most species or is markedly basad (Fig. 28), in *Ardistomopsis andrewesi*, new species. The terminal spurs of front and middle tibiae of adults of most genera are markedly bent (Fig. 29B, tsp).

Stylomere 2 of the ovipositor (Figs. 31A and B, S-2). This sclerite has two ensiform setae (es) and two nematiform setae (ns) inserted in the pre-apical groove, or these setae and the groove are lacking (Figs. 30A and B).

Tribe Peleciini

Recognition. Pelecine adults are brachypterous

carabids with the body subpedunculate, pedunculate, or not pedunculate, with pronotum extended over bases of elytra, metathorax shortened (metepisternum quadrate, width at base and length equal), elytra fused along suture, humeri slightly to markedly constricted, parascutellar interneur absent, labrum with anterior margin broadly or narrowly notched, mentum with lateral lobes short and with a distinct, deep transverse groove medially, labial palpi more or less securiform, with apical margin truncate, and tarsomere 4 deeply emarginate or bilobed.

Inabresian peleciines are cychrine-like or myrmecoid in habitus, of moderate to rather large size (ca. 4 to 27 mm.), deep bodied, with head slightly hypognathous (Figs. 126-128), vaulted elytra; in contrast to adult cychrines, the lateral lobes of the labrum are shorter (Figs. 2-4), front tibiae distinctly anisochaete, and the front and middle coxal cavities are closed.

Australian peleciines are generally smaller (Standardized Body Length 3 to 8 mm.) and flatter, head prognathous (Figs. 32 and 33), and in body form are either like pterostichines or perigonines.

Diagnosis. Peleciine adults exhibit the following distinctive combination of features which are standard in descriptions of carabid tribes, or are characteristic of all peleciines. Front tibia anisochaete, front and middle coxal cavities closed, front coxal cavities uniperforate, elytra complete, apices pointed, preapical margin oblique, head with one or two pairs of supraorbital setae; labrum with anterior margin notched; mandibles with setae in ventral groove numerous, dense, maxillary lacinia with apex rounded, occlusal margin densely setose; mentum with lateral lobes short, with transverse groove on ventral surface, tooth evident, labial palpomere 2 trisetose, palpomere 3 more or less securiform, with apex truncate; metathorax short, flight wings short stubs, elytra fused along suture, without basal part of interneur 1, parascutellar interneur and interneur 1 joined; male genitalia with parameres short, asetose apically, left conchiform, right slightly narrower, but as long as left paramere; ovipositor with valvifer setose at apex, stylomere 1 asetose, stylomere 2 short, falciform, with only two long ensiform setae, ventral preapical pit shallow with two nematoid setae (Fig. 31A and B), or absent, and stylomere 2 without nematiform setae (Figs. 30A and B).

Description. Body form various, from deep to sub-depressed. Standardized Body Length (SBL) ca. 3 to 18 mm.

Color. Dorsal surface black to red, green, or blue, or various combinations of these. Ventral surface black or dark piceous. Appendages black, tinged or not with brighter colors, or paler, rufous to flavous.

Microsculpture. Dorsal surface with various combinations of mesh patterns (depending on species), from isodiametric to grated (Allen and Ball, 1980: 487), or various parts smooth, microlines effaced. Ventral surface with mesh pattern transverse, or meshes oriented obliquely on proepisternum.

Luster. Dorsal surface variously opaque, metallic, or iridescent. Ventral surface generally iridescent.

Fixed setae (except those of ovipositor). **Head:** clypeus with one pair of setae, and vertex with one or two pairs of supraorbital setae. **Antenna:** scape with single seta (Fig. 1); pedicel and antennomere 3 each with ring of several setae near apex. **Mouthparts:** labrum with four or six setae (Figs. 1-4); maxillary stipes each with one seta preapically, basally with one longer seta (Fig. 6A, ss) or with group of shorter setae (Fig. 7) or basal seta absent; submentum with one pair, mentum with or without one pair of setae, and labial palpomere 2 trisetose (Fig. 8A).

Pronotum: one to several pairs of marginal setae, posterior pair clearly anterior of, or at, postero-lateral angles. **Elytron:** with or without parascutellar seta, discal setae, and preapical setae in interneurs 2 or 7; umbilical setae in continuous series, or interrupted, and in two or three groups. **Legs:** coxae (front to hind), 0-2-2; trochanters, 1-1-1; femora (anterior surfaces), with several setae; tarsomere 5 of each leg glabrous ventrally or with series of several setae on each ventro-lateral margin. **Abdominal sternum VII** postero-ventrally with two to ten setae.

Vestiture. Body with dorsal and ventral surfaces generally smooth, glabrous. **Antenna:** antennomeres 4 - 11 with dense covering of short setae, 1 - 3 glabrous. **Mouthparts:** palpomeres sparsely setose. **Legs:** middle and hind tibiae with few sparse long setae on antero-lateral surfaces basally, or these areas densely setose (Fig. 27); tarsi sparsely setose dorsally. **Front and middle tarsi** with ventral surfaces glabrous, or front tarsus of male with tarsomeres 1 - 4 with biseriate adhesive vestiture (squamo-setae Fig. 20), and middle (Fig. 21) and hind tarsomeres with few Type I setae; or front and middle tarsomeres 1 - 4 with adhesive vestiture of pads of Type I or II setae and hind tarsomeres 1 - 3 or 1 - 4 with few such setae (Stork, 1980: 289).

Head. Prognathous, or distinctly deflexed from horizontal plane, anteriorly more or less constricted. Fronto-clypeal suture medially shallow to indistinct. Frontal impressions various, from broad and irregular to punctiform, to pair of grooves extended anteriorly on clypeus and posteriorly as far as post-ocular transverse impression (cf. Figs. 34A - E). Supraantennal grooves narrow or broad, lateral supraantennal ridges narrow or broad. Vertex posteriorly marked or not by sharp post-ocular transverse groove (Fig. 1, potg). Occiput average or markedly constricted as clearly indicated "neck" (Fig. 34E). Compound eyes of average size, or markedly reduced, or absent (in genus *Eripus*) (cf. Figs. 69 and 70), temples more or less prominent, notched or not. Antenna filiform, of average length, flagellomeres distinctly longer than wide. Scape enlarged, either much broader than pedicel and flagellomeres, or somewhat broader and as long or longer than pedicel + antennomere 3.

Mouthparts. Labrum short, anterior margin narrowly and angularly to broadly notched (Figs. 2 and 3). Epipharynx medially ridged and more or less setose. Mandibles nearly symmetrical, moderately elongate; terebra markedly narrow (Figs. 11A - F) or not (Figs. 12A and B). Dorsal surface smooth or narrowly strigulose at base of terebral area (Figs. 18A and B). Occlusal surfaces narrow, sharp, terebral margins concave, terebral tooth small (Fig. 14A), or enlarged (Figs. 17A and B, and 18A and B). Retinaculum toothed or edentate. Molar area with two deep notches (Figs. 12A and B, 13A and B, 14A and B, and 15A and B), series of grooves (Figs. 16A and B, 18A and B, and 19A and B) or smooth (Figs. 11A and B). Ventral surface with long ventral groove, densely setose (Figs. 11C and D, 14C and D, 17C and D, and 19B). Lateral surface basally narrow (Figs. 11G and H) or markedly broad, ventral parascrobal area angular (Figs.

12C, 13C and D, and 14E and F) or smooth (Figs. 17E and F, 18C and D, and 19C), scrobes accordingly narrow or broad. Maxilla with cardo and stipes average for Carabidae (Figs. 5 and 6A); lacinia with apex blunt not in form of sharp curved tooth; galea with galeomeres nearly straight (Fig. 5) or markedly sinuate (Fig. 6B); palpus with palpomeres 2 and 4 subequal, 3 either subequal to 4 or markedly shorter; palpomere 4 fusiform, narrow, with apex pointed, or more or less markedly broadened and securiform, with apex truncate. Labium with lateral lobes of mentum short (Figs. 8A, 9A, and 10A), medially with sharply impressed transverse groove; epilobes broad, tooth small, broad or narrow at base; prementum with paraglossae narrow, short (Fig. 8B), or long (Figs. 9B and 10B), setose dorsally; glossal sclerite broad apically, dorsally continuous with paraglossae at base (Fig. 8B), or isolated by deep basal and lateral groove; palpus with palpomere 2 longer than 3, and 3 longer than 1; palpomere 3 more or less securiform, or narrowly or broadly ovate (Figs. 37B, 40B, and 43B), as broad or markedly broader than maxillary palpomere 4.

Thorax. Prothorax with all standard components, or without lateral grooves, and disc thus continuous with proepipleura; in form, more or less rectangular in outline. Pronotum longer than wide, as long as wide, or slightly wider than long (Figs. 67-128). Surface slightly or markedly convex, with median longitudinal impression and postero-lateral impressions, but without transverse impressions. Front coxal cavities uniperforate and closed. Pterothorax with middle coxal cavities closed, mesothorax with or without sternopleural sutures; metathorax short, metepisternum with anterior and lateral margins subequal; metapleural suture evident or not, posterior margin of metepimeron broadly rounded.

Elytra. Fused along suture, dorsal surface only slightly convex and posterior declivity slight, or markedly convex, valuted, with posterior declivity pronounced. Plica visible or not preapically, posterior to elytral epipleuron. Parascutellar interneur absent; other interneurs absent or present in various numbers and depth, smooth or punctate. Intervals with interneurs moderately convex or markedly so, or elytra plane. Humeri broadly rounded (Figs. 32 and 33), dentate with angles projected (Figs. 88-125), or markedly narrowed (Figs. 126-128). Basal ridge complete, incomplete, or absent.

Legs. Front tibia anisochaetous, terminal spur straight, or markedly bent (Figs. 27, 28, and 29A and B). Middle and hind tibiae with average complement of spines and spurs, inner margins sulcate or not. Hind coxae widely disjunct, each with posterior margin nearly entire, or deeply notched, and condyle of hind coxa evident in ventral aspect. Ratio of length of hind trochanter to femur various, from 0.6 to 0.29. Tarsomeres of fore and middle legs widened or not; tarsomere 4 of all legs distinctly emarginate, or deeply so and bilobed.

Abdomen. Sterna IV, V, and VI with posterior margins straight or distinctly sinuate, with lateral areas projected posteriorly as short blunt lobes. Sterna V, VI, and VII at base impunctate, or with row of large punctures.

Defensive glands. Reservoirs unilobate, ovoid, with thin muscle coat. Openings of ducts in intersegmental membrane posterior to tergum VIII.

Male genitalia. Conchiferous, parameres short, each broadly rounded apically, asetose; left slightly broader than right, but both subequal in length. Median lobe cylindrical, elongate; in ventral aspect, slightly and progressively widened from base to broadly truncate apical margin; or latter broadly pointed, sides before apex slightly sinuate or not (see Moore, 1963: 23, Figs. 7-9). Internal sac with small apical sclerite ("copulatory piece", Moore, 1963: 22), group of short spines, or not armored.

Ovipositor. Stylomeres as in Figs. 30A and B, and 31A and B. Valvifer with ensiform or trichoid setae apically. Stylomere 2 short, falcate, with two long basal ensiform setae, one lateral and one medial, and with broad preapical ventral furrow, with two nematiform setae (Fig. 31B) and two furrow pegs, or stylomere 2 without setae and ventral furrow (Fig. 30B).

Spermatheca. Bulb unipartite, bulbous, duct without sclerite at base.

Way of life. Data about how peleciniines live are confined to one series of observations about larval habits, pupation, and development of *Pelecium sulcatum* Guérin-Ménéville (Salt, 1928), and to notes about feeding habits of adults of "*Pelecium* spp." by Erwin (1979c: 550-551). According to Salt, larvae with parasitoid characteristics (short legs, plump body, and rapid rate of growth on a single host) were collected in association with "beetle pupae" and soft, young leptodesmid millipedes. Because larvae were not preserved, it is not possible to be certain that the individuals eating the coleopterous pupae were the same as those on the millipedes. Only two of the latter larvae produced adults, five days after pupation began. A larva was also reported by one of Salt's assistants as attacking a chrysomelid larva, but this record was not confirmed by Salt. It is clear, however, that *P. sulcatum* larvae are parasitoids on millipedes, though it is not clear that millipedes are the only hosts.

Erwin reports that peleciniine adults are predators on millipedes, which they chase, run up on the dorsal surface, and then force the millipede into a curled defensive posture. The beetle is thus rolled into the curve in such a way that the mandibles of its deflected head can chew through the ventral intersegmental membrane and sever the ventral nerve cord. The millipede, thus immobilized, uncurls, and the beetle eats out the soft inner parts.

Together, the data about a few immature and adult peleciniines indicate a clear association of these beetles with millipedes. Can these limited data be generalized? We think so. Since peleciniine adults of both sexes are characterized by generally broadened tarsomeres with adhesive vestiture ventrally, and since this vestiture would seem to be of use in running on smooth surfaces, such as dorsal surfaces of many millipedes (Erwin, 1979c: 551), we hypothesize that a ground plan feature of peleciniines is association with millipedes. We hypothesize further that the markedly modified mouthparts and the bent front terminal tibial spurs are part of the adaptive complex evolved for attacking millipedes. We recognize that the association of agoniciines with millipedes may not be as close as is the association of peleciniines (*sensu stricto*) with these myriapods, since agoniciine adults lack some of the special features of the Peleciniina.

Geographical distribution (Map 1). The tribe Peleciniini is in the major zoogeographical regions of the

Southern Hemisphere: Australian, Afrotropical, Oriental, and Neotropical, ranging northward in México to the Tropic of Cancer.

Ecological distribution. This tribe is represented in lowland tropical forest, and in tropical montane, or cloud forests at mid-elevations in montane areas.

Included subtribes. The tribe Peleciini includes two subtribes: Agonicina and Peleciina.

Phylogenetic considerations. One of the more striking features of the mouthparts of adult peleciines is absence (and presumably, loss) of the apical hook of the lacinia. This apotypic feature is shared with other taxa such as hiletines (Erwin and Stork, 1985: 411, Figs. 2h-j, and 412), *Promecognathus* (Horn, 1881: Fig. 18), various scaritines such as *Pasimachus* (Bänninger, 1950 and Horn, 1881: Fig. 19), the pterostichine subgenus *Stereodema* (Müller, 1944: 151, and Figs. 8 and 9), and *Catapiesis* (= *Basolia*, Horn, 1881: 107). However, peleciines differ too much in too many other features to be considered as related to hiletines, *Pasimachus*, *Stereodema*, or *Catapiesis*.

Shared by peleciines and promecognathines (especially *Promecognathus*) are many apotypic features, including details of setation, structure of mouthparts, thorax and ovipositor, and marked similarity in mode of attacking millipedes (LaBonte, 1983; cf. Erwin, 1979c). We believe, however, that these similarities are homoplastic, since other features (disjunct middle coxal cavities plus setiform unguitactor plates of promecognathines) indicate that the Promecognathini (Promecognathini + Axinidiini: Basilewsky, 1963) and Peleciini belong to different major lineages: promecognathines to Loxomeriiformes, and peleciines to Psydriformes (Erwin, 1985:446). This brief statement must not be taken as a definitive denial of the possibility of close relationship between these two groups. It is, however, our working hypothesis, to be tested (probably by others) in the context of a more general re-examination of relationships of carabid tribes.

On the other hand, adult peleciines and members of the Australian psydriform genus *Meonis* Castelnau share the above feature and the following additional apotypic features: labrum broadly notched; mandibles with occlusal surfaces simplified and elongate like those of agonicines, but with a distinct basal notch; labium with lateral lobes of mentum small, and tooth small; flightless, metathorax reduced; elytra fused along suture, striation reduced and base of interneur 2 absent.

Meonis adults have the following psydroid (and thus plesiotypic) features: mandible with a setigerous puncture in the scrobe; mentum without a transverse groove, and paraglossae long, slender, and glabrous; elytron apically with two setigerous punctures in interneurs 4 and 5; females without adhesive vestiture on tarsomeres, and stylomere 2 of ovipositor with base reduced, three short ensiform setae; male genitalia with setose parameres. Apotypic features of *Meonis* not shared with peleciines are: apical part of elytral interneur 7 absent; male genitalia with markedly complex armature, and stylomere 2 with furrow lateral in position, and nearer base than apex. These differences incline us to believe that *Meonis* and the peleciines are really not closely related, and that the shared similarities are a remarkable example of convergence.

Relationships with the broscines, as postulated by Horn and Bates, seem unlikely, the affinities (particularly body form) being best interpreted as examples of convergence or symplesiotypic similarity. Horn was impressed by the single pair of supra-orbital setae of peleciines, but this feature is characteristic of only agonicines, the genus *Pelecium*, and three species of *Ardistomopsis*. The adhesive vestiture of the tarsi, while superficially similar to that of the broscines, is different in detail; furthermore, broscine females lack adhesive vestiture. Position of the openings of the ducts of the defensive glands (in intersegmental membrane, rather than at the posterior margin of Tergum VIII), though shared by peleciines and broscines (Forsyth, 1972: 275) is a plesiotypic feature of carabids, and is not evidence of close relationship of these two groups.

Jeannel pointed out odacanthomorph affinities of peleciines, based principally on form of the basal part of the median lobe. This similarity does not seem very convincing of relationship, since peleciines in other respects seem unrelated to that group. For example, the modified tergum VIII of odacanthomorphs places the group in the Supertribe Lebiitae (Erwin, 1985: 468), but peleciines do not have this modification. Lieberr (in press) has shown that a synapotypic feature of odacanthites is a bipartite spermathecal bulb, with a sclerite at base of the spermathecal duct. The spermatheca of peleciine females has a unipartite bulb, and the base of the spermathecal duct does not have a sclerite. Although peleciine females have at most two ensiform setae on stylomere 2, as in the ground-plan number for odacanthites, the setae are positioned differently in the two groups of females, and thus the similarity is unlikely to represent homology.

Erwin (1985: 468) placed this group (as three

tribes: Agonicini, Disphaericini, and Peleciini) in the supertribe Panagaeitae, subfamily Harpalinae, the latter group being equivalent to the Conchifera of Jeannel. Placing the peleciines with the panagaeines implies close phylogenetic relationship probably inferred from the seemingly similar tarsal vestiture of the Inabresian peleciines and the male Panagaeini. However, the adhesive vestiture characteristic of the Peleciini is only superficially similar to that of the panagaeine complex.

The nearly symmetrical parameres of peleciine males, and the ducts of the defensive glands opening in the intersegmental membrane rather than at the posterior margin of tergum VIII, suggest to us a more basal position for the peleciines. Males of the primitive Agonicini exhibit squamo-setae on the front tarsomeres, a feature of the supertribe Pterostichitae, so it is possible that the tribe Peleciini is a primitive member of this assemblage, or the group comprises a supertribe of its own, possibly the sister taxon of the remaining groups of subfamily Harpalinae (*sensu* Erwin).

These statements do not solve the problem of relationships of the Peleciini. We are satisfied, however, that a sister group for the peleciines is not to be sought among the more highly evolved carabid taxa. We suggest that, pending a solution, the group be listed as Harpalinae *incertae sedis*, and placed near the beginning of the taxa of that subfamily.

Key to the Genera of the Tribe Peleciini

1. Mandible (left or right, Figs. 17-19) with short, markedly curved terebra, terebral tooth prominent, occlusal surface with or without one or two prominent retinacular teeth 2
- 1'. Mandible without terebral tooth (Fig. 11), or with terebral tooth small (Figs. 14-16), terebra not markedly curved medially 4
- 2(1). Pterothorax with mesosternopleural suture reduced to short groove above middle coxa, mesosternum and mesepisternum thus fused for most of length. Prothorax with lateral grooves absent, pronotum thus continuous laterally with proepipleura. Elytra with complete striation (Afrotropical Region) *Disphaericus* Waterhouse
- 2'. Pterothorax with mesosternopleural suture complete, mesepisternum isolated from mesosternum. Prothorax with lateral grooves extended length of pronotum, latter thus distinct from proepipleura, or lateral grooves extended to first pair of lateral setigerous punctures, only. Elytra with striation complete, or reduced to sutural interneur and interneur 8 3
- 3(2'). Elytron with striation complete (Oriental Region) *Ardistomopsis*, new genus
- 3'. Elytron with striation reduced to sutural interneur and interneur 8 (Afrotropical Region) *Dyschiridium* Chaudoir
- 4(1'). Head with one pair of supraorbital setigerous punctures 5
- 4'. Head with two pairs of supraorbital setigerous punctures (Neotropical Region) 7
5. Maxillary palpomere 3 much shorter than 4. Elytron without preapical setigerous puncture in interneur 2, plica prominent in lateral aspect. Hind coxa with deep notch in posterior margin (Neotropical Region) ... *Pelecium* Kirby
- 5'. Maxillary palpomeres 3 and 4 subequal in length. Elytron with preapical setigerous puncture in interneur 2; plica not evident in lateral aspect. Hind coxa without deep notch in posterior margin (Australian Region) ... 6
- 6(5'). Pronotum with marginal postero-lateral setigerous punctures clearly anterior to postero-lateral angles. Maxillary palpomere 4 with apex truncate. Dorsal surface of pronotum and elytra shining, not markedly iridescent *Agonica* Sloane
- 6'. Pronotum with posterior setigerous punctures in postero-lateral angles. Maxillary palpomere 4 with apex acuminate. Dorsal surface of pronotum and elytra markedly iridescent *Pseudagonica* Moore
- 7(4'). Head with frontal impressions long, extended to post-ocular transverse groove (cf. Fig. 34A); occipital area not sharply constricted in form of narrow neck *Eripus* Dejean

7. Head with frontal impressions shorter, not extended posteriorly to transverse groove (cf. Fig. 34E); occipital area constricted, in form of narrow neck *Stricteripus*, new genus

Subtribe Agonicina, new rank

Aonicini Sloane, 1920: 129. TYPE GENUS *Agonica* Sloane, 1920, by **monotypy**. 1923: 248. Csiki, 1931: 1021. - Darlington, 1961: 16. - Reichardt, 1977: 429. - Erwin, 1979b: 479. - 1979c: 588. - 1985: 468.

Agonicinae Moore, 1963: 21.

Panagaeitae (in part) Moore *et al.*, 1987: 252.

Recognition and diagnosis. Within the Peleciini, agonicine adults are recognized by only slightly convex or sub-depressed and sub-pedunculate body form with head prognathous (Figs. 32 and 33), labrum with anterior margin broadly notched (Fig. 2), single pair of supraorbital setae, mandibles slender, terebral margins not in contact (Figs. 11A and B), and scrobes narrow basally (Figs. 11G and H), humeri broadly rounded, elytron with plica small, not visible in lateral aspect, hind coxae not deeply notched posteriorly, and abdominal sterna IV, V, and VI with posterior margin straight. In addition to these external features, agonicine males are recognized by form of apex of the median lobe: in ventral aspect, either narrowed, or widened in relation to sinuate sides of preapical area. Agonicine females lack from stylomere 2 the ensiform and nematiform setae, furrow pegs, and ventral preapical pit (Figs. 30A and B).

Description. In addition to the features noted above, adults of the subtribe Agonicina exhibit the following features. Standardized Body Length ca. 3.5 to 6.5 mm.

Color. Dorsal surface black, ventral surface piceous. Legs and antennae rufous or flavous.

Microsculpture. Labrum with meshes isodiametric, or slightly transverse, not grated; otherwise on body, transverse, grated or not.

Luster. Dorsal surface shining, slightly iridescent, or markedly iridescent; ventral surface slightly or markedly iridescent.

Fixed setae. Labrum with six setae. Clypeus with pair of setae. Mouthparts: stipes basally with single long seta; mentum with pair of setae. Pronotum with two pairs of setae, posterior pair either at or anterior to postero-lateral angles. Elytra with parascutellar seta, preapical setae in interneurs 2 and 7, disc asetose, and umbilical setae in two or three groups. Tarsomere 5 of each leg with row of setae on each ventro-lateral margin. Sternum VII of both males and females each with four setae.

Vestiture. Middle and hind tibiae without dense covering of

long slender setae on anterior surfaces. Front tarsus of male (Fig. 20) with biseriate adhesive vestiture ventrally (squamo-setae), front tarsus of females with Type I setae (Fig. 22), middle and hind tarsi of males and females with few Type I setae (Fig. 27).

Head. Fronto-clypeal suture shallow. Frontal impressions narrow, prolonged posteriorly to about plane of middle of compound eye, or short, irregular, broad, non-linear depressions. Supraantennal grooves narrow, supraantennal ridges narrow. Vertex without postocular transverse groove, occiput of average size, not constricted in form of neck. Compound eyes well developed, temples hardly evident. Antenna with scape elongate, slender, longer than pedicel + antennomere 3.

Mouthparts. Labrum (Fig. 2) with anterior margin broadly notched medially. Mandibles (Figs. 11A - H) slender, dorsal surfaces smooth, terebral tooth absent, retinaculum continuous with terebra, premolar tooth not evident, occlusal surface thus simple; scrobe (Figs. 11G and H) narrow at base. Maxilla with galeomeres (Fig. 5) only slightly sinuate, thicker than in other peleciine adults (cf. Figs. 6A and B); palpus with palpomeres 3 and 4 subequal, palpomere 4 narrow, with apex either narrowly truncate or pointed (Moore, 1963: 22), (Fig. 5). Labium (Fig. 8A) with lateral lobes of mentum very short, broad, apical margin of each obliquely truncate; tooth broad at base; paraglossae short; glossal sclerite dorsally continuous with paraglossae; palpomere 3 securiform, apical margin broad, truncate (Fig. 8B).

Thorax. Proepipleura evident, slightly oblique in relation to pleural sclerites.

Pronotum longer than wide or subquadrate, postero-lateral angles broadly rounded. Metathorax without metapleural sulci.

Legs. Front tibia with apical spur of normal size, straight.

Abdomen. Sterna IV - VI each with posterior margin straight, not projected postero-laterally each side.

Male genitalia and ovipositor. See recognition section.

Geographical distribution. This subtribe is confined to the island of Tasmania and to adjacent southeastern Australia.

Ecological distribution. The species live in wet montane forests at middle elevations (Darlington, 1961: 16).

Included taxa. Two genera are members of this subtribe: *Agonica* Sloane, 1920, and *Pseudagonica* Moore, 1960.

Phylogenetic aspects. The subtribe Agonicina has retained a number of features regarded as generally plesiotypic for the higher Carabidae, and for the Peleciini: head without a post-ocular transverse groove, frontal impressions broad, irregular; without temples; mandibles slender dorso-ventrally, without hypertrophy of parascrobal areas; galeomeres not sinuate, maxillary palpomeres 3 and 4 subequal in length, maxillary palpomere 4 slender, fusiform; labium with mental setae, simple ligula; posterior marginal setae of pronotum in postero-lateral angles; elytra rather flat, not vaulted, humeri rounded, not markedly narrowed or angulate, with preapical seta in interneur 2, and plica

not readily seen in lateral aspect; front tarsus of male with biseriate adhesive vestiture; hind coxa not deeply notched posteriorly; hind femora relatively short (or trochanter relatively long); and apex of median lobe narrow.

Autapotypic features include: one pair of supra-orbital setae; abdominal sterna of males and females with same number of setae; anterior margin of labrum broadly notched; reduction of elements of the occlusal surfaces of the mandibles; absence of the metapleural suture; and reduction of setae of stylomere 2.

Pseudagonica Moore

Fig. 32, and Map 1.

Pseudagonica Moore, 1960: 105. TYPE SPECIES: *Pseudagonica nitida*, Moore: 1960: 166 (original designation). - 1963: 24.

Recognition. Adults of this genus are sub-depressed in body form (Fig. 32), with dorsal integument of pronotum and elytra and ventral surface brilliantly iridescent, frontal impressions of head broad and irregular, apex of maxillary palpus acuminate, posterior pair of marginal setae of pronotum in the postero-lateral angles, and middle and hind tibiae sulcate on inner surfaces.

Description. In addition to features of the Peleciini and Agonicina, adults of *Pseudagonica* exhibit the following. Standardized Body Length ca. 3.5 - 6.25 mm.

Microsculpture. Pronotum, elytra, and ventral surface with meshes transverse, grated, surfaces brilliantly iridescent.

Fixed setae. Umbilical setae in three groups, in number from anterior to posterior, 4-1-5.

Male genitalia. Median lobe in ventral aspect with apical margin broadly rounded, apex abruptly widened. Internal sac with patch of spines preapically (see Moore, 1963: 22, Fig. 6).

Geographical distribution. This genus is known only from the mountains of southeastern Australia, where it is represented by two subspecies: *P. n. nitida* Moore, from the Otway Range of western Victoria, and *P. n. orientalis* Moore, 1963, from more eastern localities in Victoria and New South Wales.

Phylogenetic relationships. This genus is the sister group of *Agonica* Sloane, synapotypic features being the autapotypic features of the Agonicina (see above).

Unique plesiotypic features for the Peleciini exhibited by *Pseudagonica* are: broad frontal impressions of the head, pointed apex of maxillary

palpomere 4, and posterior pair of marginal setae of the pronotum inserted in the postero-lateral angles, rather than anteriorly.

Agonica Sloane

Figs. 2, 5, 8, 11A-H, 20, 21, 33, and Map 1.

Agonica Sloane, 1920: 129. - TYPE SPECIES: *Agonica simsoni* Sloane, 1920 (by subsequent designation - Moore, 1963: 22). - Moore, 1960: 165. - 1963: 22.

Recognition. Adults of this genus are slightly convex in body form (Fig. 33), with integument of pronotum, elytra and ventral surface shining and sub-iridescent, apex of maxillary palpomere 4 truncate, posterior pair of marginal setae of pronotum inserted anterior to postero-lateral angles, and inner surfaces of middle and hind tibiae not sulcate.

Description. In addition to features of Peleciini and Agonicina, adults of *Agonica* exhibit the following. Habitus as in Fig. 33. Standardized Body Length ca. 4.5 to 6.0 mm.

Microsculpture. Pronotum, elytra, and ventral surface with meshes transverse, but not grated.

Fixed setae. Umbilical setae in two groups: anteriorly, four; posteriorly, six.

Male genitalia. Median lobe in ventral aspect narrowed to blunt point (Moore, 1963: 23, Figs. 7 to 9); internal sac with slender apical sclerite, "transfer piece" (Moore, *l.c.*).

Geographical distribution (Map 1). The range of this southeastern Australian genus comprises the southern part of the range of the Agonicina.

Included species. There are three: *A. simsoni* Sloane, 1920; *A. ovalipennis* Sloane, 1920; and *A. victorien-sis* Moore, 1963.

Phylogenetic relationships. See above, under *Pseudagonica*. The apotypic features of truncate margin of maxillary palpomere 4 (Fig. 5) and the anteriorly-located posterior pair of marginal setae of the pronotum, shared with members of the subtribe Peleciina, are interpreted as homoplastic.

Subtribe Peleciina, new rank

Harpaliens (in part), Dejean, 1829: 7.

Panagaeites (in part), Brullé, 1837: 34. - Castelnau and Brullé, 1840: 134.

Stomides (in part), Chaudoir, 1846: 511. - Lacordaire, 1854: 248, 249, and 253. - Quedenfeldt, 1890: 302. - Péringuey, 1896: 537.

Peleciini Horn, 1881: 165, 170. TYPE GENUS *Pelecium* Kirby, 1817; (by monotypy). - Preudhomme de Borre, 1882: LXXI. - Sloane, 1923: 244. - Csiki, 1932: 1285. - Blackwelder, 1944: 51. - Reichardt, 1977: 429. - 1979: 323. - Allen, 1979: 485. - Erwin, 1979b: 479. - 1979c: 590. - 1985: 468. - Ball, 1979: 95. - Kryzhanovsky, 1983: 89. - Noonan, 1985: 337.

Peleciinae Bates, 1881: 39. - Dupuis, 1913: 1. - Jeannel, 1942: 299. - Basilewsky, 1953: 113. - Moore, 1963: 21.

Peleciidae Jeannel, 1942: 299. - 1948: 376.

Disphaericini Sloane, 1923: 244, 248. TYPE GENUS *Disphaericus* Waterhouse, 1842; (by monotypy). - Péringuey, 1926: 613. - Csiki, 1929: 400. - Bourgeon, 1937: 191. - Reichardt, 1977: 429. - 1979: 323. - Erwin, 1979c: 589. - 1985: 455, 468. - Noonan, 1985: 337.

Disphaericinae Jeannel, 1942: 299.

Recognition and diagnosis. Within the Peleciini, adults of the nominotypical subtribe are recognized by a combination of: cychroid body form provided by the rather narrow head and prothorax or myrmecoid body form, suggested by the seeming thoracic constriction with narrowed posterior part of prothorax and narrowed elytral humeri; deflexed, semi-hypognathous head; deep body with vaulted elytra; posterior marginal setae of pronotum either clearly anterior to postero-lateral angles, or absent; interneur 2 without a preapical seta; head with rather broad supraantennal impressions, broad supraantennal ridges, and post-ocular transverse groove; maxillary galeomeres slender, sinuate (Fig. 6B), maxillary palpomere 3 much shorter than 4 (Fig. 6A), maxillary palpomere 4 at least broadly ovate, apical margin broadly or narrowly truncate (Figs. 57 - 66); mentum asetose (Figs. 9A and 10A), ligula with long, slender paraglossae, latter isolated from glossal sclerite by a deep groove (Figs. 9B and 10B); elytral plica prominent, clearly visible in lateral aspect; hind coxa with posterior margin deeply notched, hind femur more elongate; male genitalia with apex of median lobe broad, truncate, apical portion very short; and stylomere 2 of ovipositor with a pair of long ensiform setae, and a ventral

preapical pit with two nematiform setae, but without pit pegs (Figs. 31A and B).

Description. In addition to the features noted above, adults of the subtribe Peleciina exhibit the following features. Standardized Body Length ca. 4 to 18 mm.

Color, microsculpture, and luster. As described for tribe.

Fixed setae. As described for tribe, but restricted as in diagnosis of Peleciina.

Vestiture. As described for tribe, but restricted as follows: adhesive vestiture Type II setae, only (Figs. 23, 24, and 29B).

Head. As described for tribe, except: frontal impressions not broad, either linear or punctiform (Figs. 34A - E), supraantennal grooves broad, supraantennal ridges broad, vertex posteriorly with transverse post-ocular groove, temples prominent. Antenna with scape enlarged, but not longer than pedicel + antennomere 3 (cf. Figs. 126 - 128).

Mouthparts. Labrum (Figs. 1, 3, and 4) with apical marginal notch narrow, shallow, or broad deep "V". Mandibles as described for tribe, restricted as follows: retinacular ridge more or less evident, basal area with series of grooves on dorsal surface, with or without row of setae dorsally.

Thorax. As described for tribe, but restricted as follows: metapleural suture developed, mesosternopleural suture developed or not.

Elytra and legs. As described for tribe, but restricted as in "Recognition and diagnosis", above. Front tibia with apical spur short, broad, and more or less markedly curved (Fig. 29B).

Male genitalia and ovipositor. As described for tribe, but restricted as in "Recognition and diagnosis", above.

Geographical distribution (Map 1). This subtribe is Inabresian, being represented in the Oriental Region (India and Sri Lanka), the Afrotropical Region (except Madagascar), and the Neotropical Region, including South and Middle America to the Tropic of Cancer.

Included genera and classification. This subtribe includes six genera: the Neotropical *Eripus* Chaudoir, *Stricteripus*, new genus, and *Pelecium* Kirby; and the Old World Afrotropical *Disphaericus* Waterhouse, and *Dyschiridium* Chaudoir, and the Oriental *Ardistomopsis*, new genus.

The genera are arranged in two probably monophyletic groups: New and Old World assemblages. These geographically and phylogenetically clearly defined groups could be accorded taxonomic status, but this would interject one more level in the hierarchy, and it seems hardly worthwhile to take this action.

Phylogenetic aspects. The Subtribe Peleciina has retained fewer plesiotypic characteristics than has the Agonicina. These are: isodiametric microsculpture over most of the body (some taxa); shorter antennal scape; labrum less extensively notched; mandible with more extensive occlusal surface; thorax with metapleural sutures; elytra with more

complete striation; and stylomere 2 of ovipositor with a nearly full complement of setae.

Autapotypic features of the ground plan are these: loss of submental and mental setae; posterior pair of marginal setae of pronotum inserted anterior to postero-lateral angles of pronotum; sternum VII of females with six or more setae; front tibia with apical spur short but markedly curved; middle tarsomeres 1 - 4 with Type II setae ventrally; paracocular impressions broad, supraantennal ridges broad, temples enlarged, post-ocular transverse groove developed; maxillary galeomeres slender, markedly sinuate, maxillary palpomere 4 with apical margin truncate, maxillary palpomere 3 much shorter than 4; labial prementum with long paraglossae, set off from glossal sclerite by a deep groove on dorsal surface; hind coxa with posterior margin deeply notched, hind femur elongate; male median lobe with apical portion very short, apex very broad, truncate.

Neotropical Peleciina

Notes About Features Used in Identification of Species

Frontal impressions of the head (Fig. 34). Impressions range from deep and punctiform foveae (Fig. 34B) to long grooves extended from the posterior margin of the labrum at least to the plane of the compound eyes (*Pelecium* and *Stricteripus*, Figs. 34C and E), and to the postocular transverse groove (*Eripus* and *Pelecium*, Figs. 34A and D).

Terminal palpomeres. Range of variation in form of maxillary palpomere 4 and labial palpomere 3 is illustrated in Figs. 35 - 66. The range is from ovate (cf. Fig. 35), through broadly ovate (Fig. 64), triangular (Fig. 41) to securiform (Figs. 40A and B).

Form of pronotum. This feature includes principally shape of lateral margins, form of postero-lateral angles, and development of the postero-lateral impressions - as shown in the habitus illustrations.

Elytra. The basal ridge of the elytron is developed from humerus at least to mid-width in adults of all species of subgenus *Eripus*, and in some species of *Pelecium*. This ridge is lacking from the elytra of adults of subgenus *Eripidius*, of the species of *Stricteripus*, and of some species of *Pelecium*. As some species of *Pelecium* are represented only by the holotype, and some of these, with base of elytra covered by the base of the prothorax, were not in

condition to be tampered with, we did not make use of the development of the basal ridge as a taxonomic character in *Pelecium*.

In the New World Peleciina, there is a tendency of the prothorax to rest on the base of the elytra. This tendency is very moderate in *Eripus* and *Stricteripus* and is most pronounced in the species of *Pelecium*, and principally in the more distinctly striate adults. In these, elytral interval 5 is evidently elevated near the base, and developed as a costa at the humerus, with the latter projected forward or laterally. Between these projections, the base of the elytra is markedly depressed for receiving exactly the base of the pronotum. In adults of *Eripus*, the base of the elytra is not depressed, and the humeral projections are not developed. In adults of *Stricteripus*, though the basal depression is shallow, the humeral projections are marked, and project forward and laterally (Figs. 126 - 128).

Elytral striation ranges from complete (excluding the basal part of interneur 1), with eight interneurs extended from basal to apical margin (cf. Fig. 87) to 1 - 7 completely reduced (subgenus *Eripidius*). In subgenus *Eripus* and *Stricteripus*, at least the preapical portion of interneur 7 persists, in the vicinity of a setigerous puncture (two punctures in some species of *Stricteripus*). This remnant of interneur 7 and setigerous punctures also persists in those species of *Pelecium* that exhibit reduced striation. In *Pelecium*, striation varies markedly, as shown in the habitus illustrations.

Eripus Dejean

Eripus Dejean, 1829: 9. TYPE SPECIES: *Eripus scydmaenoides* Dejean, 1829 (designated by Hope, 1838: 91). - Dejean and Boisduval, 1834: III, plate 172, Fig. 2. - Audouin and Brullé, 1834: 441. - Hope, 1838: 91. - Duponchel, in d'Orbigny, 1844: 404. - Chenu, 1850-51: 172. - Lacordaire, 1854: 251. - Dupuis, 1913: 3. - Csiki, 1932: 1286. - Reichardt, 1977: 429.

Erypus (variant spelling) Castelnau and Brullé, 1840: 134.

Eriphus (variant spelling) Bates, 1882: 39.

Pelecium (in part); Chaudoir, 1846: 529. - 1861: 127. - 1866: 108. - Schaum, 1860: 195. - Bates, 1882: 39. - Dupuis, 1913: 3 and 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51. - Reichardt, 1977: 429.

Note about synonymy. See this topic, below, under *Pelecium*.

Recognition and diagnosis. Adults of this genus are distinguished from those of other Neotropical genera by the following combination of features: color of dorsum black, labrum with four setae (- five in few specimens; cf. Fig. 1), maxillary stipes with seta at base, frontal impressions extended posteriorly to post-ocular transverse impression, occipital area not constricted, terminal palpomeres ovate, longer than wide (Figs. 35 and 36), and apex of maxillary palpomere 4 narrower in females than in males; elytron without parascutellar seta, with humerus rounded or slightly projected (Figs. 68, 69, 73, and 75), at most scutellar interneur complete and apical portion of interval 7 evident (Figs. 68 and 79), umbilical setae in two or three groups; middle tibia of male markedly broadened apically, anterior surface moderately densely setose; male with sternum VII with two or four setigerous punctures apically, internal sac of genitalia with an apical sclerite; female sternum VII with six to ten setae apically, in single row.

Description. In addition to the features noted in the description of Peleciini and Peleciina, in the key and in the diagnosis, adults of *Eripus* exhibit the following. Habitus as in Figs. 67 - 69, 71, 73 - 75, and 83. Standardized Body Length 4.40 - 11.11 mm.

Color. Body, including head black or rufous. Legs piceous to rufous, except tarsi rufous to rufo-flavous. Antennae and palpi rufous to rufo-flavous.

Microsculpture. Labrum and dorsal surface of head with mesh pattern transverse, or microlines absent, surfaces smooth. Pronotum and elytra with meshes isodiametric to transverse, elytral sculpture grated or not. Ventral surface with meshes transverse, grated or not.

Luster. Surface shining or iridescent.

Fixed setae. As described for Peleciina, but restricted as noted in "Recognition and diagnosis"; also, in one species, marginal setae of pronotum more than two, and in one species, preapical seta of interneur 7 absent.

Classification. The nine species of *Eripus* are arrayed in two subgenera: the monobasic South American *Eripidius*, new subgenus; and the Middle American *Eripus (sensu stricto)*.

Geographical distribution (Map 1). This genus is known from one locality in Amazonian Peru, and from Guatemala and México in Middle America.

Ecological distribution. Collectively, the included species range from lowland rain forest and tropical thorn forest to cloud and wet oak-pine forest at middle elevations in the mountains. Adults live on

the ground, and are found either under logs and stones, or in leaf litter.

Chorological affinities. The main Middle American element of the genus is isolated from all other peleciine groups. The range of the South American *E. franzi*, new species, is within the ranges of *Pelecium* and *Stricteripus*.

Phylogenetic relationships. *Eripus* is hypothesized to be the sister group of the stock that gave rise to *Stricteripus* and *Pelecium*.

Key to Adults of Species and Subspecies of *Eripus* Dejean

1. Elytron without basal ridge and groove, and without preapical portion of interneur 7; dorsal surface grated, iridescent. Range: South America, Amazonian Peru (Subgenus *Eripidius*, new subgenus) *E. franzi*, new species
- 1'. Elytron with basal ridge and groove, and short preapical portion of interneur 7; dorsal surface iridescent or not. Range: Middle America: Guatemala and México (Subgenus *Eripus (sensu stricto)*) 2
- 2(1'). Elytron with sutural interneur deeply impressed, extended for at least length of disc; other interneurs not evident 3
- 2'. Elytron either smooth, or with several discal interneurs shallowly and indistinctly impressed 4
- 3(2). Eyes of normal size (*i.e.*, eye as long as, or longer than temple), temple swollen (Fig. 68). Middle tarsus with broad tarsomeres *E. suturalis* (Chaudoir)
- 3'. Eyes small, reduced (length of eye less than length of temple), temples not or only slightly convex (Figs. 69 and 70). Middle tarsomeres narrow *E. subcaecus* (Chaudoir)
- 4(2'). Eyes small, much shorter than temples, latter swollen (Fig. 71). Pronotum with postero-lateral impressions very shallow ... *E. microphthalmus* (Chaudoir)

- 4'. Eyes of normal size, longer than temples. Pronotum with postero-lateral impressions deep or not 5
- 5(4'). Pronotum (Fig. 86) with three or more pairs of setae on lateral margins. Range: central highlands of Chiapas and Pacific versant of Guatemala (Map 5) *E. breedlovei*, new species
- 5'. Pronotum with two pairs of marginal setae. Range various 6
- 6(5'). Pronotum with lateral marginal grooves interrupted medially and postero-lateral angles rounded, lateral margins not sinuate (Fig. 82). Range: Sierra Madre de Oaxaca and Mixteca Alta, in Oaxaca (Map 5) *E. oaxacanus*, new species
- 6'. Pronotum with lateral marginal grooves continuous from basal to apical margin, or if interrupted medially, postero-lateral angles denticulate, lateral margins sinuate (Fig. 80). Range various 7
- 7(6'). Right mandible without anterior part of retinacular ridge (Fig. 13B). Pronotum with postero-lateral angles rounded (Fig. 73). Range: eastern part of Trans-Volcanic Sierra and Huautla Plateau, in eastern Oaxaca (Map 3) *E. nitidus* (Chaudoir)
- 7'. Right mandible with anterior part of retinacular ridge (Fig. 12). Pronotum with postero-lateral angles various in form 8
- 8(7'). Pronotum (Figs. 83 - 85) with lateral margins evenly incurved posteriorly, not sinuate; postero-lateral angles rounded, not denticulate 9
- 8'. Pronotum (Figs. 75 - 81) with lateral margins markedly or slightly sinuate, or convergent toward base; postero-lateral angles denticulate *E. scydmaenoides* Dejean
- 9(8). Pronotum subcircular, with postero-lateral angles broadly rounded (Fig. 84). Range: Sierra Madre del Sur, Guerrero (Map 5) *E. globipennis rotundicollis*, new subspecies
- 9'. Pronotum with postero-lateral angles more narrowly rounded (Figs. 83 and 85) 10
- 10(9'). Head with frontal impressions nearly straight, frons between impressions narrower and more convex; post-ocular transverse groove shallower. Pronotum (Fig. 83) short, globose. Elytra more oval, more narrowed anteriorly, less obtusely narrowed posteriorly. Range: eastern part of Trans-Volcanic Sierra (Map 5) *E. globipennis globipennis* (Chaudoir)
- 10'. Head with frontal impressions markedly convergent medially, frons broader, less convex; post-ocular transverse groove deeper. Pronotum (Fig. 85) slender, elongate. Elytra flatter, less narrowed anteriorly and posteriorly. Range: Rio Balsas Basin and western slopes of Trans-Volcanic Sierra (Map 5) *E. globipennis whiteheadi*, new subspecies

Eripidius, new subgenus

Type species (here designated). *Eripus franzi*, new species.

Included species. Only the type species is known.

Derivation of the subgeneric name. *Eripidius* is a slightly different form of "*Eripus*", which probably refers to the enlarged front and middle tarsi of the adults. We were not able to find a direct translation of the name, but it seems to come from the Greek "*eri*", translated as very, greatly, or great, and "*pous*", meaning foot. The first part of the name could be a modified form of "*eury*" meaning wide, or even of "*erio*", meaning woolly, with reference to the ventral adhesive setation of the tarsomeres. In any event, Dejean (1829: 8) notes in the first sentence of the original description the markedly dilated anterior tarsomeres, and does not refer to the vestiture until further on.

Recognition. The reduced basal ridge of the elytra, reduced setation (absence from each elytron of the seta of interneur 7), abdominal sternum VII of male with only two setae, broadly rounded postero-lateral angles of the pronotum, smooth elytra, and posterior tarsomeres 2, 3, and 4 with adhesive vestiture ventrally distinguish adults of this subgenus from those of *Eripus* (*sensu stricto*).

Description, *et cetera*. See below, under *Eripus franzi*, new species.

Eripus franzi,
new species
Fig. 67 and Map 6

Type material. HOLOTYPE male, labelled: Sierra Garevito to Quillabamba, Peru lg. Franz [handwriting difficult to read] (CS).

Derivation of specific epithet. This is a patronymic, based on the surname of the collector of the holotype, Herbert Franz.

Recognition. See this section for the subgenus *Eripidius*.

Description. Habitus as in Fig. 67. Size average for *Eripus*, overall length ca. 7 mm., Standardized Body Length 6.34 mm., width of elytra 2.40 mm.

Color. Body black to dark piceous. Antennae, palpi, and tarsi rufous. Legs, except tarsi, piceous.

Microsculpture and luster. Labrum and dorsal surface of head with microlines obsolete, meshes not formed, surface shining. Pronotum and elytra with meshes grated, surface iridescent.

Fixed setae. As for genus *Eripus*, as modified in the Recognition section for *Eripidius*.

Head. Frontal impressions wide and deep as far as posterior pair of setigerous punctures; posterior constriction moderate; temples very short, moderately swollen. Eyes average for *Eripus*, slightly convex. Antennae moderately elongate, extended past base of pronotum by antennomeres 10 and 11.

Mouthparts. Right mandible with anterior part of reticular ridge (cf. Fig. 12B).

Pronotum. Surface markedly convex, especially anteriorly. Lateral margins uniformly arcuate throughout length; antero- and postero-lateral angles widely rounded. Median longitudinal impression very shallow; postero-lateral impressions obsolete.

Elytra. Markedly convex. Humeri rounded, without trace of projections laterally or anteriorly. Apical declivity less abrupt than usual. Striation absent, surface smooth, but unbordered base with three or four small foveae, each corresponding to base of one interneur.

Habitat. The collector reported that the type specimen was found in a small patch of virgin forest.

Geographical distribution (Map 6). This species is known from the type locality only, in Amazonian Peru, ca. 20 km. from the terminal of the Cuzco-Machu Pichu railroad.

Chorological affinities. This species is the only member of *Eripus* to occur within the range of any other pelecine genera, namely *Pelecium* and *Stricteripus*. However, *E. franzi* is not known to be sympatric with species of these two genera.

Phylogenetic relationships. This species is the sister group of subgenus *Eripus*.

Eripus (sensu stricto)

Synonymy. As indicated above, for genus *Eripus*.

Included species. The eight species are named in the key, and treated in detail, below.

Recognition. The complete basal ridge of elytra, retention of clypeal setae of head and preapical setae of elytral interval 7, abdominal sternum VII of males with four setae, and only hind tarsomere 4 with adhesive setae distinguish adults of this subgenus from those of *Eripidius*.

Description. Habitus various, as in Figs. 67 - 69, 71, 73 - 75, and 83. Overall length ca. 4 - 12 mm. Standardized body length of males 4.96 - 11.66 mm., of females 4.00 - 11.32 mm. Width of elytra of males 2.04 - 4.74 mm., of females 1.68 - 4.90 mm.

Color. As described for genus.

Microsculpture and luster. Labrum with microlines fine, mesh pattern transverse, or microlines obsolete, surface shining. Dorsum of head (including clypeus) with microlines fine, meshes transverse, or transverse medially, isodiametric laterally, or lines obsolete, surface shining. Pronotum with microlines fine, mesh pattern transverse, grated, surface iridescent. Elytra with microlines fine, mesh pattern markedly transverse, grated and surface iridescent; or meshes slightly transverse, surface shining; or meshes obsolete, surface shining.

Fixed setae. As described for genus, and as modified in recognition section of subgenus, above. Abdominal sternum VII of most females with six or more setae, some with only four.

Head. As in recognition section for genus, and: eyes various, from normal (Eye L/HL 0.28 - 0.41) to slightly reduced (Eye L/HL 0.25) to markedly reduced (Eye L/HL 0.13 - 0.20). Antennal length various, generally with antennomeres 10 and 11 extended past base of pronotum.

Pronotum. Form various, as in Figs. 68 - 86. Sides slightly sinuate posteriorly, or evenly curved; postero-lateral angles acute to broadly rounded. Surface sculpture various: median longitudinal impression of most individuals shallow but distinct; postero-lateral impressions distinct, nearly linear and deep, to obsolete.

Elytra. Surface nearly smooth, with interneurs slightly and irregularly impressed, some not evident; or interneur 1 distinctly impressed.

Habitat. A wide variety of forest types are occupied, from dry deciduous thorn forest and scrub to lowland and montane forest, to wet pine-fir forest, as well as meadows closely adjacent to the forests. Altitudinal range extends from near sea level to about 3400 m above sea level.

Geographical distribution (Map 1). The range of the eight species of this subgenus extends in Nuclear Middle America from the Pacific Versant of Guatemala northward and eastward on the Gulf Versant of México to about the Tropic of Cancer.

Chorological affinities. The range of *Eripus (sensu stricto)* is isolated from the ranges of all other taxa

of Peleciini, but is closest to the range of *Pelecium* (*Pelecidium*).

Phylogenetic relationships. This subgenus is the sister group of subgenus *Eripidius*.

Eripus suturalis (Chaudoir),

New Combination

Fig. 68 and Map 2

Pelecium suturale Chaudoir, 1861: 129. Type material. LECTOTYPE (here selected), first of two specimens (sex not determined), Chaudoir-Oberthür Collection, Box 199, each labelled *suturale* Chaud. Mexique Sallé; Ex Musaeo Chaudoir [red print on white paper] (MNHP). - Bates, 1881: 40. - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Recognition and comparisons. Adults are recognized by a combination of average eye size and clearly developed interneur 1 of the elytra. Small specimens are like those of *E. subcaecus*, with terminal palpomeres narrowed (acuminate in females) and antennomeres 5 - 10 quadrate, or nearly so.

Description. Habitus as in Fig. 68. Overall length ca. 5 - 9 mm. Standardized Body Length of males 4.68 - 9.00 mm., of females 5.20 - 9.04 mm. Width of elytra of males 1.84 - 3.60 mm., of females 2.04 - 3.72 mm.

Color. Dorsal surface black.

Mouthparts. Right mandible with anterior part of retinacular ridge (cf. Fig. 12B).

Pronotum. Lateral margins slightly sinuate posteriorly, postero-lateral angles rectangular or acute and slightly prominent.

Elytra. Smooth, except for distinctly impressed interneur 1.

Variation. Specimens from lowland localities (sea level to 1000 m.) have the dorsal integument distinctly iridescent, most specimens are larger in size (SBL 6.3 - 9.0 mm.), terminal palpomeres broad at apex, and antennomeres 5 - 10 more elongate. We believe that the narrowed terminal palpomeres and short antennomeres of high altitude specimens from Oaxaca and Guerrero are related to smaller body size (SBL 4.9 - 6.7 mm.). The pronotum varies in form, posteriorly in degree of sinuation of the lateral margins and degree of convexity of lateral margins anteriorly. This variation does not accord with any geographical pattern.

Habitat. Adults of *E. suturalis* have been collected in a variety of forest types, from lowland tropical

through cloud forest to temperate oak-pine forest and its environs (i.e., wet meadows, adjacent to the forests). Altitudinal range is from near sea level to ca. 3000 m.

Geographical distribution (Map 2). The range of this species extends on the Gulf Versant from Chiapas northward to the Sierra de Guatemala, at about the latitude of the Tropic of Cancer. In the state of Oaxaca, *E. suturalis* is represented in the Zempoal massif, the Mije Highlands, and Mixteca Alta (cf. Ball and Roughley, 1982 and Ball, 1976 for maps illustrating extents and positions of these ranges). On the Pacific Versant, *E. suturalis* is known from a single locality in the Sierra Madre del Sur of Guerrero.

Chorological affinities. The range of *E. suturalis* overlaps the ranges of most other species of subgenus *Eripus*. Specimens of this species were taken together with those of *E. scydmaenoides* and *E. oaxacanus* in the Mixteca Alta of Oaxaca (Map 2; cf. Maps 4 and 5).

Phylogenetic relationships. This species and *E. subcaecus* (Chaudoir) are probably sister species, based on the presumed synapotypy of markedly narrowed terminal palpomeres of small females.

Material examined. In addition to the types, we have seen 55 specimens, all from localities in México, as follows. **Chiapas.** 9 exx., 18.7 km. N. Ocozocuahtla, 975 m., Aug. 29, 1967 (UASM). 2 exx., 13 km. N. Pueblo Nuevo Solisthuacan, Aug. 26 - 27, 1973 (MCZ). One ex., 18.7 km. W. Rizo de Oro (border of Chiapas and Oaxaca), dry oak-pine forest, 1345 m., June 24, 1979 (UASM). **Guerrero.** One ex., 11.4 km. SW Filo de Caballo on road to Puerto del Gallo, cloud for., oak-pine litter, 2650 m., Aug. 9, 1983 (UASM). One ex., 10.3 km. SW Filo de Caballo, oak-pine-for., 2774m., 8.VII.1987 (UASM). **Oaxaca.** 2 exx., Cerro Zempoaltepetl, 2652 - 3200 m., Aug. 20, 1972 (UASM). One ex., Rte. 175, 14 km. N. Ixtlan de Juarez, pine-oak for., July 21, 1975 (UASM). 2 exx., Microondas, ca. 1 km. E. jcts. Rtes. 125 and 190, 2600 m., meadow near dry oak for., July 31, 1974, and June 10, 1979 (UASM). 4 exx., Rte. 190, 53 km. NW. Oaxaca City, oak forest, 4-5 IX 1967 (UASM). One ex., 5.0 km. NW jct. 135/195, oak-acacia grassland, 1783 m., 20.VII.1987 (UASM). **Queretaro.** One ex., 29 km. NE. Landa de Matamoros, 1615 m., 17-18 IX 1965 (UASM). One ex., 29 km. E. Landa de Matamoros, 4 VII 1976 (MCZ). **Tamaulipas.** 2 exx., 13 km. NW. Gomez Farias, Sierra de Guatemala, Rancho del Cielo, 1158 m., 6-10 X 1965 (UASM). **Veraacruz.** Cordova, one ex. (BMNH), 3 exx. (CAS). 2 exx., El Bastanal, nr. Coyame, 762 m., montane rain forest, 19.IX.1965 (UASM). 2 exx., Fortin de las Flores 26-30 VI 63 (UASM). One ex., 4 km. W. Sontecomapan, 61 m., June 3, 1966 (UASM). **"Mexico".** One ex. (USNM), 3 exx. (BMNH).

Eripus subcaecus (Chaudoir),
New Combination
Figs. 69, 70, and Map 2

Pelecium subcaecum Chaudoir, 1866: 110. HOLOTYPE female, in Chaudoir - Oberthür Collection, Box 199, labelled Ex Musaeo Chaudoir [red print on white paper], in front of the following box label: subcaecum Chaud Mexique A. Deyrolle (MNHP). - Bates, 1881: 40. - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Recognition and comparisons. Adults of this species are unique in having the eyes strikingly reduced in size and in being flat, or nearly so. In the markedly sinuate lateral margins of the pronotum (Fig. 69), specimens of this species resemble those of *E. suturalis* and some of *E. scydmaenoides*, from Guerrero and Chiapas.

Description. Habitus as in Fig. 69. Overall length ca. 5 mm. Standardized Body Length of females, 4.00 - 4.32 mm. Width of elytra 1.68 mm. Eye L/HL 0.13 - 0.20.

Color. Head and body rufous, with appendages slightly paler.

Head. Eyes small, distinct or indistinct (Fig. 70). Postocular transverse impression only slightly impressed. Antennomeres 5 - 10 nearly quadrate.

Mouthparts. Right mandible with anterior part of retinacular ridge evident (cf. Fig. 12B).

Pronotum. As in Fig. 69.

Elytra. Disc smooth, except for deeply impressed interneur 1. Humeri with well developed lateral projections.

Habitat. One specimen of this species was taken in cloud forest, from litter under a tree fern.

Geographical distribution (Map 2). This species is known only from one locality in eastern Oaxaca, on the Zempoal massif (cf. Ball and Roughley, 1982: 349 and Figs. 63 - 65).

Chorological affinities. The range of *E. subcaecus* is overlapped by the ranges of *E. scydmaenoides* and *E. suturalis* (Map 2; cf. Map 4).

Phylogenetic relationships. This species and *E. suturalis* are probably sister species.

Material examined. In addition to the holotype, we have seen one female collected in the Mexican state of Oaxaca, on the Zempoal massif: 10.4 km. S. Totontepec, 2480 m., 17 VI 1979 (UASM).

Eripus microphthalmus (Chaudoir),
New Combination
Fig. 71 and Map 3

Pelecium microphthalmum Chaudoir, 1866: 108. HOLOTYPE male, in Chaudoir-Oberthür Collection, Box 199, labelled EX Musaeo Chaudoir [red print on white paper], in front of the following box label: microphthalmum Chaud. Mexique A. Deyrolle (MNHP). - Bates, 1881: 40. - Dupuis, 1913: 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Note about type material. The sex of the single specimen that Chaudoir had was not specified in the original description. A second male - labelled paratype; Orizaba; Mexique Sallé Coll; BCA Col.I.1 *Pelecium microphthalmum* Chaud. - is in the BMNH, but there is no indication of a second specimen in the original description. Consequently, this one cannot be considered a paratype, though there is no question about its specific identity.

Recognition. A combination of small eyes (Fig. 71), pronotum with postero-lateral angles rounded and lateral margins not sinuate posteriorly, and smooth, non-striate elytra distinguish adults of this species from those of the other species of subgenus *Eripus*.

Description. Habitus as in Fig. 71. Overall length ca. 9 mm. Standardized Body Length 7.40 - 7.72 mm. Width of elytra 2.68 - 2.80 mm. Eye L/HL 0.25.

Head. Eyes small (Fig. 71).

Mouthparts. Right mandible with anterior part of retinacular ridge (cf. Fig. 12B).

Pronotum. Lateral margins evenly curved from base to apex, postero-lateral angles obtuse, narrowly rounded.

Elytra. Smooth, without impressed interneurons on disc.

Geographical distribution (Map 3). This species is known only from Orizaba, state of Veracruz, México. We imagine the holotype is from the same locality, but unfortunately, there is no evidence to this effect other than the close working association of Sallé and Chaudoir, and thus the probability that each got a specimen from the supplier at the same time.

Chorological affinities. *E. microphthalmus* and *E. nitidus* have both been taken at "Orizaba", so it is possible that they are sympatric there, or were, before the forests in that area were destroyed. Also, the ranges of *E. scydmaenoides* and *E. globipennis* are close to Orizaba, but neither species is recorded from there (Map 2; cf. Maps 4 and 5).

Phylogenetic relationships. Not hypothesized here.

Material examined. The holotype, and one additional male, as noted above.

Eripus nitidus (Chaudoir),
New Combination
Figs. 13A - D, 25, 35, 73, and Map 5

Pelecium nitidum (Chaudoir), 1861: 129. LECTO-TYPE (here selected) first of three males in Chaudoir-Oberthür Collection, Box 199, labelled Ex Musaeo Chaudoir [red print on white paper], in front of the following box label: *aterimum* Chaud. Mexique Sallé (MNHP).

Pelecium aterimum; Bates (not Chaudoir), 1882: 39. - Dupuis, 1913: 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Note about synonymy. Bates was incorrect in combining *E. aterimum* (= *E. scydmaenoides*) and *E. nitidus*. In the very short description (four lines), Chaudoir did not point out the major easily seen distinction between the two species: the postero-lateral angles of the pronotum are characteristically obtuse and blunt in adults of *E. nitidus*, whereas in those of *E. aterimum*, they are slightly prominent, with lateral margins more or less sinuate before the base.

Recognition and comparisons. Adults of this species are recognized at first glance by pronotal form (Fig. 73), with lateral margins markedly but evenly incurved posteriorly, not sinuate, and postero-lateral angles narrowly obtuse, not projected. The right mandible (Fig. 13B) lacks the anterior part of the retinacular ridge.

Description. Habitus as in Fig. 73. Overall length ca. 8 - 12 mm. Standardized Body Length of males 7.10 - 11.66 mm., of females 8.12 - 10.88 mm. Width of elytra of males 2.86 - 4.68 mm., of females 2.80 - 4.24 mm. Eye L/HL 0.28 - 0.41.

Color. Dorsal surface black.

Head. Dorsal surface as in Fig. 1. Eyes of average size for subgenus. Antennomeres 5 - 10 each longer than wide, not quadrate.

Mouthparts. Mandibles as in Figs. 13A - D, right mandible (Fig. 13B) without anterior portion of retinacular ridge (cf. Fig. 12B). Terminal palpomeres of male as in Fig. 35.

Pronotum. As in Fig. 73, with features noted above.

Elytra. Smooth, or nearly so, disc without clearly impressed interneurs.

Legs. Front tibia, apex, as in Fig. 25: corbel at about right angle to long axis.

Habitat. Adults of this species were collected in for-

ests of pine, oak and fir, or pine-fir, or in meadows in the vicinity of such forests. They were also collected in cloud forest. Most collections were between 2400 and 3000 m., but one specimen was taken at 1830 m.

Geographical distribution (Map 3). The range of this species is confined to the eastern part of the Trans-Volcanic Sierra, and southward in the Sierra Madre de Oaxaca to the Huautla Plateau, north of the Rio Santo Domingo, an important zoogeographic barrier.

Chorological affinities. The range of *E. nitidus* is overlapped by or in close proximity to the ranges of: *E. suturalis*; *E. microphthalmus*; *E. scydmaenoides*; and *E. globipennis*. Both *E. nitidus* and *E. microphthalmus* are recorded from Orizaba, and this is the only record clearly implying sympatry.

Phylogenetic relationships. Not hypothesized here.

Material examined. In addition to the types and paralectotyps, we have seen 44 specimens, from the following localities in México. **Hidalgo.** 6 exx., El Chico Nat. Park, 4.8 km. NE. El Chico, oak-fir forest, 2650 m., 25 VI 1975 (UASM). One ex., 8.5 km. W. Real del Monte, oak-fir forest, 2820 m., 9 V 1977 (UASM). **Oaxaca.** One ex., Rio Santiago, 11.7 km. E. Huautla de Jimenez, 1830 m., 13 VII 1975 (UASM). **Puebla.** 5 exx., 7.6 km. E. Santa Maria del Monte, 2480 m., 9 VII 1975 (UASM). 2 exx., km. 11, Rte. 119 to Tetela de Ocampo, 2740 m., 29 VI 1975 (UASM). **Tlaxcala.** 10 exx., 6.8 km. N. Tlaxco, Liano Tiopa, meadow and pine-fir forest, 2820 m., 29-30 VI 1975 (UASM). **Veracruz.** One ex., E. slope Citlaltepeltl, 2890 m., 10 VII 1964 (CAS). 8 exx., Cofre de Perote, N. slope 2926 m., 24 VIII 1967 (UASM). One ex., 15.3 km. N. Coscomatepec, cloud forest, 2300 - 2400 m., 6-7 VII 1975 (UASM). One ex., Cuiyachapa, 15.3 km. W. Coscomatepec, 2740 - 3050 m., 5 VII 1975 (UASM). One ex., Jacala (USNM). 2 exx., 2.5 km. E. La Joya, Hwy. 140, 21 III 1980 (CAS). 2 exx., La Joya, 9 km. S Las Vigas, dense leaf litter, and grassy forest floor on pumice, 2050m., 20.VII.1987 (CUIC). 10 exx., Las Vigas (BMNH). One ex., Orizaba (BMNH).

Eripus scydmaenoides Dejean
Figs. 12, 36, 74 - 81, and Map 4

Eripus scydmaenoides Dejean, 1829: 10. HOLO-TYPE male, in Chaudoir-Oberthür Collection, Box 199, labelled: *Eripus*; *scydmaenoides*; Mexico; Höpfner [all four labels on green paper, handwritten, in Dejean's hand]; Ex Musaeo Chaudoir [red print on white paper]; TYPE (red paper); in front of the following box label: *scydmaenoides* Dej. Mexique C. Dejean (MNHP). - Dejean and Boisduval, 1832: plate 172, fig. 2. - 1834: 15.

Pelecium scydmaenoides; Chaudoir, 1861: 129. -

Bates, 1881: 40. - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Pelecium aterrimum Chaudoir, 1854: 336. Type material: evidently lost. NEOTYPE male (here designated), labelled: MEX. Oaxaca Microondas Sta. 0.5 mi. e. jct. Rtes. 190 & 125, ca. 2959 m. July 31, 1974; MIDDLE AMERICAN EXP. 1974. D. R. Whitehead, H. Frania & G. E. Ball collectors (MNHP). NEW SYNONYMY. - Chaudoir, 1861: 129. - Dupuis, 1913: 3. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Pelecium nitidum Bates, 1881: 39, and Plate 3, fig. 1 (not Chaudoir).

Pelecium subdentatum Chaudoir, 1866: 109. HOLOTYPE female, in Chaudoir-Oberthür Collection, Box 199, labelled: subdentatum type [female symbol] Chd; Mexique [both labels handwritten]; Ex Musaeo Mniszech; TYPE [red paper] (MNHP). NEW SYNONYMY. - Bates, 1881: 40. - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Note about type material. For the types of both *P. aterrimum* and *P. subdentatum*, the original descriptions mention a specimen from the Mniszech collection, both received from Dupont. The specimen for *P. aterrimum* has not been found.

Notes about synonymy. The holotype is the smallest male known (SBL 4.96 mm.) of this species, and is much smaller than the type of the conspecific *E. subdentatus* (SBL 9.32 mm.) and of *E. aterrimus* (overall length 4 lines [Chaudoir, 1854: 336] or 10.2 mm.). Size influences one's judgment of other features. At first glance, the type of *E. scydmaenoides* seems very different from the other two types. In fact, careful examination shows that the seeming differences are simply matters of scale. Similarly, the types of *E. subdentatus* and *E. aterrimus* differ in size, and probably in pronotal form. But the significance of these differences is not much in terms of overall variation in the species, as determined by examination of a series of specimens.

Recognition. *Eripus scydmaenoides* is a wide-ranging species, exhibiting variation in size and form. The various isolates that we have studied share the following combination of features: elytra virtually smooth, discal interneurs either not apparent or indistinct; pronotum (Figs. 74 - 81) with postero-lateral angles narrowly oblique, slightly prominent,

lateral margins more or less sinuate posteriorly; and eyes (Figs. 74 and 75) not reduced, normal in size.

Description. Habitus as in Figs. 74 (holotype of *E. scydmaenoides* Dejean) and 75 (holotype of *E. subdentatus* Chaudoir). Overall length ca. 5 - 12 mm. Standardized Body Length of males 4.96 - 11.08 mm., of females 5.52 - 11.32 mm. Width of elytra of males 2.04 - 4.74 mm., of females 2.26 - 4.90 mm.

Color. Dorsal surface black.

Head. Eyes of normal size, as in Figs. 74 and 75.

Mouthparts. Mandibles as in Figs. 12A - D. Right mandible with anterior part of retinacular ridge (Fig. 12B). Terminal palpomeres of females as in Fig. 36.

Pronotum. As in Figs. 74 - 81.

Elytra. Smooth, or with only vestiges of discal interneurs.

Geographical variation. Size, form and development of lateral grooves of pronotum, and development of humeri vary. Seven strikingly large individuals (SBL 10.8 - 11.3 mm.) were collected on the main ridge of the Sierra Madre del Sur, in wet oak-pine forest, west of Juchatengo, Oaxaca, in 1966. An average size specimen (SBL 6.9 mm.) was collected in the same locality in 1972. Conceivably, two species are represented, but most of the accompanying differences in form between the two size groups are probably size-related. Elsewhere, size ranges between 4.8 and 9.7 mm.

Throughout most of the range of *E. scydmaenoides*, the lateral margins of the pronotum posteriorly are only slightly sinuate (Figs. 74 - 78), or not sinuate (Figs. 79 and 81). Specimens taken on the Volcan Tacaná, on the Pacific Versant of Chiapas, and at Omilteme, Guerrero, in the Sierra Madre del Sur, have the sides markedly sinuate (Fig. 80), and the postero-lateral angles acute. Also, the Guerrero specimens are without lateral grooves of the pronotum medially, as in specimens of *E. oaxacanus* (see below). One large specimen (labelled only "Cent. Mex.", MNHP) has the sides of the pronotum moderately sinuate, but the disc is flatter and broader than in any other specimen.

The humeri of the elytra are projected more prominently than average in most specimens from localities in the Sierra Madre Oriental (states of Queretaro and San Luis Potosi).

Some of these variant population samples might comprise subspecies, but from the amount of variation observed and the extent of the range of the species, we have too few samples to attempt an infraspecific classification.

Habitat. Adults of *E. scydmaenoides* have been collected in leaf litter and under stones in shaded open areas, from sea level to 3300 m. Forest types occupied range from deciduous tropical scrub, thorn forest and tropical montane forest on the Pacific

Versant to dry and wet oak and oak-pine forests at higher elevations in the major massifs of México.

Geographical distribution (Map 4). The range of *E. scydmaenoides* extends on the Pacific Versant of México from easternmost Chiapas in the Sierra Madre de Chiapas, through the Sierra Madre del Sur, to the Sierra Madre Occidental of Jalisco, and on the Gulf Versant from Oaxaca (Mije Highlands, Sierra Madre de Oaxaca, and Mixteca Alta - see Ball, 1976) to the Sierra Madre Oriental, in the state of San Luis Potosí.

Chorological affinities. The extensive range of this species overlaps or contacts the ranges of most other species of *Eripus* (*sensu stricto*), except that of *E. breedlovei*. At one locality in Oaxaca (microondas, near junctions of Routes 125 and 190), specimens of *E. scydmaenoides* have been collected with those of *E. suturalis* and *E. oaxacanus*, and at Omilteme, Guerrero, in the Sierra Madre del Sur, specimens of *E. scydmaenoides* and of *E. globipennis rotundicollis* have been collected.

Phylogenetic relationships. This species is probably closely related to *E. oaxacanus*, based on overall similarity in habitus. Most of this "similarity", however, involves plesiotypic features. On the other hand, it does not seem likely that either of these two species is more closely related to any other species of subgenus *Eripus*.

Material examined. In addition to the type material, we have seen 47 specimens of this species, all from México. **Chiapas.** One ex., Unión Juárez, Barranca Providencia, NE. slope Volcan Tacaná, montane tropical forest, leaf litter, 1500 m., 15 XII 1975 (UASM). **Guerrero.** 2 exx., Omilteme (BMNH), one ex., Omilteme (Oberthür Coll., MNHP). **Jalisco.** 13 exx., Estacion Biol. Chamela, thorn forest, 20 VII - 2 VIII 1984 (UCBC). 7 exx., 17.1 km. S. La Huerta, Rte. 80, 300 m., 4 VIII 1966 (UASM). **Mexico (state of).** 5 exx., microondas, 3.7 km. NE. El Rosal, oak forest, 2710 m., 24 VII 1975 (UASM). **Oaxaca.** 3 exx., Cerro Yucuyacua, E. Nundaco, 3139 - 3322 m., 17 VIII 1972 (UASM). One ex., Rte. 131, 35.1 km. N. Juchatengo, wet oak-pine forest, 2164 m., 11 VII 1972, and 7 exx., 18-19 VII 1966 (UASM). 2 exx., microondas sta., ca. 1 km. E. jct. Rtes. 125 and 190, 2600 m., 31 VII 1974 and 23-24 VIII 1972 (UASM). 3 exx., Rte. 175, 21.4 km. N. Oaxaca city, oak-pine forest, 2195 m., 12 VIII 1972 (UASM). One ex., 30.6 km. S Suchixtepec, wet oak-pine for., 1294 m., 12.VII.1987 (UASM). One ex., 142.4 km. S. Valle Nacional, 2438 m., 2 V 1966 (UASM). **Puebla.** One ex., 2.7 km. S Apulco (nr. Zacapoaxtla), cloud for., 1401 m., 22.VII.1987 (UASM). **Queretaro.** One ex., 3.5 km. W. Pinal de Amoles, 2530 m., 15 XI 1965 (UASM). **San Luis Potosí.** 2 exx., 6.4 km. E. Ciudad del Maiz, 2 IX 1964 (UASM). One ex., 7-29 km. E. Ciudad del Maiz, 1128-1310 m., 9-10 VII 1966 (UASM). **Veracruz.** One ex., 1.8 km. S. Huatusco, 24 IV 1977 (UASM). **Mexico (country).** 2 exx., Koebele coll. (CAS).

Eripus oaxacanus, new species Fig. 82 and Map 5

Type material. HOLOTYPE male and ALLOTYPE female, labelled: MEXICO Oaxaca Microondas Sta. 0.5 mi. e. jct. Rtes. 125 and 190 oak for (dry) 2650 m. VI.10.1979 J. S. Ashe, G. E. Ball, D. Shpeley (USNM). PARATYPES three, labelled as follows. Female, MEXICO Oaxaca 1.6 mi. w. Capulalpam wet oak-pine for., Aug. 13, '72 B. S. Heming, G. E. Ball (UASM). Male, MEXICO, Oaxaca, 14.3 km. e. Ixtlan de Juarez dry pine-oak for. July 21, 1975 G. E. Ball and H. E. Frania (CS). Female, MEXICO, Oaxaca, 7.4 km. N. Santiago Tejaman oak for (dry) on ground 2350 m. VI.9-10. 1979 J. S. Ashe, G. E. Ball, and D. Shpeley (BMNH).

Derivation of specific epithet. The Latinized, adjectival form of "Oaxaca", the name of the state in México, in which the type locality of the species is located.

Recognition. Adults of this species most closely resemble those of *E. scydmaenoides*. They are rather more bulky, and the lateral grooves of the pronotum are interrupted medially. This latter feature is also evident in Omilteme specimens of *E. scydmaenoides*, but not in specimens that are sympatric with *E. oaxacanus*. Other features of this species are eyes of average size, postero-lateral angles of pronotum rounded, lateral margins slightly sinuate, and elytra smooth, without discal interneurs.

Description. Body form stout. Overall length ca. 8 - 10 mm. Standardized Body Length of males 8.36 - 8.66 mm., of females 6.42 - 9.68 mm. Width of elytra of males 3.34 - 3.98 mm., of females 2.66 - 3.90 mm.

Color. Dorsal surface piceous to black.

Head. Eyes of average size, only slightly convex. Temples quite swollen, hind constriction moderate. Antennae average, exceeding base of pronotum with antennomeres 10 and 11.

Mouthparts. Right mandible with anterior part of retinacular ridge (cf. Fig. 12B).

Pronotum (Fig. 82). Anteriorly very convex, posteriorly less so; lateral margins rounded to slightly sinuate posteriorly; lateral grooves interrupted medially.

Elytra. Oval, markedly convex. Humeri rounded, not projected. Apical declivity marked.

Habitat. All specimens of this species were collected in or adjacent to dry oak, or dry or wet oak-pine forest, at altitudes of more than 2000 m.

Geographical distribution (Map 5). The range of this species is confined to the Oaxacan massifs of the Gulf Versant of México (Mixteca Alta, Mije Highlands, and Sierra Madre de Oaxaca - cf. Ball and

Roughley, 1982). This area is notable as a center of endemism in the Mexican highlands (cf. Ball, 1976).

Material examined. The type series, only.

Eripus globipennis (Chaudoir),
New Combination

Recognition. Adults of this species are recognized by a combination of comparatively small body size (SBL less than 9.0 mm.), and pronotum with rounded postero-lateral angles (Figs. 82 - 85). The lateral margins of the pronotum are more constricted in adults of *E. globipennis* (Fig. 83) than in those of *E. nitidus* (Fig. 73), which also have rounded postero-lateral angles. The right mandible of *E. globipennis* adults has a well developed anterior part of the retinacular ridge (cf. Fig. 12B). Eyes are of average size for subgenus *Eripus*.

Included taxa. Three subspecies are recognized: *E. g. globipennis* (Chaudoir); *E. g. rotundicollis*, new subspecies; and *E. g. whiteheadi*, new subspecies.

Geographical distribution (Map 5). The range of this species includes the Trans-Volcanic Sierra, Sierra Madre del Sur, and the Rio Balsas Basin.

Chorological affinities. The geographical range of *E. globipennis* is overlapped by those of *E. microphthalmus*, *E. scydmaenoides*, and *E. nitidus*. For details of range contacts, see below.

Phylogenetic relationships. The broadly rounded postero-lateral angles of the pronotum, probably an apotypic feature, are shared with specimens of *E. breedlovei*. Possibly then these two species are sister species, even though their known geographical ranges are widely separated from one another (cf. Map 5).

Eripus g. globipennis (Chaudoir)
Fig. 83, and Map 5

Pelecium globipenne Chaudoir, 1866: 107. Type material: LECTOTYPE male (here selected) and PARALECTOTYPE female, in Chaudoir-Oberthür Collection, Box 199, each labelled Ex Musaeo Chaudoir [red print on white paper], in front of following box label: globipenne Chaud. Mexique A. Deyrolle (MNHP). - Bates, 1881: 40. - Dupuis, 1913: 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Note about type material. The original description specifies a male and a female, received from Deyrolle.

Recognition. See key to species and subspecies of *Eripus*.

Description. Habitus as in Fig. 83. Overall length ca. 5 - 6 mm. Standardized Body Length of males 5.54 - 5.74 mm., of female measured 5.26 mm. Width of elytra of males 2.14 - 2.20 mm., of female 2.24 mm.

Color. Dorsal surface black.

Head. Eyes moderately convex, temples rather short. Antennae extended to base of pronotum.

Pronotum. Very convex, principally anteriorly toward rounded antero-lateral angles. Postero-lateral angles obtuse, rounded.

Elytra. Oval, markedly convex, apical declivity very abrupt. Discal interneurs absent, surface smooth. Humeri rounded.

Habitat. Data are available for one locality only: specimens were found in leaf litter in a temperate wet oak-pine forest, at about 2000 m.

Geographical distribution (Map 5). This subspecies is known only from the eastern part of the Trans-Volcanic Sierra.

Chorological affinities. A specimen of this subspecies, one of *E. microphthalmus*, and one of *E. nitidus* have been taken at Orizaba. Additionally, specimens of *E. suturalis* and *E. scydmaenoides* have been collected near the localities for *E. g. globipennis*.

Material examined. In addition to the type material, we have seen four specimens from the Mexican state of Veracruz, as follows. 3 exx., 21.2 km. W. Ciudad Mendoza, 2000 m., 22 VI 1966 (UASM). One ex., Orizaba (BMNH).

Eripus g. rotundicollis,
new subspecies
Fig. 84 and Map 5

Type material. HOLOTYPE male, labelled: MEXICO Guerrero 26.2 km. from jct. rd. to Chichihualco on rd. to Filo de Caballo 1840 m.; ridge top under stones, oak-pine-palmetto-madroño. 83-69. Aug. 9, 1983; 1983 MEX EXPED. H. E. Frania, R. J. Jaagumagi collectors (USNM). ALLOTYPE female, labelled: MEXICO Guerrero 4900', 8.4 mi w. Chilpancingo VII.16.66; George E. Ball, D. R. Whitehead collectors (USNM). Four male PARATYPES, labelled as follows. Two, same as holotype (UASM). Two, MEXICO, Guerrero, 15 km. sw Xochipala

open grassy ridge top 1800 m. 13 Aug. 1986 J. Rawlins, R. Davidson (CNHM and CS).

Derivation of specific epithet. From two Latin words: *rotundus*, round, and *collis*, neck or collar (the pronotum), in allusion to the markedly rotund form of the pronotum.

Recognition. See key to species and subspecies of *Eripus*.

Description. Overall length ca. 8 - 9 mm. Standardized Body Length of males 7.08 - 7.52 mm., of females 7.02 - 7.74 mm.; width of elytra of males 2.86 - 3.00 mm., of females 2.86 - 3.20 mm. In most features, same as *E. g. globipennis*.

Pronotum. Subcircular in outline (Fig. 84), disc markedly convex; antero-lateral angles widely rounded, postero-lateral angles wholly rounded.

Habitat. Specimens of this subspecies have been collected in rather dry semi-tropical forests, with madroños and palm trees among the pines and oaks, at altitudes between 1500 and 1900 m.

Geographical distribution (Map 5). This subspecies is known only from the Sierra Madre del Sur, in the Mexican state of Guerrero, on the Pacific Versant.

Chorological affinities. The range of this subspecies is overlapped by those of *E. suturalis* and *E. scydmaenoides* (cf. Maps 2 and 4). The locality where the allotype was collected is only a few kilometers from Omilteme, where specimens of *E. scydmaenoides* were collected.

Material examined. The type series, only.

Eripus g. whiteheadi, new subspecies Figs. 1, 85 and Map 5

Type material. HOLOTYPE male and ALLOTYPE female, labelled: MEXICO Morelos 4800' 5.4. mi. e. Cuernavaca VI. 29-30. 1966 pedregal; George E. Ball, D.R. Whitehead collectors (USNM). PARATYPES four, one male labelled same as holotype (UASM). One female, Mexico Guerrero: Iguala 823 m. Aug. 22, 1976 E.S. Ross (CAS). One female MEXICO Jalisco El Rincon 33.7 mi. NW Los Volcanes, 4600', Aug. 11-12, 1967; Ball, T.L. Erwin and R.E. Leech collectors (UASM). One female, MEX. Puebla Hwy 190 36 km. NW Huahuapan de Leon, Oax. 9 Aug. 1988 1600 m. J.K. Liebherr; sandy creek bed, at night (CUIC).

Derivation of subspecific epithet. This subspecies is named after the collector of part of the type series, Donald R. Whitehead, in appreciation for his many contributions to this study, including collection of many specimens of *Eripus*.

Recognition. See key to species and subspecies of *Eripus*.

Description. Overall length ca. 8 - 10mm. Standardized Body Length of males 7.20 - 8.12 mm., of females 7.10 - 8.96 mm. Width of elytra of males 2.86-3.16 mm., of females 2.82-3.44 mm.

In most features, same as *E. g. globipennis*. Dorsal surface of head as in Fig. 1. (Note: the only specimen of *Eripus* with six labral setae.)

Pronotum (Fig. 85). Postero-lateral angles less rounded than in other subspecies, and pronotum generally more elongate, less rotund.

Habitat. Specimens of this subspecies were collected at relatively low altitudes, between 800 and 1500 m., in Balsas thorn forest, on volcanic soil, and in oak-pine forest.

Geographical distribution (Map 5). This subspecies is known from widely separated localities in Morelos, Guerrero, Puebla, and Jalisco, around the rim of the Trans-Volcanic Sierra and Sierra Madre del Sur.

Chorological affinities. The range of this subspecies is overlapped by that of *E. scydmaenoides* (cf. Map 4), but the two taxa have not been collected in the same locality. Also, the ranges of *E. g. whiteheadi* and *E. g. rotundicollis* are quite close. Presumably, short clines ought to connect populations of these two subspecies.

Material examined. The type series, only.

Eripus breedlovei, new species Fig. 86 and Map 5.

Type material. HOLOTYPE female, labelled: MEXICO Chiapas Municipio Comitán 8-12 km. N. Mex. Hwy 190 at Laguna Chamula on logging rd., 2438 m. 15.X.1976 D.E. & J.A. Breedlove; Cal Acad Sci Coll (CAS). PARATYPE female, labelled: [female symbol] not winged; ADP 14112; GUATEMALA San Marcos 15° 01' - 91° 48' 3000 m 24-25 May 1973; in damp ravine under stone; T.L. & L.J. Erwin Collecting Expedition #18 Notebook #2; Erwin and Hevel Central American Expedition 1973 (USNM).

Derivation of specific epithet. This is a patronymic, based on the surname of the eminent botanist of the California Academy of Sciences, Dr. Dennis E. Breedlove, who is very well known for his botanical and ethnobotanical work in Chiapas, but not so well known in entomological circles, in spite of the rich insect material (including the holotype of this species) that he has accumulated in the course of his extensive botanical forays.

Recognition and comparisons. Adults of this species are easily recognized by having on the lateral margins of the pronotum more than two pairs of setae. Additionally, the postero-lateral angles of the pronotum are rounded.

Description. Overall length ca. 5.5 - 10 mm. Standardized Body Length of females 4.90 - 9.18 mm. Width of elytra 2.1 - 3.5 mm.

Color. Dorsal surface black.

Head. Eyes average size, convex.

Mouthparts. Right mandible with anterior part of retinacular ridge (cf. Fig. 12B).

Pronotum. As in Fig. 86, postero-lateral angles rounded, especially those of paratype.

Elytra. Convex, humeri rounded, apical declivity abrupt; surface smooth, discal interneurs not evident.

Habitat. The only two specimens of this species have been collected at altitudes between 2400 and 3000 m., in oak-pine forest at the lower elevation.

Geographical distribution (Map 5). The range of this species includes the Central Highlands of Chiapas, México, and the Sierra Madre de Chiapas, in Guatemala. It seems almost certain that it must also occur in the latter mountain range in Chiapas. Experience with other taxa (cf. Ball and Roughley, 1982) suggests that structurally similar forms occurring in these two mountain ranges are specifically distinct. Possibly the differences between the holotype and paratype herald different species - but that remains to be seen, in terms of additional material.

Chorological affinities. The only species of *Eripus* whose geographical range might overlap that of *E. breedlovei* is *E. scydmaenoides* (cf. Map 4).

Phylogenetic relationships. This species may be sister group to *E. globipennis*, a surmise based on the rounded postero-lateral angles of the pronotum, exhibited by both of these forms.

Material examined. Types, only.

Pelecium Kirby

Pelecium Kirby, 1817: 378. TYPE SPECIES: *Pelecium cyanipes* Kirby, 1817: 378 (by monotypy). Dejean and Boisduval, 1834: 6. - Audouin and Brullé, 1834: 440. - Hope, 1838: 91. - Blanchard, in Cuvier, 1843: 152. - Chevrolat, in D'Orbigny, 1847: 548. - Chaudoir, 1846: 529. - 1854: 335. - 1861: 127. - 1866: 108. - Chenu, 1850-51: 172. - Lacordaire, 1854: 253. - Schaum, 1860: 195. - 1864: Horn, 1881: 170. - Dupuis, 1913: 3. - Csiki, 1932: 1286. - Blackwelder, 1944: 51. - Reichardt, 1977: 361, 365. - 1979: 323. - Allen, 1979: 485. - Erwin, 1979a: 361, 365. - 1979b: 480. - 1979c: 485. - Noonan, 1985: 337.

Augasmosomus Chaudoir, 1846: 527. TYPE SPECIES: *Augasmosomus faldermanni* Chaudoir, 1846: 428 (by monotypy). - 1850: 436 - Chenu, 1850-51: 173. - Schaum, 1860: 195.

Notes about synonymy. Both *Eripus* Dejean and *Augasmosomus* Chaudoir were regarded by previous authors as congeneric with *Pelecium* Kirby. Adults of both of the former groups are characterized by elytra with reduced striation. Nonetheless, we include only *Augasmosomus* in *Pelecium* and exclude *Eripus*. The reason is that *Augasmosomus* and *Pelecium* differ by only elytral sculpture, whereas *Eripus* is characterized by a variety of differences, providing a morphological gap between the two groups of about the same extent as between the Afrotropical-Oriental genera on the one hand, and the Australian genera on the other. Furthermore, character states regarded as synapotypic for *Pelecium* (in a restricted sense) also characterize *Augasmosomus*. But these features are not shared with *Eripus*.

Recognition and diagnosis. Adults of *Pelecium* are at once distinguished from their New World counterparts by having just a single pair of supraorbital setae, males have a single pair of setae on abdominal sternum VII, and most species are characterized by bright color of the dorsal surface. The elytra of many species have deep interneurs in addition to the sutural interneur. Also, adults exhibit elytra with humeri thickened, in form of more or less prominent lateral tooth-like projections.

Description. In addition to features noted in the descriptions of *Peleciini* and *Peleciina*, in the key and in Recognition and diagnosis, adults of *Pelecium* exhibit the following. Size moderate to large, Standardized Body Length ca. 6 to 18 mm; overall length to 28 mm.

Color, microsculpture, and luster. Co-extensive with range noted in description of tribe. Adults of most species with bright color dorsally.

Head. Frontal impressions punctiform or grooved, but in adults of most species not extended posteriorly to transverse groove; supraantennal grooves and ridges broad.

Pronotum. Base extended posteriorly, clearly overlapping base of elytra.

Elytra. Co-extensive with range noted for tribe.

Legs. Middle tibia somewhat widened preapically, with moderately dense vestiture of long setae.

Classification. The 33 species of *Pelecium* that we recognize are arrayed in two subgenera and eight (informal) species groups, based in part on features believed to be synapotypic for each of these assemblages. The subgenera are *Pelecidium*, new, and *Pelecium* (*sensu stricto*).

Geographical distribution. The known range of this genus extends from northern Argentina to Panamá. See Maps 6 - 12.

Chorological affinities and phylogenetic relationships. See references to these topics under *Eripus* and *Stricteripus*.

KEY TO SUBGENERA, SPECIES, AND SUBSPECIES OF THE GENUS *Pelecium* KIRBY

1. Labrum with four setae. Pronotum with one pair of lateral marginal setae; median longitudinal impression deep. Elytron without parascutellar seta Subgenus *Pelecidium*, new 2
- 1'. Labrum with six setae. Pronotum with two or more pairs of marginal setae; median longitudinal impression various. Elytron with parascutellar seta Subgenus *Pelecium* (*s. str.*) 4
- 2(1). Elytron with only interneur 1 deeply impressed, and only thus in medial part of disc (Fig. 114A) *P. laevigatum* Guérin-Ménéville
- 2'. Elytron with at least interneurs 1 - 4 deeply impressed on disc 3
- 3(2'). Dorsal surface of pronotum and elytra subopaque. Elytral interneurs 2 - 4 terminated closer to base, intervening smooth space rather narrow (Fig. 88) *P. sulcatum* Guérin-Ménéville
- 3'. Dorsal surface of pronotum and elytra shining, iridescent. Elytral interneurs 2 - 4 terminated far from base, intervening smooth space extensive (Fig. 89) *P. sulcipenne* Chaudoir
- 4(1'). Elytron with striation complete: eight clearly impressed interneurs, interneur 7 or 6 and 7 joined to 8 at lateral margin, not extended to base (Fig. 91) 5
- 4'. Elytron with striation incomplete, or wholly smooth 16
- 5(4). Tarsomere 5 with row of few slender setae on each ventro-lateral margin 6
- 5'. Tarsomere 5 without setae ventro-laterally 8
- 6(5). Dorsal surface of pronotum and elytra blue or black; microsculpture meshes isodiametric, surface dull *P. cyanipes* Kirby
- 6'. Dorsal surface of pronotum and elytra violaceous; microsculpture meshes transverse, on elytra transverse-grated, surface shining to iridescent 7
- 7(6'). Elytron with humerus projected anteriorly. Pronotum with base not margined (Fig. 101) *P. renati* Straneo
- 7'. Elytron with humerus not projected anteriorly. Pronotum with base margined laterally (Fig. 102) *P. striatum* Straneo
- 8(5'). Elytron with interneurs impunctate 9
- 8'. Elytron with interneurs punctate at least on apical declivity 14
- 9(8). Head with frontal impressions sinuous, elongate (Fig. 95). Dorsal surface dark, with greenish reflections *P. longicollis impunctatum*, new subspecies
- 9'. Head with frontal impressions not sinuate, short (Figs. 92 and 93) or long (Figs. 90 and 91) 10

- 10(9'). Head with frontal impressions short, punctiform, at most extended to level of anterior margin of compound eye (Figs. 92 and 93A). Size smaller, length of body less than 10 mm. Color of dorsal surface somber 11
- 10'. Head with frontal impressions long, extended to mid-eye level, or more posterad (Figs. 90 and 91). Size of most specimens larger, length 9 - 20 mm. Color of dorsal surface various 12
- 11(10). Pronotum with lateral margins only slightly arcuate; postero-lateral impressions very short. Elytra with apical declivity very steep. General form elongate and sub-parallel (Fig. 93) *P. parallelum*, new species
- 11'. Pronotum with lateral margins more arcuate; postero-lateral impressions longer (Fig. 92). Apical declivity of elytra more gradually sloped *P. tenellum* Schaum
- 12(10'). Eyes small. Elytra elongate, not markedly arcuate laterally; ratio length/width *ca.* 1.80 (Fig. 90) *P. striatipenne* Chaudoir
- 12'. Eyes larger. Elytra widened, lateral margins markedly arcuate 13
- 13(12'). Dorsal surface bright green, pronotum with or without bluish reflections *P. drakei* Quedenfeldt
- 13'. Dorsal surface violaceous or bluish *P. violaceum* Brullé
- 14(8'). Pronotum short, wider than long; stouter species (Fig. 96) *P. punctatum* Straneo
- 14'. Pronotum elongate, longer than wide 15
- 15(14'). Elytron with interneurs punctate throughout length. Head with frontal impressions shorter, not sinuate laterally (Fig. 94) *P. brasiliense* Straneo
- 15'. Elytral interneurs with punctures on apical declivity, only. Frontal impressions elongate, markedly sinuate laterally (Fig. 95) *P. longicolle longicolle* Straneo
- 16(4'). Head with frontal impressions elongate, extended posteriorly to postocular transverse impression (as in *Eripus* exx.) 17
- 16'. Head with frontal impressions shorter, punctiform or not, not extended beyond posterior margin of compound eyes 19
- 17(16). Elytron with interneurs 1 - 4 deeply impressed, 4 short, not extended to apical declivity posteriorly. Pronotum black, elytra blackish, with aeneous luster (Fig. 113) *P. negrei* Straneo
- 17'. Elytron with more than four interneurs impressed. Pronotum and elytra bright coppery 18
- 18(17'). Elytron with interneurs 1 - 5 deeply impressed, but 5 very short (Fig. 112) *P. fulgidum* Straneo
- 18'. Elytron with interneurs 1 - 6 deeply impressed, but 6 very short (Fig. 111) *P. refulgens* Guérin-Ménéville
- 19(16'). Elytron with more than three discal interneurs deeply impressed in at least part of length 20
- 19'. Elytron with three or fewer discal interneurs deeply impressed, or wholly smooth 27
- 20(19). Tarsomere 5 with row of few slender setae on each ventro-lateral margin 21
- 20'. Tarsomere 5 glabrous ventrally 24
- 21(20). Elytron with interneurs smooth, impunctate. Pronotum and elytra bright coppery. Elytra markedly convex, with interneurs 1-6 deeply impressed, 6 markedly shortened anteriorly (Fig. 103) *P. bolivianum* Straneo
- 21'. Elytral interneurs markedly punctate 22
- 22(21'). Elytron with interneurs 1 - 6 impressed. Pronotum wider than long. Dorsal surface black with faint violaceous reflections (Fig. 104) *P. atroviolaceum*, new species
- 22'. Elytron with not more than interneurs 1 - 5 impressed. Pronotum at least as long as wide 23
- 23(22'). Elytron with interneurs 1-5 impressed. Pronotum longer than wide. Dorsal surface coppery (Fig. 106) *P. punctatostriatum* Straneo

- 23'. Elytron with only interneurs 1 - 4 impressed. Pronotum as long as wide. Color various, head black with or without greenish reflections; pronotum dark green; and elytra black with bluish-violaceous reflections (Fig. 105) *P. semistriatum*, new species
- 24(20'). Pronotum with lateral margins markedly rounded, with three pairs of marginal setae (Fig. 110) *P. rotundipenne* Schaum
- 24'. Pronotum various in form, with two pairs of marginal setae 25
- 25(24'). Elytron with only discal interneurs 1 - 4 deep, and only interneur 1 extended to apical declivity, 4 remote from base and apex (Fig. 109). Pronotum with posterolateral impressions indistinct, shallow. Color of dorsal surface bright coppery, appearing purple in subdued light; laterally with green reflections *P. purpureum* Straneo
- 25'. Elytron with at least interneurs 1 - 5 moderately deeply impressed, and extended to rather gradually sloped apical declivity. Pronotum with postero-lateral impressions various. Color of dorsum dark purplish, metallic, without green reflections laterally 26
- 26(25'). Pronotum with sides markedly rounded, postero-lateral impressions evident (Fig. 107) *P. paulae*, new species
- 26'. Pronotum with sides less rounded, subsinuate posteriorly, postero-lateral impressions indistinct (Fig. 108) . *P. helenae*, new species
- 27(19'). Tarsomere 5 glabrous ventrally 28
- 27'. Tarsomere 5 with row of few slender setae on each ventro-lateral margin 33
- 28(27). Elytron with at least portions of interneurs 1 and 2 deeply impressed 29
- 28'. Elytron with not more than interneur 1 deeply impressed in part of length 30
- 29(28). Pronotum with lateral margins broadly rounded to postero-lateral angles (Fig. 116). Dorsum dark bluish or bluish-violaceous *P. obtusum* Straneo
- 29'. Pronotum with lateral margins slightly sinuate posteriorly, postero-lateral angles slightly projected (Fig. 117). Dorsal surface black with faint violaceous reflections *P. bisulcatum* Straneo
- 30(28'). Head with frontal impressions slightly elongate, extended to or slightly posterad of anterior margin of compound eyes (Fig. 115). Dorsal surface green *P. foveicollis* Chaudoir
- 30'. Head with frontal impressions punctiform 31
- 31(30'). Elytron smooth, no discal interneurs impressed (Fig. 120) *P. laeve* Chaudoir
- 31'. Elytron with at least interneur 1 deeply impressed, with or without shallow vestiges of some other interneurs 32
- 32(31'). Interneur 2 shallow, but quite distinct (Fig. 118) *P. besckii* Chaudoir
- 32'. Interneur 2 evanescent (Fig. 119) *P. faldermanni* Chaudoir
- 33(27'). Dorsal surface bluish. Base of pronotum narrower than apical margin. Elytron with lateral border terminated in small deep fovea (Fig. 121) *P. obscurum* Straneo
- 33'. Dorsal surface coppery. Base of pronotum not narrower than apical margin (Fig. 122) *P. nicki* Straneo

Pelecidium, new subgenus

Type species (here designated). *Pelecium sulcatum* Guérin Ménéville.

Derivation of the subgeneric name. *Pelecidium* is a slightly different form of "*Pelecium*", derived from the Greek word for ax, which alludes to the securiform (ax-like) terminal palpomeres of adults of many of the species included in that genus.

Included species. *P. sulcatum* Guérin-Ménéville, *P. sulcipenne* Chaudoir, and *P. laevigatum* Guérin-Ménéville.

Recognition. The reduced number of setae (four on labrum, single posterior pair on pronotum, absence of parascutellar setae from elytra), numerous setae on the base of the maxillary stipes, scutellum reduced, not extended between elytra at base, and deeply sculptured pronotum and elytra are distinctive for adults of this subgenus.

Description. Habitus as in Figs. 88, 89, and 114 A and B. Color of dorsum black.

Microsculpture and luster. Labrum and dorsal surface of head with meshes transverse, surface shiny. Pronotum with meshes transverse, surface subiridescent. Elytra with meshes transverse, surface subiridescent, sericeous.

Fixed setae. Labrum with four setae. Clypeus with single pair of setae. Pronotum with single pair of lateral setae. Maxillary palpomeres at base with numerous setae. Sternum VII posteriorly: males with two setae, females with six to eight setae.

Head. Frontal impressions elongate, deep, extended to about transverse plane of middle of eyes.

Mandibles (Figs. 14A-F). Right mandible with anterior part of retinacular ridge extensive, distinct (Fig. 14B, arr).

Maxillae. Palpomere 4 of male narrowly securiform or broadly ovate (Figs. 37A and 39), that of females similar (Fig. 38).

Labium. Palpomere 3 of male broadly securiform (Fig. 37B), in form of equilateral triangle; of female, triangular, but narrower.

Pronotum. Postero-lateral impressions basin-like, about as broad as long.

Elytra. Striate, reduced to not more than five interneurs.

Legs. Tarsomere 5 with ventro-lateral setae.

Geographical distribution (Map 6). The range of *Pelecidium* extends from northwestern Colombia in South America, to the Republic of Panamá, in lower Central America.

Chorological affinities. The geographical range of this group seems isolated from the ranges of most other peleciniines, being overlapped only by *Stricteripus banningeri*, a derived species in its genus.

Phylogenetic relationships. Unique derived features are: reduced number of setae on labrum and pronotum, numerous setae on the maxillary stipites, and deep sulcation of the pronotum. This combination of apotypic features establishes the monophyly of *Pelecidium*. The plesiotypic condition of the right mandible and relatively low number of setae on abdominal sternum VII of males and females indicate a primitive position within the genus *Pelecium*.

Pelecium sulcatum Guérin-Ménéville

Figs. 37, 38, 88, and Map 6

Pelecium sulcatum Guérin-Ménéville, 1843b: 16. HOLOTYPE and PARATYPE in Chaudoir-Oberthür Collection, Box No. 199. Specimens in front of following box label: *sulcatum* Guérin Colombie Guérin; specimens labelled Ex Musaeo Chaudoir [red print on white paper]. - Chaudoir, 1846: 535. - d'Orbigny, 1847: 548. - Dupuis, 1913: 4. - Salt, 1928: 131. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Note about type material. According to the original

description, the type material was obtained by Goudot, from "Colombie, Vallée de la Madelaine", which area is the type locality.

Recognition. See key, and Figs. 37, 38, and 88.

Measurements and descriptive notes. Habitus as in Fig. 88. Overall length 9-14 mm. Holotype: Standardized Body Length 10.5 mm., width of elytra 3.7 mm. Length/width for most specimens, 1.5; for Bonda specimen, 1.65, elytra thus more elongate.

Impressions of head, pronotum, and elytral interneurs deep, intervals markedly convex. Elytron with interneurs 6 or 7 absent, interneur 5 short or absent from some specimens, only interneur 2 extended to base; interneurs 1-4 terminated separately on declivity. Females with Sternum VII of abdomen posteriorly with row of eight setae.

Way of life. See Salt (1928) for details. A general account is presented in conjunction with treatment of tribal characters.

Geographical distribution (Map 6). This species is known only from Colombia.

Material examined. In addition to the type material, we have seen more than 20 specimens from the following localities. Colombia (ex. Mus. Mniszech) (Coll. Oberthür, MNHP) 1 specimen; Ocana (Laudet 1875) 7 specimens (Coll. Oberthür, MNHP); Colombia, Sevilla (C.C. Gowdy 1-5-26, n. 122, ex. coll. Van Emden, BMNH); Colombia, Magdalena Valley, El Banco (C. Alle. 62 BMNH); Sevilla, Magd. many exx. (MCZ)

Pelecium sulcipes Chaudoir

Figs. 3, 7, 9, 14A-F, 23, 24, 31, 39, 89, and Map 6.

Pelecium sulcipes Chaudoir, 1861: 128. HOLOTYPE male, in Chaudoir-Oberthür Collection, Box 199, labelled: *sulcipes* Chaud. Colombie C. Laferté; Ex Musaeo Chaudoir [red print on white paper] (MNHP). - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Note about type material. The holotype is in the *P. sulcatum* series of specimens with the normal box label folded and attached to the pin. Although the published locality record requires a specimen from "Venezuela", in the early part of the 19th Century, the present northern South American countries were not clearly delimited, and what was "Colombie" at the time of collection of the type specimen could have become "Venezuela" by the time the

species was described. In any event, Venezuela should be accepted as the type area of this species.

Recognition. See key and Figs. 39 and 89. Females have only six setae posteriorly on sternum VII.

Measurements and descriptive notes. Habitus in Fig. 89. Overall Length 11.5 - 13 mm., width of elytra 3 - 3.8 mm. Holotype: Standardized Body Length 11.7 mm., width of elytra 4.3 mm. Characters generally as for *P. sulcatum*.

Geographical distribution (Map 6). This species is known only from northern South America and Lower Central America (Panamá).

Material examined. In addition to the holotype, we have seen 32 specimens from the following localities. **PANAMA.** Barro Colorado Island; R.W.8.V, Taylor, 21.VI.1961 (MZSP); 4 exx., Wheeler Trail, 15-27 May 1972, T.L. and L.J. Erwin (USNM); 6 exx., Erwin-Hevel Exp., July, 1973 (USNM); 1 ex., Berlese funnel, Zetek 5135, April-Oct., 1947 (USNM). 1 ex., 16 km. SE EL Valle, 8°30', 80°01', 24 June, 1973, H. P. Stockwell (USNM). 1 ex., 7 km. N. rd to EL Valle, 08°31', 1 July 1973, T.L. and L.J. Erwin (USNM). 1 ex., La Chorra, IV.1944, K.E. Frick (CAS). 2 exx., La Joya, 14 August 1945, K.E. Frick (CAS and CS). 12 exx., Los Santos, 6.3 km. N. Poci, 07°41', 80°10', under cowpies or wood chips in pasture 21 June 1973, T.L. and L.J. Erwin (USNM). 3 exx., Veraguas, 12.3 km. SW Algarros N. Rio San Pedro, 21 June 1973, under cowpies or wood chips in pasture, T.L. and L.J. Erwin (USNM).

Pelecium laevigatum Guérin-Ménéville Figs. 114A and B, and Map 11

Pelecium laevigatum Guérin Ménéville, 1843b: 17. HOLOTYPE male, Chaudoir - Oberthür Collection, Box 199, labelled: Ex Musaeo Chaudoir [red print on white paper], in front of the following box label: laevigatum Guérin Colombie Laferté (MNHP). - Chaudoir, 1846: 536. - 1861: 129. - d'Orbigny, 1847: 548. - Schaum, 1860: 197. - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Notes about type material. Chaudoir (1861: 129) noted that he had the unique specimen on which Guérin-Ménéville based his short description. It was collected by Godot in humid forest at the foot of the Quindin mountains, on the banks of the Comtayma River (Chaudoir, 1846: 536).

Recognition. Distinguishing features are shiny elytra, with the only discal interneur impressed being 1; pronotum rather narrow, longer than wide (Fig.

114A), and with markedly steep apical declivity of the elytra (Fig. 114B).

Measurements. Holotype: Standardized Body Length 7.7 mm. width of elytra 3.2 mm.

Geographical distribution (Map 11). This species is known only from Colombia, in northern South America.

Material examined. In addition to the type, we have seen three other specimens, as follows: one ex., Colombie, Ex Musaeo Mniszech (Chaudoir-Oberthür Coll., MNHP); one ex., Colombie, Ibaque Fr. Claver (Chaudoir-Oberthür Coll., MNHP); and one ex., 4620 Pelecium Ibaque (BMNH).

Pelecium (*sensu stricto*)

Included groups. The 30 species of this subgenus are arrayed in eight groups, based on microsculpture, setation of tarsomere 5, form of terminal palpomeres, and development of elytral striation. Sequence of arrangement is intended to be phylogenetic, with the least derived groups listed first.

Each group name is based on the first-proposed species name in the group. Group names and numbers of included species are listed below, followed by taxonomic treatments of the taxa:

1. *P. violaceum* group (eight species);
2. *P. cyanipes* group (one species);
3. *P. renati* group (two species);
4. *P. punctatostriatum* group (four species);
5. *P. rotundipenne* group (four species);
6. *P. refulgens* group (three species);
7. *P. faldermanni* group (five species); and
8. *P. laeve* group (three species).

Recognition. Adults of this subgenus are distinguished from those of *Pelecidium* by features presented in the key, and by absence of a seta at base of stipes, absence of fronto-clypeal setae, absence of the anterior retinacular ridge from the right mandible (Fig. 15B) and scutellum not shortened but extended between elytra at base. Females have more than eight setae (9 - 16) posteriorly on abdominal sternum VII.

Description. None required, since collectively the members of this subgenus exhibit all features of the genus, except those diagnostic of *Pelecidium* (see above).

Geographical distribution (Maps 7 - 12). The range of

Pelecium (sensu stricto) is confined to cis-Andean South America, south of the Amazon Basin.

Chorological affinities and phylogenetic relationships. See under *Pelecidium* for details. The most important apotypic feature of *Pelecium (sensu stricto)* is the loss of the anterior part of the retinacular ridge (Fig. 15B; cf. Fig. 14B).

Pelecium violaceum group

Map 7

Included species. These are: *P. striatipenne* Chaudoir, *P. violaceum* Brullé, *P. drakei* Quedenfeldt, *P. tenellum* Schaum, *P. parallelum*, new species, *P. punctatum* Straneo, *P. longicolle* Straneo, and *P. brasiliense* Straneo.

Description. Color of dorsum black (with or without metallic reflection) to violaceous, green, and coppery.

Microsculpture and luster. Labrum with meshes isodiametric to transverse, surface shining. Clypeus with meshes isodiametric or transverse, surface shining. Frons and vertex with meshes isodiametric to transverse, surface opaque to shining. Pronotum with meshes isodiametric or transverse, surface opaque or subiridescent. Elytra with meshes transverse, grated or not, surface shining to iridescent.

Head. Frontal impressions elongate, narrow, extended posteriorly to plane of eyes, or slightly beyond eyes, or just to anterior margin of eyes (cf. Fig. 34C).

Maxilla. Maxillary palpomere 4 of males securiform (Figs. 40A, 42A, and 44); of females, rather narrowly triangular (Figs. 41A and 43A).

Labium. Labial palpomere 3 securiform in males (Figs. 40B and 42B), securiform (Fig. 42B) to triangular (Figs. 41B and 43B) in females.

Pronotum. Postero-lateral impressions deep, narrow and linear, or punctiform.

Elytra. Striation complete, with eight deep interneurs, punctate or not, extended length of elytron.

Legs. Tarsomere 5 asetose ventro-laterally.

Geographical distribution (Map 7). The range of the *P. violaceum* group extends from the eastern Brazilian state of Rio Grande do Norte southward to Argentina and westward to Paraguay and cis-Andean Bolivia. The Amazon Basin is unoccupied by members of this group. Distributions of the latter are not sympatric.

Pelecium striatipenne Chaudoir

Fig. 90 and Map 7.

Pelecium striatipenne Chaudoir, 1866: 10. HOLOTYPE in Chaudoir - Oberthür Collection, Box 199, in front of following box label: striatipenne Chaud. Bresil inter Squires; specimen labelled Ex Musaeo Chaudoir [red print on white paper]

(MNHP). - TYPE AREA. - Brazil, state of Minas Gerais (det. from original description). - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Recognition. The type of this species is most like adults of *P. violaceum* and *P. longicolle* (Fig. 90; cf. Figs. 91 and 95). From specimens of *P. violaceum* the type of *P. striatipenne* differs chiefly by more slender form, with elytra more elongate, and eyes smaller. From specimens of *P. longicolle*, apart from impunctate apices of elytral interneurs, the type differs by smaller size, more elongate frontal impressions, much smaller eyes, less elongate pronotum with lateral margins not sinuate, and elytra narrower.

Measurements and descriptive notes. Habitus as in Fig. 90. Overall length 11 mm; width 5.4 mm. Holotype: Standardized Body Length 9.4 mm; width of elytra 3.2 mm. Microsculpture as described for *P. violaceum* group. Pronotum with median longitudinal impression thin, postero-lateral impressions rather shallow.

Geographical distribution (Map 7). Known only from the state of Minas Gerais, Brazil.

Material examined. Holotype, only.

Pelecium violaceum Brullé

Figs. 15A - F, 91, and Map 7

Pelecium violaceum Brullé, 1838: 34. Type material not seen. - Chaudoir, 1846: 545. - 1861: 12. - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Recognition. Identity of specimens assigned to this species is based on study of the original description and Figure 8 (Brullé, 1834). In the Chaudoir-Oberthür Collection, Box 199 (MNHP), are two specimens in front of the following box label: violaceum Brullé Bolivie Guérin.

Diagnostic features are: character states of the *P. violaceum* group and: dorsal surface violaceous, pronotum cordiform, with deep postero-lateral impressions, space between impression and postero-lateral angle very convex, and elytra elongate with striation complete (Fig. 91).

Comparisons. See treatment of *P. striatipenne*, below. Adults are most like those of *P. drakei*,

which have the same features, except the dorsal surface is emerald-green, and the elytra are narrower (length/width 1.38 for *P. drakei*; ca. 1.55 for *P. violaceum*). We note a specimen without locality label (CN) with color green as in *P. drakei*, but with elytral proportions like those of *P. violaceum*.

Measurements and descriptive notes. Habitus as in Fig. 91. Overall length 9 - 27 mm.; width of elytra 3.5 - 9 mm.

Geographical distribution. (Map 7). The range of this species includes cis-Andean Bolivia, Paraguay, Argentina, and western Brazil. There is also a record, whose authenticity we doubt, from eastern Brazil (state of Espirito Santo). This record has not been included on Map 7. Although *P. violaceum* is in the Amazon drainage, it is likely confined to upland areas.

Material examined. We have seen 48 specimens of *P. violaceum* from the following localities. **ARGENTINA**. One ex., Annapolis (CS). One ex., Campo Grande, 24 I 73 (MZSP). 2 exx., Dos de Mayo, III 1965 (CN, MZSP). One ex., Jujuy, C. Bruch (MACN). One ex., Jujuy, Calilegua, 12 II 1960, Monros (FMLT). One ex., Jujuy, Los Perales, 12 II 51, Monros-Willink (FMLT). One ex., Jujuy, Pernas de Lambrisa, 6 II 48, Willink-Monros (FMLT). One ex., Mendoza, Desaguadero, 9 III 44, Willink-Monros (FMLT). 4 exx., Misiones (MACN). One ex., Misiones, Mensel Belgrano 8 XII 51, Willink-Monros (FMLT). One ex., Misiones, S. Ignacio, B.W. Bade (MACN). One ex., Salta, Alto Chafiar, 13 II 53, N. Kusnezov (CN). One ex., Salta, Tartajai, 1943, G.L. Harrison (CAS). One ex., Tucuman (MNHP). One ex., Vill. Buried (MACN). 4 exx., "Argentina" (CAS, CS, MACN, MNHP). **BOLIVIA**. One ex., Buena Vista, E. Bolivia, J. Steinbach (CNHM). 2 exx., Cordillera Santa Cruz, Las Juntas III.1947, Pereda (CS, FMLT). 2 exx., Santa Cruz, El Cidral 1.28 I 62, R. Golbach (CS, FMLT). One ex., Santa Cruz, Nueva Moka, XII 60, A. Martinez (MZSP). 2 exx., Santa Cruz, San Jose de Chiquitos (CN). 8 exx., Sara Dept. Santa Cruz de la Sierra, 1 IV 1904, J. Steinbach (FMLT). **BRAZIL**. One ex., Espirito Santo, Fazenda Jerusalem (MNHP). One ex., Goyaz, Campinas, R. Spitz (MZSP). 2 exx., Mato Grosso, Chapada (CMNH). One ex., Rondonia, Forte Principe da Beira, 19 XI-3 XII 67, G.R. Kloss (MZSP). One ex., Rio Verde 60 11.28-IX 66, G.R. Kloss (MZSP). **PARAGUAY**. One ex., Itapua, Cantera XI 56, F.H. Walz (CN). One ex., "Paraguay 13215" (MACN).

Pelecium drakei Quedenfeldt

Figs. 40, 41, and Map 7

Pelecium drakei Quedenfeldt, 1890: 302. LECTO-TYPE labelled: Umrum m g Brazil Drake 89, *Pelecium drakei* Quedf. [MUB]. - Dupuis, 1913: 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51. - Straneo, 1959: 293.

Recognition. Because of the identity in habitus between adults of *P. violaceum* and *P. drakei*, a

habitus figure representing the latter species is not provided. The emerald-green dorsal surface distinguishes adults of this species from all other members of *Pelecium*, though one bicolored specimen (head and pronotum greenish-blue, elytra coppery - MNMB) is included in this species.

Measurements and descriptive notes. Habitus as in Fig. 91. Overall length 10 - 20 mm. Standardized body length 9.9 - 18.9 mm., width of elytra 5.0 - 7.8 mm. (19 exx., Mato Grosso, Brazil). Surface of elytra shining, not iridescent. Maxillary palpomere 4 as in Figs. 40A and 41A. Labial palpomere 3 as in Figs. 40B and 41B. Note that terminal palpomeres of males are substantially shorter and broader than those of females.

Geographical distribution (Map 7). The range of this species includes western Brazil and adjacent parts of Paraguay.

Material examined. In addition to the type material, we have seen 29 specimens, from the following localities. **BRAZIL**. Mato Grosso, P. Germain, 1886 (one ex., CN; 4 exx., CS; 19 exx., MNHP). One ex., Mato Grosso, Guaicurus (MZSP). 2 exx., Mato Grosso 3 VI 1895, Andeer (CN, CS). 2 exx., "Brazil" (MNMB). **PARAGUAY**. One ex., Chaco, P.N. Defensores de Chaco Madrejon, 8 12 1981, bosque bajo por el camino de Agua Dulce, J.A. Kochalka (CNHM).

Pelecium tenellum Schaum

Fig. 92 and Map 7

Pelecium tenellum Schaum, 1860: 197. HOLOTYPE: female, labelled: 41489 Brasil coll. Schaum; *tenellum* Schaum (MUB). - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Notes. Brownish color of the holotype indicates that it is teneral. The species is sufficiently characterized by the habitus illustration (Fig. 92), recognition features of the *P. violaceum* group, and features indicated in the key.

Measurements. Length 15.7, mm. width 2.05 mm.

Geographical distribution (Map 7). Known only from "Brazil".

Material examined. Holotype only.

Pelecium parallelum, new species

Figs. 93A and B, and Map 7

Type material. HOLOTYPE male, labelled: Pedro Assu, det. *P. tenellum* Schaum, in Coll. Putzeys (Soc. Ent. Belg.) [RSNB]. We believe that this specimen was collected in Brazil, state of Rio Grande do Norte, where there is a "Rio Assu", and on that river, a town or village, Assu.

Recognition. The elongate subparallel form and abrupt elytral declivity (Fig. 93B) of the type are unique in *Pelecium*.

Description. Habitus as in Fig. 93A. Overall length 9.6 mm; width of elytra 3.4 mm.

Color. Body black; antennomeres 1 - 4 piceous, 5 - 11 and palpomeres rufous; legs piceous.

Luster. Dorsal surface moderately shining, with faint iridescence.

Prothorax. Pronotum longer than wide, dorsal surface convex. Lateral margins slightly rounded, slightly subsinuate before postero-lateral angles, latter moderately obtuse, not dentate. Median longitudinal impression short and narrow, moderately deep. Prosternum with sulcus moderately deep and narrow.

Elytra. Elongate, markedly convex, apical declivity very abrupt (Fig. 93B); lateral margins abruptly arcuate posterior to humeri, subparallel throughout most of length, greatest width ca. 2/3 length. Basal depression moderate. Striation complete; intervals moderately convex.

Geographical distribution (Map 7). Known only from the type locality, presumably in northeastern Brazil.

Material examined. Holotype, only.

Pelecium punctatum Straneo

Fig. 96 and Map 7

Pelecium punctatum Straneo, 1953: 4. HOLOTYPE female, labelled: Bolivia, La Paz (CS).

Notes about type material. In the original description, one specimen from São Paulo, Brazil is cited (Coll. Nick) as a doubtful member of *P. punctatum*. This specimen differs from the type by larger size (length, 25mm.), pronotum more elongate, with lateral margins subsinuate before base. We have not seen this specimen again, and do not know what happened to Nick's collection, after his death. The specimen probably belongs to *P. brasiliense*, a species not described until 1962 (see below).

Recognition. See key and Fig. 96. The dorsal surface is rather bright violaceous-bluish in color. The rather stout shape, markedly punctate interneurs, and glabrous tarsomere 5 render this species easily recognizable.

Measurements and descriptive notes. Holotype, overall length 19 mm; Standardized Body Length 18.0 mm., width of elytra 7.2 mm. Surface of elytra iridescent.

Geographical distribution (Map 7). Known only from the type locality, in Bolivia.

Material examined. Holotype, only.

Pelecium longicolle Straneo

Fig. 95 and Map 7

Recognition. See key to species of *Pelecium* and Fig. 95. In general form and proportions, specimens of *P. longicolle* are most like those of *P. brasiliense*. They differ in pronotal shape (Fig. 95; cf Fig. 94), with lateral margins more sinuate in *P. longicolle*, in form of pronotal impressions and in punctuation of interneurs: those of *P. longicolle* are either impunctate or punctate preapically, only; those of *P. brasiliense* are punctate throughout their length.

Geographical distribution (Map 7). This species is known only from eastern Brazil and Paraguay, to the west.

Included taxa. Two subspecies are recognized: *P. l. longicolle*, and *P. l. impunctatum*, new subspecies.

Pelecium longicolle longicolle Straneo

Pelecium longicolle Straneo, 1953: 2. TYPE MATERIAL: HOLOTYPE male (MCZ) and ALLOTYPE female (CS), labelled: Brazil, Sta. Catarina, Hansa Humboldt, Maller.

Notes about type material. In the original description, Straneo recorded the interneurs as entirely smooth. However, after the elytra were cleaned thoroughly, a few deep and conspicuous punctures were seen preapically.

Measurements and descriptive notes. Overall length 15 - 21 mm; width of elytra 5.3 - 6.8 mm. Allotype, Standardized Body Length 18.2 mm., width of elytra, 6.7 mm. Maxillary palpomeres as in Fig. 44. Punctures of elytral interneurs noted above. Color black, or black with violaceous reflections. Surface of elytra shining, iridescent.

Geographical distribution (Map 7). This subspecies is known from eastern Brazil.

Material examined. In addition to the types, we have seen two specimens with the same locality data as the types (MNHP and CS).

Pelecium longicolle impunctatum,
new subspecies

Type material. HOLOTYPE, labelled: PARAGUAY, Dapucaí (CN).

Measurements and descriptive notes. Overall length 15.5 mm., Standardized Body Length 14.1 mm., width of elytra 5.2 mm. Like *P. l. longicolle*, but dorsal surface with faint greenish reflections and interneurs impunctate.

Geographical distribution (Map 7). Known only from the type locality, in Paraguay.

Material examined. Holotype, only.

Pelecium brasiliense Straneo
Figs. 44, 94, and Map 7

Pelecium brasiliense Straneo, 1962: 1. Type material, males: HOLOTYPE, labelled Brazil, São Paulo Rio Claro V. 1925 (MZSP); PARATYPE (teneral specimen), labelled Brazil São Paulo Francis 1908 (CS).

Recognition. Specimens of this species are much like those of *P. l. longicolle*, differing by details in the key and by the less sinuate lateral margins of the pronotum and distinctly more slender elytra (Fig. 94; cf. Fig. 95).

Measurements and descriptive notes. Overall length 18 - 20 mm. Paratype, Standardized Body Length 17.7 mm., width of elytra 6.4 mm. Color black with violaceous reflection in holotype, greenish reflection in paratype. Surface of elytra subiridescent. Maxillary palpomeres as in Fig. 44. Elytra with interneurs punctate throughout length, apical declivity very steep.

Geographical distribution (Map 7). Known only from the state of São Paulo, in eastern Brazil.

Material examined. In addition to the type material, we have seen a male labelled "Brasil V.04, "elongatus N", the name evidently *in litteris* (MUB).

Pelecium cyanipes group

Included species. *P. cyanipes* Kirby.

Description. Color of dorsum black or dark blue.

Microsculpture and luster. Labrum with meshes isodiametric, surface shining. Clypeus, frons, and vertex, pronotum and elytra with meshes isodiametric, surface dull.

Head. Frontal impressions more or less punctiform, short, extended no farther posteriorly than transverse plane of anterior margin of compound eyes (Fig. 34B).

Maxilla. Palpomere 4 triangular (Fig. 45) in males, broadly ovate (Fig. 46) in females.

Labium. Labial palpomere 3 markedly securiform in males, in form of broad equilateral triangle (cf. Fig. 44); in females, in form of narrow triangle.

Pronotum. Postero-lateral impressions linear and deep.

Elytra. Striation complete, with eight deep impunctate interneurs, extended length of elytra.

Legs. Tarsomere 5 with row of setae on ventro-lateral margins.

Geographical distribution (Map 8). This group is known only from eastern Brazil, from the states of São Paulo, Rio de Janeiro, Minas Gerais, Bahia, and Espirito Santo.

Pelecium cyanipes Kirby
Fig. 45, 46, 97 - 100, and Map 8

Pelecium cyanipes Kirby, 1817: 318. HOLOTYPE labelled: Type; 63/140; (1) cyanipes[BMNH]. - Dejean, 1829: 7. - Dejean and Boisduval, 1832, t.172, f. l. - 1834: 12. - Guérin-Ménéville, 1843a: t.8, f.a-c. - Chaudoir, 1846: 532. - d'Orbigny, 1847: 548. - Schaum, 1860: 195. - Chaudoir, 1861: 127. - Motschulsky, 1862: 7. - Horn, 1881: 170. - Dupuis, 1913: 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Pelecium carinatum Chaudoir, 1846: 1. LECTO-TYPE (here selected), specimen in Chaudoir-Oberthür Coll, Box 199, in front of following box label: carinatum Chaud Bresil C. Fald; specimen labelled Ex Musaeo Chaudoir [red print on white paper] [MNHP]. NEW SYNONYMY. - Chaudoir, 1861: 128. - Dupuis, 1913: 3. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Pelecium cyanipes Schaum (not Kirby), 1860: 195.

Pelecium ovipenne Chaudoir, 1861: 128. LECTO-TYPE (here selected), specimen in front of the following box label: ovipenne Chaud Bresil Bescke; Reiche; specimen labelled Ex Musaeo Chaudoir [red print on white paper] [MNHP]

NEW SYNONYMY. - Dupuis, 1913: 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Pelecium humeratum Chaudoir, 1866: 108. LECTOTYPE (here selected): male in Chaudoir-Oberthür Collection, Box 199, in front of the following box label: humeratum Chaud Bresil N. Frib. Bescke; specimen labelled Ex Musaeo Chaudoir [red print on white paper] [MNHP]. NEW SYNONYMY. - Dupuis, 1913: 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Note about type material. The type area is Brazil, the only locality noted in the original description.

An additional 16 specimens are associated with the lectotype of *P. carinatum* in the Chaudoir-Oberthür collection. Of these, eight are from the Chaudoir collection, six from the Mniszech collection, and one is from the Steinheil collection. Although the original description was based on a single male, which would be the holotype, it is impossible to determine which of these specimens was the one before Chaudoir. Thus, a lectotype is chosen.

A second specimen of *P. ovipenne*, a female, is in the Chaudoir-Oberthür collection, and is a paralectotype. According to the original description, both were collected in Rio de Janeiro. As the result of an unfortunate accident, the junior author broke both lectotype and paralectotype, with the head and prothorax of the lectotype and head of the paralectotype broken beyond repair. The major features of this species, however, are in details of the elytra. Consequently, there seems no need of establishing a neotype, based on, for example, the Sallé specimens of this species.

In the Chaudoir-Oberthür Collection 11 specimens are associated with the lectotype of *P. humeratum*. Of these, six are also from the Chaudoir Collection, three from the Mniszech collection, and for two, the original collections are not recorded. The specimens from the Chaudoir collection are regarded as paralectotypes, but not the other material. In the original description, Chaudoir noted that he had specimens of both sexes, but did not specify the total number of specimens.

Notes about synonymy. Although the type specimens of the four forms treated here as conspecific appear to be quite different from one another, structurally intermediate specimens have been observed. If these forms were allopatric, they would seem to qualify as subspecies. However, their geographical ranges overlap extensively. It thus seems best to

treat this complex as a single species. See below, under variation, for further details.

Recognition. See key and description of the *P. cyanipes* species group. In form and size, adults of *P. cyanipes* and *P. violaceum* are quite similar to one another, but the dorsal surface of the former specimens exhibit isodiametric microsculpture, dull luster, and tarsomere 5 has ventro-lateral setae.

Measurements and descriptive notes. Habitus as in Figs. 97 - 100. Overall length 11 - 17 mm. Standardized Body Length and width of elytra of lectotypes, as follows: *P. carinatum*, SBL 14.7 mm., width 6.4 mm.; *P. ovipenne*, SBL 11.3 mm., width 4.6 mm.; *P. humeratum*, SBL 13.6 mm., width 5.2 mm. Maxillary palpomeres as in Figs. 45 and 46.

Pronotum (Figs. 97 - 100) markedly narrowed to broad at base, with lateral margins sinuate posteriorly, and postero-lateral angles more or less prominent; basal margin beaded variously, from complete to only laterally near postero-lateral angles; postero-lateral impressions isolated from adjacent lateral margin by more or less pronounced convexity of intervening surface, impressions close to or remote from lateral margins.

Elytra (Figs. 97 - 100) short and broad or more elongate. Humeri rectangular or acute and projected prominently anteriorly (Fig. 97). Intervals convex to carinate (Fig. 99), interval 5 most prominently so.

Variation. Although we believe that the forms included in *P. cyanipes* are conspecific, we acknowledge the possibility that they may be sibling species with overlapping ranges of variation in structural features. On the other hand, the four forms may be host races, each tending to specialize in use of a different species (assuming that they are indeed associated with millepedes!). To avoid totally obscuring the striking variation under a single name, we treat the four forms as conspecific morphs, using their specific epithets to designate each, as follows. Thus used, these names have no formal taxonomic status.

The *cyanipes* morph (Fig. 100): pronotum with basal margin beaded completely or partially, space between postero-lateral angle and impression on each side more or less narrow and convex; elytral intervals convex, but not carinate; humeri rectangular or nearly so, not markedly projected anteriorly.

The *carinatum* morph (Fig. 99): pronotum with basal margin completely or partially beaded, and surface rather flatter and base wider than in *cya-*

nipes morph; space between postero-lateral impression and adjacent lateral margin each side flat or slightly convex; elytra with intervals markedly convex to sharply carinate, especially interval 5; humeri rectangular to slightly projected antero-laterally.

The *humertum* morph (Fig. 97): pronotum with basal margin completely or partially beaded, and otherwise quite similar to the *carinatum* morph; elytra with humeri distinctly projected antero-laterally, intervals convex.

The *ovipenne* morph (Fig. 98): pronotum with basal margin beaded laterally only, dorsal surface flat, and otherwise generally similar to the *carinatum* morph; elytra with humeri rectangular to slightly projected antero-laterally, intervals convex, not carinate. The elytra tend to be broader (L/W 1.25 - 1.35), while those of the other morphs have relatively narrower elytra (L/W ca. 1.28 - 1.50). However, the pronounced overlap in range of variation prevents use of this ratio in recognizing individual specimens.

Geographical distribution (Map 8). As recorded for the *P. cyanipes* group, plotted on the map by morph.

Chaudoir noted that *P. cyanipes*, *P. carinatum*, and *P. ovipenne* were common in the vicinity of Rio de Janeiro. Nevertheless, few specimens seen have been collected during the past 80 years, in spite of entomological expeditions made, for instance, by the Museum of Zoology of São Paulo. Probably failure to locate specimens is the result of changed ecological conditions, which have caused *P. cyanipes* to become rare, or worse yet, this species may even be extinct.

Material examined. In addition to the types, we have seen 59 specimens from localities in eastern Brazil, as follows.

The *cyanipes* morph, 21 specimens. One ex., Barao Homen de Mello 700 m., Zikau (ex coll. Van Emden -BMNH). One ex., Caraca, P. Germain, 2nd semestre 1884 (MNHP). Two exx., Mar de Espanha, I.F. Likau (CN). One ex., N. Friburgo, Bescke (MNHP). Two exx., Petropolis (MUB, BMNH). Two exx., Rio de Janeiro (BMNH, MUB). Twelve specimens are labelled "Brazil" or "Brasilien": 3, von Langsdorf (MUB); 1, Schaum (MUB); 3, coll. Schaufuss (MUB); 1 (MNHB); 1, of large size, Coll. Spinola, D. Buquet (MRSNT); 1 (MNMB); 1, coll. Fry, Bowring (BMNH); 1, coll. Spaveo (CS). COLOMBIA. 1 ex., Columbia 2255, Bowring 6347 (BMNH); this specimen must be incorrectly labelled, and the locality is not recorded on Map 8.

The *carinatum* morph, 17 specimens. Two exx., Rio de Janeiro (BMNH, Fry coll.). One ex., Pai, Brazil (MUB). Fourteen exx., labelled only "Brasilien": 3 (MNHB); 3 (MUB); 3 (Basel); 2 BMNH, Fry. coll. 2 (CS); and one (UASM).

The *ovipenne* morph, four specimens. One ex., Brasil, 41486 coll. Schaum (MUB). One ex., Brazil 7715k (BMNH). One ex., Brazil, ex. Mus. A. Sallé 1897 (Coll. Chaudoir-Oberthür, MNHP). One, N. Frib Janson acq. 1884 (coll. Chaudoir-Oberthür, MNHP). One ex., Brazil (CS).

The *humertum* morph, 17 specimens. One ex., Bahia, Ex

Musaeo Mniszech (MNHP). One ex., Espiritu Santo (MNHP). One ex., Minas Gerais, Iaza-dos Campo 1500 m. 10.11.20, Zikan (BMNH). One ex., Rio de Janeiro, 4796, Fry Coll. (BMNH). One ex., Braz, 77.15 (BMNH). Seven exx., Ex Musaeo Chaudoir (MNHP) - probably from the type locality. Two exx., Ex Musaeo Mniszech (MNHP). One ex., Janson acq. 1884 (MNHP). One ex., Bowring Coll. (CS). One ex., Brasilien (MUB).

Pelecium renati group

Map 8

Included species. *P. renati* Straneo and *P. striatum* Straneo.

Description. Color. Dorsal surface bright violaceous.

Microsculpture and luster. Labrum, clypeus, frons, vertex, and pronotum with meshes transverse, surface shining. Elytra with meshes grated, surface iridescent.

Head. Frontal impressions more or less punctiform, extended sharply no farther posteriorly than plane of anterior margin of eyes (Fig. 34B).

Maxilla. Palpomere 4 of female broadly ovate (Fig. 47).

Labium. Labial palpomere 3 of male either broadly or narrowly triangular; of female, either narrowly triangular, or broadly ovate with truncate apex.

Pronotum. Postero-lateral impressions shallow, not sharply delimited, base beaded or not.

Elytra. Striation complete, with eight deep impunctate interneurs, extended length of elytra.

Legs. Tarsomere 5 with row of setae on each ventro-lateral margin.

Geographical distribution (Map 8). The *P. renati* group is known from the Brazilian state of Santa Catarina, only.

Pelecium renati Straneo

Figs. 47, 101, and Map 8

Pelecium renati Straneo, 1953: 4. HOLOTYPE female, labelled: Brasil, Hansa Humboldt, Santa Catharina (CS).

Recognition. On *P. renati* adults, the frontal impressions of the head are extended posteriorly, but with outline not sharply limited. Postero-lateral impressions of the pronotum are also not sharply limited, the base of the pronotum is not beaded, the postero-lateral angles are blunt, and the humeral angles of the elytra protrude anteriorly. This is the principal combination of features to distinguish between adults of *P. renati* and *P. striatum* (Fig. 101; cf. Fig. 102).

Measurements and descriptive notes. Habitus as in Fig. 101. Holotype: Standardized Body Length 12.4

mm., width of elytra 5.0 mm. Other features as noted above and in the description of the *P. renati* group.

Geographical distribution (Map 8). This species is known only from the type locality.

Material examined. Holotype, only.

Pelecium striatum Straneo

Fig. 102 and Map 8

Pelecium striatum Straneo, 1955: 277. HOLOTYPE female, labelled: Brasil, Hansa Humboldt, Santa Catharina (CS).

Recognition. The diagnostic combination of features is: head with frontal impressions circular, not extended posteriorly; pronotum with postero-lateral angles dentate, base beaded laterally; and elytra with humeral angles not protruded forward (Fig. 102; cf. Fig. 101).

Measurements and descriptive notes. Habitus as in Fig. 102. Holotype: Standardized Body Length 11.7 mm.; width of elytra 4.7 mm. Other features as noted above and in description of the *P. renati* group.

Geographical distribution (Map 8). This species is known only from the eastern Brazilian state of Santa Catarina.

Material examined. In addition to the holotype, we have seen four specimens, as follows. BRAZIL. Three exx., same data as holotype, leg. Muller (BMNH, MNHP, and UASM). One ex., 93564 Blumenari Krischendorf (MUB).

Pelecium punctatostriatum group

Map 9

Included species. *P. bolivianum*, new species, *P. atrovioleaceum*, new species, *P. semistriatum*, new species, and *P. punctatostriatum* Straneo.

Description. Color of dorsum black with faint violaceous reflections, to coppery.

Microsculpture and luster. Labrum and dorsal surface of head with microlines effaced, shiny. Pronotum and elytra with meshes transverse, grated or not, surface iridescent or shining.

Head. Frontal impressions long, extended to middle of compound eyes (cf. Fig. 34C), or basically punctiform, with

extensions no farther posterad than transverse plane of anterior margin of compound eyes (cf. Fig. 34B).

Maxillae. Palpomere 4 of male narrowly triangular (Fig. 49); of female, narrowly triangular (Fig. 48) to broadly ovate (Fig. 50).

Labium. Palpomere 3 of male securiform, or narrowly triangular; of female, either narrowly triangular or broadly ovate.

Pronotum. Postero-lateral impressions linear and long, or rather broad, basin-like.

Elytra. Striation reduced: interneur 7 absent, and interneurs 5 and 6 developed or absent.

Legs. Tarsomere 5 with row of setae on each ventro-lateral margin.

Geographical distribution (Map 9). The four species of this group are known only from western Brazil and cis-Andean Bolivia, in the upper reaches of the Amazon Basin.

Pelecium bolivianum, new species

Fig. 103 and Map 9

Type material. HOLOTYPE female, labelled: Bolivien Santa Cruz El Cidral 1-28.I.1962 6. Goldbach (FMLT). PARATYPE female, labelled: Bolivien Prov. Sara Dept. Sta. Cruz de la Sierra 500 m. 1-4-1904 J. Steinbach 5.V (MUB).

Recognition. See key and Fig. 103. This is the only member of the *P. punctatostriatum* group with impunctate elytral interneurs.

Description. Habitus as in Fig. 103. Overall length 14 - 16 mm., width of elytra 5 - 6 mm.

Color. Dorsal surface bright coppery. Antennae and legs piceous. Tarsomeres and palpomeres rufo-piceous.

Fixed setae. Abdominal sternum VII of female with 10 setae, one pair each in large puncture, rather distant from posterior margin, and row of eight smaller punctures, near margin.

Head. Frontal impressions anteriorly deep, nearly round, posterior extensions to plane of middle of eyes, but shallow and indistinct. Temples short, post-ocular constriction marked. Eyes moderately large, markedly convex. Antennae moderately long, extended almost to base of pronotum.

Prothorax. Pronotum anteriorly very convex, posteriorly less so; lateral margins arcuate for nearly entire length, subsinuate before postero-lateral angles, latter obtuse; apical margin truncate. Median longitudinal impression moderately deep throughout length, deeper posteriorly; postero-lateral impressions rather short, very deep, extended nearly to base. Prosternum with deep longitudinal sulcus.

Pterothorax. Metepisternum very short.

Elytra. Form elongate, oval. Markedly convex, apical declivity very steep. Basal depression deep; humerus markedly protruded anteriorly. Striation incomplete, interneur 7 absent, and interneur 6 short, not extended to base; interneurs 1 - 6 extended to apical declivity, 3 and 4 and 5 and 6 connected preapically.

Geographical distribution (Map. 9). Known only from cis-Andean Bolivia, as noted for the type material.

Material examined. Types, only.

Pelecium atrovioleaceum, new species

Figs. 48, 104, and Map 9

Type material. HOLOTYPE male, labelled: Brazil Chapada Acc. No. 2966 (CNHM). ALLOTYPE female, labelled same as holotype (CS).

Recognition. Adults of this species most closely resemble those of *P. punctatostriatum*, but the latter have interneur 7 clearly developed and the dorsal surface is bright violaceous-bluish.

Description. Habitus as in Fig. 104. Holotype: overall length 15.5 mm.; Standardized Body Length 14.7 mm., width of elytra 5.8 mm.

Color. Dorsal surface black, with violaceous reflections. Legs, except tarsi, and antennomeres 1 - 4 piceous. Tarsomeres and palpomeres rufo-piceous. Antennomeres 5 - 11 ferrugineous.

Microsculpture and luster. Pronotum and elytra with meshes transverse, not grated, surface shining, not iridescent.

Fixed setae. Abdominal sternum VII of male posteriorly with single pair of setae; female with many setae, setigerous punctures placed irregularly.

Head. Frontal impressions rather short, anteriorly deep, posteriorly indistinct (cf. Fig. 34B). Temples very short. Eyes moderate in size, convex. Antennae rather elongate, antennomeres 10 and 11 extended posterad of base of pronotum.

Mouthparts. Maxillary palpomere 4 as in Fig. 48.

Prothorax. Pronotum convex, especially near antero-lateral angles, these obtuse, rounded; lateral margins markedly arcuate, with short sinuation anterad of postero-lateral angles, latter nearly rectangular, with blunt apex. Median longitudinal impression rather deep, with few small punctures; postero-lateral impressions moderately elongate, deep, not extended to base. Prosternum with longitudinal sulcus deep and wide.

Pterothorax. Metepisternum small, very short.

Elytra. In form, short, ovate, globose; apical declivity steep. Basal depression and humeral projections moderate. Striation incomplete, interneur 7 represented by faint trace, only; interneurs 1 - 6 coarsely punctate throughout length; interneurs 1 - 4 complete, 5 and 6 shortened anteriorly; 3 and 4 and 5 and 6 in contact preapically. Intervals markedly convex.

Geographical distribution (Map 9). This species is known from western Brazil, from the type locality, only.

Material examined. Types only.

Pelecium semistriatum, new species

Figs. 49, 50, 105, and Map 9

Type material. HOLOTYPE male, labelled: Brazil Chapada Campo Oct. Acc N. 2966 (CNHM). ALLOTYPE female, labelled: [same locality as

holotype], March (CS). PARATYPE female, labelled: [same locality as holotype], Apr. (CNHM).

Recognition. In body form and general detail, adults of this species are like those of *P. atrovioleaceum*, and the two species are probably sympatric. However, specimens of *P. semistriatum* lack elytral interneurs 5 and 6 and the humeral projections of the elytra are more prominent and are directed anteriorly (Fig. 105; cf. Fig. 104).

Description. Habitus as in Fig. 105. Male, overall length 10.1 mm.; females ca. 13 mm. in length. Holotype: Standardized Body Length 9.5 mm., width of elytra 3.5 mm.

Color. Dorsal surface of male with head black, with faint greenish reflection; pronotum dark green; elytra black, with bluish-violaceous reflection; females with reflections fainter and general color darker. Antennomeres of females piceous, of male ferrugineous (slightly teneral). Legs piceous, except tarsi; latter and palpomeres rufo-piceous.

Microsculpture and luster as for *P. atrovioleaceum*.

Fixed setae. Abdominal sternum VII of male with one pair of setae; females with nine to eleven setae, irregularly placed.

Head. Frontal impressions deep, rather shorter anteriorly, indistinct posteriorly. Temples short, post-ocular constriction marked, neck wide. Eyes moderate in size, markedly convex. Antennae of females moderately elongate; antennae of male abnormal.

Prothorax. Pronotum with surface markedly convex, especially anteriorly; lateral margins rounded for more than 3/4 length, slightly sinuate posteriorly; antero-lateral angles rounded, obtuse; postero-lateral angles obtuse, blunt. Median longitudinal impression moderately deep, with small punctures; postero-lateral impressions very deep and short. Base beaded laterally. Prosternum with longitudinal sulcus rather deep.

Elytra. Markedly convex, apical declivity steep, abrupt, especially in females; lateral margins markedly bowed. Basal depression short, deep; humeri moderately projected anteriorly. Striation incomplete, interneurs 1 - 4 punctate throughout length, interneurs 2 - 4 deep, progressively shorter anteriorly and posteriorly; interneurs 5 - 7 indistinct.

Geographical distribution (Map 9). *P. semistriatum* is known only from the type locality, in western Brazil.

Material examined. Types, only.

Pelecium punctatostriatum Straneo

Fig. 106 and Map 9

Pelecium punctatostriatum Straneo, 1970: 49.

HOLOTYPE female, Brasil Mato Grosso Poconé I.1963 Valette col. (MZSP). PARATYPE female, labelled: Brasil, Dianarma Parque Nacional Xingu 15.II.1965 Vanzolini (CS).

Recognition. The diagnostic combination of features is: pronotum with base bordered by a shallow

groove, and elytra with interneurs 1 - 5 deep, distinct, coarsely punctate.

Measurements and descriptive notes. Habitus as in Fig. 106. Holotype, overall length 15.5 mm.; width of elytra 5.5 mm. Paratype, Standardized Body Length 12.4 mm., width of elytra 4.8 mm.

Color. Various: dorsal surface black, without metallic reflection; or, head and pronotum bright emerald green, elytra coppery; faintly metallic. Other features as above, and as in description of *P. punctatostriatum* group.

Microsculpture and luster. Pronotum and elytra with meshes transverse, grated, surface iridescent.

Geographical distribution (Map 9). Known from western Brazil, state of Mato Grosso.

Material examined. Types, only.

Pelecium rotundipenne group Map 10

Included species. *P. paulae*, new species, *P. helenae*, new species, *P. purpureum* Straneo, and *P. rotundipenne* Schaum.

Description. Color of dorsum: black with violaceous reflection, to violaceous and coppery, with greenish reflection.

Microsculpture and luster. Labrum without microlines, surface shining. Clypeus without microlines, or with microlines in pattern of transverse mesh, surface shining. Frons and vertex with meshes isodiametric or transverse, surface shining. Pronotum and elytra with mesh pattern transverse, microlines fine, in part effaced, surface coppery, shining, iridescent or not.

Head. Frontal impressions punctiform (cf. Fig. 34B).

Maxilla. Palpomere 4 of males triangular (Fig. 52), of females broadly ovate (Figs. 51 and 53) to narrowly triangular (Fig. 54).

Labium. Palpomere 3 of males narrowly securiform, of females broadly ovate.

Pronotum. Postero-lateral impressions basin-like, moderately deep to obsolescent.

Elytra. Striation reduced: interneurs 6 and 7 absent, interneur 5 absent or reduced to short depression at mid-length of elytron. Interneur 1 or 1 - 3 extended to base; all interneurs terminated separately, on or basad of apical declivity.

Legs. Tarsomere 5 without ventro-lateral setae.

Geographical distribution (Map 10). The range of this group is confined to eastern Brazil, in the states of Santa Catarina, São Paulo, and Espírito Santo.

Pelecium paulae, new species Figs. 51, 107, and Map 10

Type material. HOLOTYPE female, labelled: Brasil, Sta. Catharina (CS).

Derivation of specific epithet. Adjectival form, genitive case of the given name of Paola de Fanis, granddaughter of the senior author, who helped him in preparing the illustrations of *Pelecium* specimens.

Recognition. See key, and Fig. 107. The holotype of this species is quite similar to adults of *P. helenae*, with the former having the sides of the pronotum more arcuate, postero-lateral impressions more distinct, and elytra with lateral margins less arcuate.

Description. Habitus as in Fig. 107. Overall length 12 mm.; Standardized Body Length 11.3 mm., width of elytra 4.2 mm.

Color. Dorsal surface shining, with faint violaceous reflection. Legs, except tarsi, piceous. Antennomeres, palpomeres, and tarsomeres bright rufous.

Fixed setae. Abdominal sternum VII with one pair of setae each in large setigerous puncture removed from posterior margin; row of 11 setae in smaller punctures near posterior margin.

Head. Frontal impressions short, deep foveae (cf. Fig. 34B). Temples small; post-ocular constriction marked, neck relatively narrow. Antennae elongate, base of pronotum exceeded by two antennomeres.

Maxillae. Palpomere 4 ovate.

Prothorax. Pronotum cordate, dorsal surface markedly convex anteriorly; lateral margins markedly arcuate, but abruptly sinuate near obtuse postero-lateral angles. Median longitudinal impression narrow, rather deep; postero-lateral impressions shallow, round.

Elytra. Oval in form, ca. 1.5 longer than wide, moderately convex, apical declivity moderately steep. Basal impression deep, transverse basal ridge faint; humeri markedly projected anteriorly. Striation incomplete, interneurs smooth, extended to or nearly to apical declivity; interneurs 1 and 2 deep to base; 3 deep, slightly shortened; 4 shallower, short; no other interneurs, except marginal.

Geographical distribution (Map 10). Known only from the eastern Brazilian state of Santa Catarina.

Material examined. Holotype, only.

Pelecium helenae new species Figs. 52, 53, 108, and Map 10

Type material. HOLOTYPE male, labelled: Brasil, Jupuvara SP 28.IV.1937. L. Morretes (MZSP). ALLOTYPE female, labelled: Brasil Est. Biol. Boraceia Salesopolis S. P. 8.III.1962 Lenko and Reichardt (CS). PARATYPES, nine, all from Brazil, labelled: one, same as allotype; one, Rio 3155 Bow-

ring 6347 (BMNH); one, Salesopolis VII.61 Oliveira; two, Campos de Jordão S.P. 28.I.67, one collected by L. Travassos (CS), and one by Luderiv (MZSP); one, São Paulo, Capital, 1902 (CS); one, Sapucaí Mirim Cidade, Azul 1400 m MG (Exp. Zool. 4.XII.53) (UASM); and one Belém Parti III.21.1970 J.M. and B.A. Campbell (CNC).

Derivation of specific epithet. Adjectival form, genitive case of the given name of Elena de Fanis, granddaughter of the senior author, undergraduate in zoology, and very interested in insects.

Recognition. See key, and remarks under *P. paulae*.

Description. Habitus as in Fig. 108. Overall length 8 - 14 mm.; width of elytra 3 - 5.5 mm. (smallest specimen from Minas Gerais; overall length of holotype ca 12 mm.). Allotype: Standardized Body Length 13.2 mm., width of elytra 5.1 mm.

Color. Dorsal surface violaceous. Legs, except tarsi, piceous. Antennomeres, palpomeres, and tarsomeres rufescent.

Fixed setae. Abdominal sternum VII of male with three marginal setae (i.e., probably normally one pair, plus an extra seta); of female, with many setae, irregularly placed.

Head. Frontal impressions anteriorly very deep, posteriorly attenuate and narrowed, extended or not to level of 1/3 of eyes (cf. Fig. 34B). Temples small, post-ocular constriction marked, neck narrow. Antennae rather elongate, extended beyond base of pronotum by two or three antennomeres.

Maxillae. Maxillary palpomere 4 in males triangular (Fig. 52); in females, broadly ovate, with apex obliquely truncate (Fig. 53).

Prothorax. Pronotum with dorsal surface moderately convex, especially near anterior angles; lateral margins arcuate nearly to base, very shortly subsinuate posteriorly; posterolateral angles obtuse. Median longitudinal impression various, rather deep in most specimens, narrow; postero-lateral impressions very faint, nearly absent. Prosternum with longitudinal sulcus moderately deep.

Pterothorax. Metepisternum very short.

Elytra. Ovate, dorsal surface very convex, lateral margins markedly curved; apical declivity very abrupt. Basal depression marked, humeri only slightly projected. Striation incomplete. Interneurons smooth, not punctate, 1 - 4 deep; interneuron 1 nearly complete, 2 - 4 progressively shortened; 5 moderately impressed, short; in some specimens, interneuron 6 evident, but short and faint.

Geographical distribution (Map 10). This species is known only from eastern Brazil, states of São Paulo, Minas Gerais, and Pará, near the mouth of the Amazon River (CNC).

Material examined. Types, only.

Pelecium purpureum Straneo

Fig. 109 and Map 10

Pelecium purpureum Straneo, 1955: 279. HOLOTYPE male, labelled: Brasil Espiritu Santo (Coll. Oberthür, MNHP). - Straneo, 1959: 293.

Recognition. Distinguishing features are: dorsal surface coppery, very bright, with green metallic reflections principally on sides of elytra; head with very short frontal impressions, as in *P. beschii*; pronotum subcordate, with basal impressions shallow; elytra short, wide, with interneurons 1 - 4 smooth, deeply impressed, 2 and 3 shortened apically, 4 shortened basally and apically (Fig. 109).

Measurements. Holotype: overall length 14 mm.; Standardized Body Length 13.0 mm., width 5.5 mm.

Taxonomic note. In the original description, *P. purpureum* was recorded as allied to *P. beschii*. Actually, only details of head and pronotum are similar to those of *P. beschii*, but the elytra are entirely different. It seems unlikely, then, that these two species are closely related.

Geographical distribution (Fig. 10). Known only from the eastern Brazilian state of Espiritu Santo.

Material examined. In addition to the holotype, we have seen one specimen from the same locality, in MNMB.

Pelecium rotundipenne Schaum

Figs. 54, 110, and Map 10

Pelecium rotundipenne Schaum, 1860: 196.

LECTOTYPE male and PARALECTOTYPE female (here selected), each labelled: Brasil Neufreieburg (MUB). - Dupuis, 1913: 4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Recognition. Adults are easily distinguished by the two pairs of marginal setae on the anterior half of the pronotum. This is the only species of *Pelecium* to exhibit an extra pair of marginal setae. Shape is also rather characteristic, because of the short elytra with markedly arcuate lateral margins (Fig. 110).

Measurements. Overall length 10.5 - 12.5 mm.; width of elytra 4.3 - 4.6 mm. Pronotum and elytra with surface iridescent.

Geographical distribution (Map 10). This species is known only from the type locality, in the state of Espiritu Santo, eastern Brazil.

Material examined. In addition to the types, we have

seen four specimens as follows: 2, Bresil (Janel), Ex Musaeo Chaudoir, Coll. Oberthür (MNHP); one, Brazil, 77.15k Chabrallaci Ph MSS (BMNH); and one, Brazil (CS).

Pelecium refulgens group

Map 10

Included species. *P. refulgens* Guérin Ménéville, *P. fulgidum* Straneo, and *P. negrei* Straneo.

Description. Color of dorsal surface bright coppery with greenish reflection, to dark green.

Microsculpture and luster. Labrum and clypeus with microlines effaced, surface shining. Frons and vertex with meshes transverse, surface shining. Pronotum with meshes transverse, surface subiridescent to iridescent. Elytra with meshes transverse - grated or not, surface iridescent or shining-coppery.

Head. Frontal impressions elongate, extended to or nearly to post-ocular transverse groove (cf. Fig. 34D).

Maxillae. Palpomere 4 of males securiform (Fig. 55), of females narrowly triangular (Fig. 56).

Labium. Palpomere 3 of males narrowly securiform, of females, broadly ovate.

Elytra. Striation reduced: interneur 7 absent; interneur 6 reduced or absent; interneur 5 present or absent. Interneurs 1 - 4 extended to base; all interneurs terminated separately, at least 1 - 3 extended to preapical declivity.

Legs. Tarsomere 5 without ventro-lateral setae.

Geographical distribution (Map 10). The species of this group are known only from the Eastern Brazilian state of Bahia.

Pelecium refulgens Guérin-Ménéville

Fig. 111, and Map 10

Pelecium refulgens Guérin-Ménéville, 1831: plate 25. Type material, three specimens in Chaudoir-Oberthür Collection, labelled: Ex Musaeo Chaudoir [red print on white paper] in Box 199, in front of the following box label: refulgens Guérin Bresil Gory. LECTOTYPE (here selected), first specimen in series. - Castelnau, 1840: t 9, f. 1. - Chaudoir, 1846: 533. - 1861: 128. - d'Orbigny, 1847: 548. - Schaum 1860: 196. - Dupuis, 1913: 4. - Csiki, 1932. - Blackwelder, 1944: 51. - Straneo, 1962: 2.

Notes about type material. In addition to the lectotype and the two other Chaudoir specimens noted above, there is one more from the Mniszech collection.

Recognition. See key and Fig. 111. Adults have the pronotum greenish and elytra coppery, with green-

ish reflections. Elytral interneurs 1 - 5 are shortened apically, and interneur 6 is very short. Specimens of *P. fulgidum* recall those of *P. refulgens* in form, but the former lack interneurs 6 and 7, and interneur 5 is very short.

Measurements. Lectotype: Standardized Body Length 13.2 mm., width of elytra 5.5 mm.

Geographical distribution (Map 10). Brazil, probably eastern, but more precise data are not available.

Material examined. In addition to the lectotype and three specimens noted we have seen one additional, in MNMB.

Pelecium fulgidum Straneo

Fig. 112 and Map 10

Pelecium fulgidum Straneo, 1962: 4. HOLOTYPE and ALLOTYPE in CS, and four PARATYPES, in MNHP, each labelled: Brazil, S. Antonio de Barra Prov. Bahia.

Recognition. Like adults of *P. refulgens* in form and metallic color of dorsal surface; differing in that interneur 6 is absent, and interneur 5 is very short (Fig. 112).

Measurements. Overall length 12 - 19 mm.; width of elytra 4.5-7 mm. Holotype: Standardized Body Length 11.6 mm., width of elytra 4.5 mm.

Variation. One specimen (CS) has the dorsal surface emerald green rather than coppery.

Taxonomic note. By mistake of transcription, in the original description Straneo stated that the number of supraorbital pores was two, instead of one, on each side of the head.

Geographical distribution (Map 10). This species is known from the eastern Brazilian state of Bahia.

Material examined. In addition to the types, we have seen one ex. from Susapara, (Ch Pujol) (CN).

Pelecium negrei Straneo

Figs. 55, 56, 113, and Map 10

Pelecium negrei Straneo, 1962: 5. HOLOTYPE male and ALLOTYPE female, each labelled: Brasil Bahia Senhor de Bonfin (CS). PARATYPES,

two - female, Brasil, Bahia Villa Nova Garba Ag. 11 1908 (CN); male, Brazil Bonfim Garba 1908 (CN).

Recognition. Form as in Fig. 113; cf. Figs. 111 and 112. In form and size, adults of this species are much like those of *P. refulgens* and *P. fulgidum*. They differ, however, in that head and pronotum are black, elytra more convex, and only four elytral interneurs are deeply impressed, all of which are extended to base, but shortened apically.

Measurements and descriptive notes. Habitus as in Fig. 113. Length 12 - 16 mm.; width of elytra 4.5 - 6 mm. Holotype, Standardized Body Length 11.6 mm., width of elytra 4.5 mm. Maxillary palpomere 4 of male as in Fig. 55; of female, as in Fig. 56.

Variation. Elytral color varies from rather dull coppery-greenish to dark greenish to nearly black.

Geographical distribution (Map 10). This species is known from the Brazilian state of Bahia, only.

Material examined. Types, only.

Pelecium faldermanni group Map 11

Included species. *P. foveicolle* Chaudoir, *P. obtusum* Straneo, *P. bisulcatum* Straneo, *P. besckii* (Chaudoir), and *P. faldermanni* (Chaudoir).

Description. Color of dorsal surface black, metallic green, dark blue, or bluish-violaceous.

Microsculpture and luster. Labrum with microlines effaced, surface shining. Dorsal surface of head with meshes transverse, or microlines effaced, surface shining. Pronotum with meshes transverse or microlines effaced, surface shining or iridescent. Elytra with meshes transverse or microlines effaced, surface shining or iridescent.

Head. Frontal impressions narrow, elongate, extended to transverse plane of anterior margin of compound eyes, or punctiform (cf. Fig. 34B).

Maxillae. Palpomere 4 of males broadly ovate to triangular (Figs. 57, 59, and 61); of females, broadly ovate (Figs. 58 and 60).

Labium. Palpomere 3 of males narrowly securiform; of females, broadly ovate.

Pronotum. Postero-lateral impressions punctiform, deep or shallow.

Elytra. Striation reduced: interneurs 5 - 7 absent; 3 and 4 absent or represented as very shallow grooves; 1 and 2 deep, distinct, or variously reduced; interneur 1 extended to apical declivity.

Legs. Tarsomere 5 without ventro-lateral setae.

Geographical distribution (Map 11). The range of this

group is confined to Eastern South America from the Atlantic coast westward to Paraguay. The Lower Amazon Basin is not occupied.

Pelecium foveicolle Chaudoir Figs. 57, 58, 115, and Map 11

Pelecium foveicolle Chaudoir, 1866: 188. Type material: Chaudoir-Oberthür Collection, box 199, two specimens in front of the following box label: foveicolle Chaud Brésil intér Mniszech LECTOTYPE (here selected), labelled: Ex Musaeo Chaudoir [red print on white paper]. PARALECTOTYPE, labelled: Ex Musaeo Mniszech. - Dupuis, 1913:4. - Csiki, 1932: 1287. - Blackwelder, 1944: 51.

Notes about type material. Chaudoir (*l.c.*) noted that the two specimens on which the description of *P. foveicolle* was based were from the Mniszech collection, and that he was permitted to retain one of them. We believe this is the one labelled "Ex Musaeo Chaudoir". Subsequently, Chaudoir obtained the Mniszech collection, and we believe that the specimen of this species thus labelled represents the other one referred to in the original description. We selected it as paralectotype.

Recognition. The following combination of structural features is diagnostic: dorsal surface metallic green (few specimens bluish), pronotum nearly as long as wide, and postero-lateral impressions small and deep. Also, males have four setae on abdominal sternum VII.

Measurements and descriptive notes. Habitus as in Fig. 115. Overall length 7.5 - 12.5 mm. Lectotype: Standardized Body Length 9.6 mm., width of elytra 4.0 mm. Maxillary palpomere 4 triangular in male (Fig. 57), broadly ovate in female (Fig. 58).

Variation. Development of discal interneurs varies as follows: 1 and 2 distinctly impressed, remaining interneurs shallow; only 1 and 2 deeply impressed, other absent, or only 1 deeply impressed, others absent. Most specimens, however, do not exhibit any traces of interneurs 3 - 6, and only the preapical portion of interneur 7.

Geographical distribution (Map 11). The range of this species extends from the Eastern Brazilian states of Minas Gerais and São Paulo, westward to Paraguay.

Material examined. In addition to the type material, we have seen seven specimens, as follows: BRAZIL. One ex., Jathey Etat de Goyaz (Ch. Pujol 1895-96) (Oberthür Coll, MNHP); two exx., Ribirão Preto, Fac. Medicine (Barretto) (MZSP) (CS); one ex., São Paulo Francis (Garde X.9.10) (CN); one ex., Minas Gerais (XII.1966, M. Alvarenga) (CN). PARAGUAY, Two exx., vic. Horqueta (16.XI.32 A. Schulz) (MCZ) (CS).

Pelecium obtusum Straneo

Fig. 116 and Map 11

Pelecium obtusum Straneo, 1953: 6. HOLOTYPE, teneral specimen, labelled: Brasil Santa Catharina Hansa Humboldt (CS).

Recognition. Adults of this species are like those of *P. besckii* (Fig. 116; cf. Fig. 118), but the pronotum of *P. obtusum* is shorter, with lateral margins evenly rounded, and postero-lateral angles broadly rounded. Elytral interneurs 1 and 2 are deeply impressed, interneur 3 less so, and the elytra are shorter.

Measurements and descriptive notes. Habitus as in Fig. 116. Standardized Body Length 11.8 mm., width of elytra 4.8 mm. Color of dorsal surface violaceous, rather bright, legs, antennomeres and palpomeres ferrugineous.

Geographical distribution (Map 11). The range of this species includes Brasilia and the state of Santa Catarina, in Eastern Brazil.

Material examined. In addition to the holotype, we have seen two specimens labelled: Brasilia; Sommer Nos. 981 and 13560, respectively (MUB).

Pelecium bisulcatum Straneo

Fig. 117 and Map 11

Pelecium bisulcatum Straneo, 1970: 50. HOLOTYPE male labelled: Argentina, Misiones Sn Pedro 1000 m (CS).

Recognition. In form and elytral sculpture, adults of this species are much like those of *P. besckii* (Fig. 117; cf. Fig. 118). The two forms are readily separated by frontal impressions of the head, which, instead of being rounded large foveae are, in *P. bisulcatum*, elongate and extend to the level of the middle of the eyes, and by differences in pronotal

shape. Nonetheless, this species and *P. besckii* are very closely allied. Owing to the differences in habitat, as well as structural features, it is necessary to have more specimens of *P. bisulcatum* from Argentina, and more specimens of *P. besckii* from Brazil to definitely establish the status of these named forms.

Measurements and descriptive notes. Habitus as in Fig. 117. Holotype, overall length 10 mm., Standardized Body Length 8.7 mm., width of elytra 2.7 mm. Color of dorsal surface violaceous, moderately shining; tarsomeres, antennomeres, and palpomeres ferrugineous.

Geographical distribution (Map 11). This species is known from northern Argentina and eastern Brazil, in the state of Minas Gerais.

Material examined. In addition to the type, we have seen one specimen from Brazil labelled: Minas Gerais, Villa Monte Verde (8.XII.66, J. Halik) (CS).

Pelecium besckii (Chaudoir)

Figs. 59, 60, 118, and Map 11

Augasmosomus besckii Chaudoir, 1850: 436. Type material in Chaudoir-Oberthür Collection, Box 199, four specimens, each labelled Ex Museo Chaudoir [red print on white paper], in front of the following box label: Besckii Chaud Bresil N. Frib. Bescke; LECTOTYPE (here selected), first specimen in series (MNHP).

Pelecium besckii Chaudoir, 1854: 336. - Schaum, 1890: 196. - Chaudoir, 1861: 128. - Dupuis, 1913: fig. 11. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Pelecium beskei Straneo, 1955: 279 (*lapsus calami*).

Pelecium bisulcatum reichardtii Straneo, 1970: 50. HOLOTYPE male, labelled: Brasil, São Paulo, 18.II.1961 (MZSP). ALLOTYPE female, same locality as holotype, 7.I.1961. (CS). NEW SYNONYMY.

Notes about type material. From the original description, one gets the impression that it was based on a single specimen, collected at Nuevo Freiburgo. Nonetheless, there are four specimens in the Chaudoir-Oberthür collection any one of which could be the type, and three of which were probably

received from Bescke after the description was published. Since a selection had to be made from among the four specimens, and since one cannot be sure that the original description was indeed based on a single specimen, it seems appropriate to refer to the type as lectotype rather than holotype.

Notes about synonymy. The type material of *P. bisulcatum reichardti* exhibits the shorter frontal impressions of the head characteristic of *P. besckii* rather than the longer impressions characteristic of *P. bisulcatum*. This, plus the proximity of the type localities of *P. besckii* and *P. bisulcatum reichardti* make it seem likely that these two named forms are conspecific.

Recognition. The diagnostic combination of character states for adults of this species is: frontal impressions short, rounded wide foveae (cf. Fig. 34B); pronotum with lateral margins arcuate and posterolateral angles markedly obtuse; elytral discal interneurs with only 1 and anterior part of 2 deeply impressed, smooth, impunctate; dorsal surface more or less violaceous. In contrast to adults of *P. besckii*, those of *P. faldermanni* are black, with less arcuate lateral pronotal margins, and with two punctate discal interneurs and one or more indistinctly impressed additional interneurs. Adults of *P. obtusum* exhibit abbreviated prothoraces, and specimens of *P. bisulcatum* have elongate frontal impressions.

Measurements and descriptive notes. Habitus as in Fig. 118. Length 7-14 mm. Lectotype: Standardized Body Length 11.0 mm., width of elytra 4.4 mm. Maxillary palpomere 4 of male (Fig. 59) broadly ovate, of females (Fig. 60) narrowly ovate.

Variation. Adults of *P. besckii* are markedly varied in details of elytral striation. Interneur 1 and anterior half of 2 are consistently deeply impressed, but on some specimens there is a trace of interneur 3.

Geographical distribution (Map 11). The range of this species is confined to eastern Brazil, including the states of Bahia, Rio de Janeiro, Santa Catarina, and São Paulo.

Material examined. In addition to the lectotype and specimens of *P. bisulcatum reichardti*, noted above, we have seen eight specimens of this species, as follows. BRAZIL. one ex., Bahia (ex. coll. Oberthür, MNHP); two exx., "Brazil" (ex. Musaeo Thorey and Ex. Musaeo Mniszech, coll. Oberthür, MNHP); one ex., Rio 3106 Bowring 6343 (BMNH), with interneur 3 rather well impressed for .75 of length; one ex., 14.42 Sta. Cath. n.e.

Fry Coll (1905-100) (BMNH); 3 exx., "Brazil" (MUB); one ex. São Paulo State, MHammer Coll. (CUIC).

Pelecium faldermanni (Chaudoir)

Figs. 61, 119, and Map 11.

Augasmosomus Faldermanni Chaudoir, 1846: 528. HOLOTYPE, labelled Ex Musaeo Chaudoir [red print on white paper], in Box 199, Chaudoir-Oberthür Collection, in front of the following box label: Faldermanni Chaud. Brésil C. Fald. (MNHP). - 1850: 436. - 1854: 336.

Pelecium Faldermanni Schaum, 1860: 196. - Chaudoir, 1861: 128. - 1866: 108. - Dupuis, 1913: 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51.

Augasmosomus iridescens Chaudoir, 1850: 436. HOLOTYPE, in Chaudoir-Oberthür Collection, Box 199, labelled: Bresil N. Frib. Bescke; Ex Musaeo Chaudoir [red print on white paper] (MNHP).

Pelecium iridescens Schaum, 1861: 197. - Chaudoir, 1861: 128.

Pelecium brevisulcis Straneo, 1953: 5. HOLOTYPE female, labelled: Brasilien (CS). NEW SYNONYMY.

Notes about synonymy. The new synonymy indicated above is based on comparison of the types of *P. faldermanni* and *P. brevisulcis*. The holotype of *P. iridescens* was recognized by Chaudoir (1861: 128) to be only a teneral specimen of *P. faldermanni*.

Recognition. See key and Fig. 119. Clearly characterized by the marked depth of interneur 1, and by the markedly elevated surface laterad of interneur 1. Males have a narrowly triangular maxillary palpomere 4. This species seems to be rare, so it is impossible to state whether differences between two specimens from different localities are merely individual, or taxonomically valid.

Measurements. Lectotype; Standardized Body Length 8.6 mm., width of elytra 3.4 mm. Holotype, *Augasmosomus iridescens*: Standardized body length 7.8 mm., width of elytra 3.0 mm.

Geographical distribution (Map 11). The range of this species extends from eastern Brazil (State of Espiritu Santo) southward to northern Argentina.

Material examined. In addition to the type material noted above, we have seen five specimens of *P. faldermanni*, as follows. BRAZIL. One ex., Brazil, Faldermanni Chd. Coll. Parry, ex. Mus. H. W. Bates 1892 (MNHP); one ex., 10360 Santa Cath. Fry Coll. (BMNH); one ex., Rio Jan. 57403 Fry Coll. (BMNH); one ex., Itapiranga, Rio Grande do Sul II.52 (CN). ARGENTINA. One ex., Misiones Dos de Mayo XI.64 (CN).

Pelecium laeve group Map 12

Included species. *P. laeve* Chaudoir, *P. obscurum* Straneo, and *P. nicki* Straneo.

Description. Color of dorsal surface black, with or without metallic reflection, or violaceous-coppery.

Microsculpture and luster. Labrum and dorsal surface of head with microlines effaced, surface shining. Pronotum and elytra with meshes transverse, grated or not, surface shining or iridescent.

Head. Frontal impressions punctiform, with anterior extensions (cf. Fig. 34B).

Maxilla. Palpomere 4 of females narrowly to broadly ovate (Figs. 62 and 63).

Labium. Palpomere 3 of males narrowly securiform, of females, broadly ovate.

Pronotum. Postero-lateral impressions shallow basins, or absent.

Elytra. Striation absent, surface smooth.

Legs. Tarsomere 5 with or without row of setae on each ventro-lateral margin.

Geographical distribution (Map 12). This group is known from two isolated areas in eastern Brazil: the state of Espirito Santo (*P. laeve*) and Santa Catarina (*P. nicki* and *P. obscurum*).

Pelecium laeve Chaudoir Fig. 120 and Map 12

Pelecium laeve Chaudoir, 1854: 337. HOLOTYPE in Chaudoir-Oberthür Collection, Box 199, labelled Ex Musaeo Chaudoir ?red print on white paper?, in front of the following box label: laeve Chaud. Novofriburgo Bescke (MNHP). - Schaum, 1860: 196. - Chaudoir, 1861: 130. - Dupuis, 1913: 4. - Csiki, 1932: 1286. - Blackwelder, 1944: 51. - Straneo, 1955: 278.

Pelecium politum Schaum, 1860: 197. HOLOTYPE, Neufreiburg, Brazil 41488 Brasil Coll. Schaum; politum Schaum, laeve Chaud (MUB). - Chaudoir, 1861: 130.

Notes about synonymy. The description of *P. politum* Schaum is the result of a mistake by Chaudoir, who, in the original description of *P. laeve* wrote that there was an impressed stria along the suture.

Chaudoir corrected that assertion in 1861, with an apology to Schaum.

Recognition. Among the species of *Pelecium* characterized by nearly a complete lack of interneurs from the elytra, adults of *P. laeve* are distinguished by lack of setae from tarsomere 5 ventrally, elongate slender pronotum, and anteriorly directed humeral projections (Fig. 120; cf. Figs. 121 and 122).

Measurements. Length ca. 10-12 mm.

Geographical distribution (Map 12). This species is known only from eastern Brazil: states of Espirito Santo, to the north, and Santa Catarina, to the south.

Material examined. Types, only.

Pelecium obscurum Straneo Figs. 62, 121, and Map 12

Pelecium obscurum Straneo, 1955: 278. HOLOTYPE female, labelled: Brasil Santa Catharina (CS).

Recognition. In the original description, adults of this species were compared with *P. laeve*. In fact, *P. obscurum* seems more closely allied to the sympatric *P. nicki*, whose adults have setae latero-ventrally on tarsomere 5, whereas this article is glabrous in *P. laeve*.

The differences between adults of *P. obscurum* and *P. nicki* are principally head color (see key), shape of pronotum, which in *P. obscurum* is shorter, more rounded, with base slightly narrower than anterior margin, and the lateral groove ended in a small rounded and deep fovea near the postero-lateral angles. The shape of the base of the elytra is of the same type as in *P. nicki*, but beside the very short, vestigial impression representing the beginning of interneur 1 (which is lacking), there is a small deep fovea which is lacking from the elytra of *P. nicki*. In *P. nicki*, the frontal impressions, though small, are distinctly more developed. In spite of these obvious differences, *P. obscurum* and *P. nicki* must be very closely related to one another.

Measurements and descriptive notes. Habitus as in Fig. 121. Overall length 10.4 mm., Standardized Body Length 9.8 mm., width of elytra 4.2 mm. Color of dorsal surface black with faint bluish reflection;

legs, antennomeres, and palpomeres rufo-piceous. Maxillary palpomere 4 of female as in Fig. 62.

Geographical distribution (Map 12). This species is known only from the type locality, in the eastern Brazilian state of Santa Catarina.

Material examined. Holotype, only.

Pelecium nicki Straneo

Figs. 63, 122, and Map 12

Pelecium nicki Straneo, 1955: 279. HOLOTYPE female, labelled: Brasil Nova Teutonia 27 g S 52 23 (24.10.39) F. Plaumann (CS). Four PARATYPES, one labelled same as holotype, one Brasil (Coll. Oberthür, MNHP); two, Brasil, Prov. Sta. Catharina J. Michaelis 1877 (Coll. Oberthür, MNHP) (CS).

Recognition. Specimens are easily determined by a combination of the following: dorsal surface violaceous-coppery (or green) in color, pronotum with lateral margins moderately subsinuate toward the postero-lateral angles, postero-lateral impressions shallow, elytra without discal interneurs, and tarsomere 5 with setae ventro-laterally.

Measurements and descriptive notes. Habitus as in Fig. 122. Length 9.5-13 mm.; width of elytra 3.8-4.8 mm. Holotype; Standardized Body Length 11.2 mm., width of elytra 4.4 mm. Maxillary palpomere 4 of female broadly obtuse, as in Fig. 63.

Geographical distribution (Map 12). *P. nicki* is known only from southeastern Brazil, in the states of Santa Catarina and Rio Grande do Sul.

Material examined. In addition to the type material, we have seen six specimens, as follows: BRAZIL. Two exx., Santa Catarina (F. Plaumann), topotypes (BMNH); one ex., as above (CN); one ex., S. Leopoldo, Rio Grande do Sul (Pe. Buck) II.28 (CN); one ex. (very dark), Ponta Gross, Parania XII.1938, C. A. Camargo (MZSP); one ex., Brazil, ex Musaeo E. Allard 1898 (MNHP).

Stricteripus, new genus

Fig. 34E and Map 13

Type Species: *Pelecium peruvianum* Straneo, 1955

Derivation of name. a combination of "strict" (from the Latin *strictus*, meaning constriction, and refer-

ring to the constricted neck) plus *Eripus*, the combined word alluding to the affinity of this group with *Eripus*.

Included species. This genus has three species: *S. impressus* (Straneo), *S. peruvianus* (Straneo), and *S. banningeri* (Straneo).

Recognition. The most striking feature of adults of this genus is the markedly constricted occipital (postocular) region of the head. (Figs. 34E and 123-125). Also important in recognition are the setose middle tibiae, each with a prominent lateral dentiform projection (Figs. 26 and 27), slightly expanded hind tarsomeres 1-4, with appreciable amounts of adhesive Type II-setae ventrally, elytral humeri with prominent lateral projections, and dorsal surface of elytra smooth, interneurs 1-7 lacking, except preapical part of interneur 7.

Description. In addition to features recorded in descriptions of Peleciini and Peleciina, in the key, and in the Recognition section, above, adults of *Stricteripus* exhibit the following. Habitus as in Figs. 123, 124, and 125. Size moderate, overall length 8.6-14 mm.

Color. Dorsal surface of head, pronotum, and elytra black. Legs and antennomeres 1-4 black. Antennomeres 5-11 and palpomeres piceous.

Microsculpture and luster. Dorsal surface of labrum with microlines effaced or transverse, surface shining. Head with dorsal surface of clypeus, frons and vertex with microlines effaced, shining. Pronotum and elytra with meshes transverse, not grated, surface subiridescent.

Fixed setae. Labrum with six setae. Clypeus with single pair of setae. Pronotum with two pairs of marginal setae. Maxillary stipes without seta at base. Elytron with parascutellar seta, and one or two setae in interneur 7, preapically; umbilical series in three groups. Sternum VII of males posteriorly with six setae, females with 12 setae.

Vestiture. Tarsomeres 1-4 of front and middle legs and 1-3 of hind legs with extensive pads of Type II setae.

Head. Frontal impressions deep parallel grooves, extended posteriorly to plane of middle of compound eyes; supraantennal grooves and ridges broad (cf. Fig. 34E). Temples small. Eyes moderate in size, convex.

Mouthparts. Mandibles as in Figs. 16A-D, approximately symmetrical: incisor more than one third total length; retinaculum not toothed; basal area with occlusal margin sloped medially in relation to terebral area, and with series of shallow grooves; deep notches not evident. Maxilla with palpomere 4 of males and females broadly ovate, but not securiform (Figs. 64, 65, and 66A), male palpomeres broader than those of females. Palpomere 3 very short, much shorter than other palpomeres. Labium with palpomere 2 shorter than palpomere 3, latter securiform in males (Fig. 66B), broadly ovate in females, broader than palpomere 4 of maxilla.

Pronotum (Figs. 123-125). Base extended posteriorly, clearly overlapping base of elytra. Apical margin straight to arcuate; lateral margins evenly arcuate to slightly sinuate posteriorly; basal margin slightly arcuate to sinuate laterally; antero-lateral angles broadly rounded to bluntly angulate; postero-lateral angles obtuse to acute. Median longitudinal impression narrow and shallow to broad and deep; postero-lateral impressions basin-like, distinct.

Legs. Tibiae of all legs with corbels sloped at obtuse angle

in relation to long axis (Fig. 26; cf. Fig. 25). Middle tibia (Fig. 27) densely setose, and with laterally directed spine preapically (Fig. 27).

Geographical distribution (Map 13). The included species are known from two areas: a more southern one, in cis-Andean Bolivia and Peru; and a more northern locality in Venezuela. Presumably, intermediate localities have representatives of this genus as well, as implied by range indicated on Map 1.

Chorological affinities. The range of *Stricteripus* overlaps the western and northern parts of the range of *Pelecium*, and the range of the single South American species of *Eripus*.

Phylogenetic relationships. *Stricteripus* is hypothesized to be the sister group of *Pelecium*. See Evolutionary Considerations, below, for details.

Key to the Species of *Stricteripus*, New Genus

1. Pronotum with sides explanate and lateral margins sinuate posteriorly; postero-lateral angles acute, antero-lateral angles prominent (Fig. 125) *S. banningeri* (Straneo)
- 1'. Pronotum with sides not explanate, and lateral margins not sinuate posteriorly; postero-lateral and antero-lateral angles obtuse, postero-lateral angles not prominent (Figs. 123, 124) 2
- 2(1'). Pronotum with lateral margins uniformly curved (Fig. 124) . . *S. peruvianus* (Straneo)
- 2'. Pronotum with lateral margins not uniformly curved, but straight and convergent to base (Fig. 123) . . . *S. impressus* (Straneo)

Stricteripus impressus (Straneo),
New Combination
Figs. 123 and Map 13

Stricteripus impressum Straneo, 1955: 200.
HOLOTYPE labelled: Bolivie, S. Antonio (Coll. Oberthür, MNHP).

Recognition. See key, and Fig. 123.

Measurements and descriptive notes. Habitus as in Fig. 123. Overall length 8.6 mm., Standardized Body

Length 8.0 mm., width of elytra 3.3 mm. Eyes relatively small.

Geographical distribution (Map 13). *S. impressus* is known from the type locality, only, in Bolivia.

Material examined. Only the holotype.

Stricteripus peruvianus (Straneo),
New Combination
Figs. 16A-D, 26, 27, 64, 65, 124, and Map 13

Pelecium peruvianum Straneo, 1955: 281. HOLOTYPE male, labelled: Peru Dep. Amazonas Chachapoyas M. de Mathan 1899 (MNHP). ALLOTYPE female, same data as for holotype (CS).

Recognition. See key and Fig. 124. Specimens of this species are much like those of *S. impressus*, but are larger in size, and with larger eyes and lateral margins of the pronotum evenly rounded. (L/W ca. 1.28 - 1.50). However, the pronounced overlap in range of variation prevents use of this ratio in recognizing individual specimens.

Measurements and descriptive notes. Habitus as in Fig. 124. Overall length 11-14 mm. Holotype: Standardized Body Length 10.0 mm., width of elytra 4.0 mm. Mandibles as in Figs. 16A-D; tibiae and tarsomeres as in Figs. 26 and 27; and maxillary palpomeres as in Figs. 64 and 65.

Geographical distribution (Map 13). This species is known from cis-Andean Peru, in the upper reaches of the Amazon Basin.

Material examined. In addition to the type material, we have seen: three specimens labelled, Peru, 98 mi. E. Olmos Lambayeque 19.I.1955, E. I. Schlinger and E. S. Ross (CAS and CS); one specimen, labelled Peru, 17 km. NE Balzas road to Chachaboyas 28.I.1986, dry gully, acacias-grassland #862015, R. Jaagumagi (ROM).

Stricteripus banningeri (Straneo),
New Combination
Figs. 66, 125, and Map 13

Pelecium banningeri Straneo, 1953: 7. HOLOTYPE male, labelled: N. Grenada, S. Inez (CS).

Note about type locality. We think that, as N. Grenada

da stands for Nueva Grenada, the original Spanish name for Venezuela and Colombia, the type locality of *S. banningeri* must be found in these regions. In fact, there is a Santa Inez in northeastern Venezuela, about 40 km. NE Barcelona. It is thus near the coast and would have been readily accessible during the last century to visiting or resident Europeans. We are prepared to accept this locality as near where the holotype of *S. banningeri* was collected.

Recognition. The explanate pronotum, with anterior marginal groove interrupted and postero-lateral angles acute, is sufficient to recognize adults of this species.

Measurements and descriptive notes. Habitus as in Fig. 125. Overall length 12 mm., Standardized Body Length 10.4 mm., width of elytra 4.3 mm. Elytra with humeral projections extended laterally. Maxillary palpomere 4 as in Fig. 66A; labial palpomere 3 as in Fig. 66B.

Geographical distribution (Map 13). This species is known only from the type locality, presumably in Venezuela.

Material examined. Holotype only.

Palaeotropical Peleciini

Ardistomopsis, New Genus

Disphaericus (in part); Schaum, 1864: 122. - Bates, 1886b: 73. - Andrewes, 1923: 228. - 1927: 109. - 1930: 153. - Csiki, 1929: 400.

Type Species. *Disphaericus myrmex* Andrewes, 1923 (here designated).

Derivation of generic name. The name is a combination of *Ardistomis*, a genus of scaritine carabids, and *opsis*, a Greek adjective for "like". Adults of *Ardistomopsis* have the appearance of rather large specimens of *Ardistomis*, and hence are *Ardistomis*-like.

Included species. This genus includes five species: *A. marginicollis* Schaum; *A. myrmex* Andrewes; *A. ovicollis* Bates; *A. andrewesi*, new species, and *A. batesi*, new species. The distribution of probably synapotypic character states indicates two species

complexes: *A. marginicollis*-*A. myrmex*; and *A. ovicollis*-*A. andrewesi*-*A. batesi*. See below for details.

Recognition. Among peleciines, adults are characterized by markedly sloped elytral humeri, elytra completely striate, pronotum with a single pair of lateral setae, lateral grooves distinct, and isolating the pronotum from the proepipleura, mesothorax with complete sternopleural sutures, mesepisterna isolated from mesosternum, mandibles with both terebral and retinacular teeth, and occlusal margin of base smooth, with a row of few setae (Figs. 17A, B, and I). Furthermore, the group is confined to the Oriental Region, in Sri Lanka and India (Map 1).

Description. Restriction of tribal and subtribal descriptions as follows. Habitus as in Fig. 126. Body pedunculate, with both pronotum and elytral humeri narrowed basally (Fig. 126). Size moderate, Standardized Body Length ca. 7 to 8.5 mm.

Color. Body black. Antennae and legs black, infuscated, or rufous. Palpi rufous or rufo-testaceous.

Microsculpture. Head, pronotum, and elytra with meshes transverse, or more or less effaced on head, grated on pronotum and elytra. Surface shining to iridescent.

Fixed setae. Labrum with six, head with one or two pairs of supraorbital setae, pronotum with single pair of lateral marginal setae. Base of maxillary stipes without seta. Elytron with parascutellar seta, one preapically in interneur 7, and series of about 25 umbilical setae. Abdominal sternum VII posteriorly, of males with two to six setae, females with eight to 10 setae.

Vestiture. Tarsomeres of males and females ventrally with adhesive vestiture of Type II setae: front legs, tarsomeres 1-4; middle legs, tarsomeres 2-4; and hind legs, on tarsomeres 1-3.

Head. Frontal impressions linear, elongate, extended posteriorly to posterior pair of supraorbital setigerous punctures. Median portion of fronto-clypeal suture indistinct. Temples, immediately behind compound eyes, small. Occipital area not constricted as neck, postocular transverse groove absent. Antenna with scape broad but relatively short, less than length of pedicel + antennomere 3.

Mouthparts. Labrum with anterior margin deeply and broadly notched. Mandibles (Figs. 17A-I) each with terebra markedly curved anteriorly, tapered as long sharp incisor, broadened basally dorso-ventrally, ventro-lateral margin evenly curved, not notched, scrobes wide (Figs. 17G-H); occlusal margin (Figs. 17E-F) with single ridge; terebral tooth broad and distinct; retinacular teeth separated from one another by deep groove; basal area with row of several setae, without marginal crenulations or parallel grooves. Maxillary palpomere 4 in both sexes more or less broadly ovate, apical margin truncate or nearly so. Labium (cf. Fig. 10A) with mental tooth very small, labial palpomere 3 broadly ovate to sub-triangular, as broad or broader than maxillary palpomere 4.

Thorax. Prothorax with proepipleura delimited dorsally by lateral grooves of pronotum, dorsal surface markedly vaulted.

Elytra. Basal ridge not evident. Interneurs deep, punctate or not, intervals slightly to moderately convex.

Male genitalia. As described for Peleciina, and internal sac covered with microtrichia of varied size, or with slender spines in discrete groups or generally spaced.

Geographical distribution. This genus is confined to the Indian sub-continent and the nearby island of Sri Lanka.

Chorological affinities. The range of *Ardistomopsis* is isolated from those of all other taxa of Peleciini, but is closest to the ranges of its closest relatives.

Phylogenetic relationships. Evidence of monophyly of the genus is provided by the lost pair of lateral pronotal setae, and the unique possession of a row of setae on the dorso-basal area of the mandibles. *Ardistomopsis* is related to *Disphaericus* and *Dyschiridium*, as indicated by joint possession of mandibles with large teeth and pedunculate (myrmecoid) body form. The primitive condition of the mandibles plus completely developed lateral grooves of the pronotum and mesosternopleural sutures indicate that *Ardistomopsis* is sister to the other two genera.

Key to Species of *Ardistomopsis*, new genus

1. Head with single pair of supraorbital setigerous punctures 2
- 1'. Head with two pairs of supraorbital setigerous punctures 4
- 2(1). Front tibia with notch of antennal cleaner near mid-length (Fig. 29A). Surface of elytra iridescent or not 3
- 2'. Front tibia with notch of antennal cleaner near base (Fig. 28). Surface of elytra shiny, but not iridescent *A. andrewesi*, new species
- 3(2). Elytron with interneurs deep (including 6 and 7 pre-basally), intervals clearly convex; surface iridescent *A. ovicollis* (Bates)
- 3'. Elytron with interneurs shallow (especially basal parts of 6 and 7); intervals nearly flat; surface shining, not iridescent *A. batesi*, new species
- 4(1'). Pronotum orbicular, nearly as long as wide *A. marginicollis* (Schaum)
- 4'. Pronotum longer, distinctly longer than wide *A. myrmex* (Andrewes)

Ardistomopsis marginicollis (Schaum),
New Combination
Fig. 29

Disphaericus marginicollis Schaum, 1864: 122.
Type material. Not seen. TYPE LOCALITY. -

Tranquebar (state of Tamil Nadu), India. - Andrewes, 1923: 228. - 1927: 109. - Csiki, 1929: 400. - Andrewes, 1930: 153.

Notes about type material. We have not seen the type, but we have studied a female collected at Madras and labelled: "Disphaericus marginicollis Schaum mit Type in Zool Mus. Berlin vergleichen det. Bänninger 19.III.1928".

Recognition. See key to species. In addition to those features, adults of *A. marginicollis* have a much more abrupt posterior declivity than have other species of the genus.

Description. Standardized Body Length of females 7.96-8.42 mm. Width of elytra 3.2-3.3 mm. Seemingly the largest species in the genus.

Color. Body integument, legs, and antennomeres black; palpomeres rufo-piceous.

Microsculpture and luster. Head with meshes transverse, surface not grated but shining and sub-iridescent. Pronotum and elytra with meshes transverse, grated, surface slightly iridescent.

Fixed setae. As described for genus, but head with two pairs of supraorbital setae. Sternum VII of female with 10 setae, irregularly distributed.

Vestiture. Tarsomeres 1-4 of front and middle legs and 2-4 of hind legs with adhesive vestiture ventrally.

Mouthparts. Terminal maxillary and labial palpomeres subtriangular, apical margins subtruncate, labial palpomere 3 broader than maxillary palpomere 4.

Pronotum. Relatively wide (width and length subequal); posterior declivity abrupt.

Elytra. Narrowly ovate, interneurs coarsely punctate.

Legs. Front tibia with notch of antennal cleaner near mid-length. (Fig. 29A).

Geographical distribution. This species is known only from South India.

Chorological affinities. The range of this species is adjacent to, and is probably overlapped by, that of *A. andrewesi*.

Phylogenetic relationships. Adults of this species share with those of *A. myrmex* the feature of sub-triangular terminal palpomeres, which is probably derived in this genus. The two species are allopatric, and thus vicariant. On these bases, we hypothesize a sister group relationship for these two species.

Material examined. Five specimens, as follows. Two females, South India, collected in September and November (BMNH). Female, Samanahally, near Bangalore, IV-V 1899, R. P. Tabourel (MNHP). Female, Bangalore (MNHP). Male, India Martin, Ex Musaco E. Allard (MNHP).

Ardistomopsis myrmex (Andrewes),
New Combination

Disphaericus myrmex Andrewes, 1923: 228. HOLOTYPE female, labelled: Type H. T. [Circular; ringed with red]; Ceylon 1922.215; Koggala XI.08; *Disphaericus myrmex* Andr. Type H. E. Andrewes det. (BMNH). - ALLOTYPE male, labelled: Ceylon Yerbura 92-59; El Coll. Brit Mus; Velverry 10.1.92; *Disphaericus Myrmex* Andr. cotype [handwritten] H. E. Andrewes det; H. E. Andrewes Coll. BM 1945-97 (BMNH). - Csiki, 1929: 400. - Andrewes, 1930: 153.

Notes about type material. Andrewes (1923: 230) records two males from: "Ceylon: Koggala and Valverry". The specimen labelled as type is also labelled Koggala, but it is a female. We are prepared to believe that Andrewes simply mistook the sex of that individual. The Valverry specimen is a male.

Recognition. See key to species. The specimens that we have seen are distinctive also in the broad elytra, and the adhesive vestiture of the hind tarsomeres is particularly well developed.

Description. Standardized Body Length of male 8.9 mm., of female 7.8 mm. Width of elytra, male 3.3 mm., of female 3.7 mm. (This species has the second broadest elytra in the genus.)

Color. Body integument black. Antennomere 1 rufous; femora, tibiae, and antennomeres 2-11 rufous or piceous. Palpomeres rufous.

Microsculpture and luster. Head with meshes transverse, not grated, surface shining, not iridescent. Pronotum and elytra with meshes transverse, grated, surface slightly iridescent.

Fixed setae. As described for genus, and head with two pairs of supraorbital setae. Sternum VII of males posteriorly with four setae, females with 10 setae, irregularly distributed.

Vestiture. Tarsomeres 1-4 of front and middle legs and tarsomeres 1-3 of hind legs with adhesive vestiture.

Mouthparts. Terminal maxillary and labial palpomeres of female narrowly triangular, apices truncate, labial palpomere 3 broader than maxillary palpomere 4.

Pronotum. Average for genus (cf. Fig. 126), apical declivity less abrupt than in *A. marginicollis*.

Elytra. Wider than in other species of *Ardistomopsis*, and humeri markedly sloped. Striation complete, interneurs finely punctate, as in *A. andrewesi*.

Male genitalia. Median lobe as described for *Peleciina*, but apex without distinct dorsal ridge, i.e., internal sac connected directly to apical edge. Internal sac covered with microtrichia, those on ventral surface medially enlarged, several times larger than average, but not as long as those of *A. andrewesi* and *A. batesi* males.

Geographical distribution. According to Andrewes (1923: 230), this species occurs in South India (Anamalai Hills) as well as in Sri Lanka. However, at the time, he was not aware of another species, *A. andrewesi*, whose range is near the Anamalai Hills,

and adults superficially are quite similar to those of *A. myrmex*. Although we have not seen the specimens in question, we believe they belong to *A. andrewesi*, and that *A. myrmex* is confined to Sri Lanka.

Chorological affinities. Also on Sri Lanka is *Ardistomopsis ovicollis* Bates. It is not known if the range of this species is in contact with that of *A. myrmex*, but such seems likely.

Phylogenetic relationships. See this topic under *A. marginicollis*. The pale appendages exhibited by adults of this species and shared with the species triad *A. ovicollis-andrewesi-batesi* is probably a homoplastic feature.

Material examined. Types, only.

Ardistomopsis ovicollis (Bates),
New Combination

Disphaericus ovicollis Bates, 1886: 73. HOLOTYPE male, labelled: Type H. T. [circular, ringed with red]; Ceylon G. Lewis 1910-320; Dikoya 3,800-4,200 ft. 6.XII.81-16.I.82; *Disphaericus ovicollis* Bates [BMNH]. - Andrewes, 1923: 229. - Csiki, 1929: 400. - Andrewes, 1930: 153.

Recognition. See key to species.

Description. Standardized Body Length 7.0 mm. Width of elytra 2.5 mm.

Color. Body integument black. Femora and tibiae rufous. Antennomeres and palpomeres rufo-flavous.

Microsculpture and luster. Head with microlines effaced, surface shining. Pronotum and elytra with surface grated, iridescent.

Fixed setae. Head with single pair of supraorbital setae. Pronotum with single pair of lateral setae. Abdominal sternum VII posteriorly with eight setae.

Vestiture. Tarsomeres 2-4 of front, middle and hind legs ventrally with adhesive setae (cf. Fig. 29B).

Mouthparts. Terminal maxillary and labial palpomeres broadly ovate, similar to one another in form and size.

Pronotum. Relatively narrow, elongate.

Elytra. Narrowly ovate, interneurs coarsely punctate.

Legs. Front tibia with notch of antennal cleaner near mid-length. (cf. Fig. 29A).

Male genitalia. Median lobe as described for *Peleciina*. Internal sac with patches of microspines: one patch of longer spines apico-ventrally (with sac everted), two patches of shorter spines medially, and one patch baso-dorsally.

Geographical distribution. This species is known only from the type locality, on the island of Sri Lanka.

Chorological affinities. See this topic, under *A. myrmex*.

Phylogenetic relationships. Pale appendages and single pair of supraorbital setae suggest relationship among this species, *A. andrewesi*, and *A. batesi*. For the present, we treat this complex as an unresolved trichotomy.

Material examined. Holotype, only.

Ardistomopsis andrewesi,

New Species

Figs. 17, 28, and 126

Type material. HOLOTYPE male, labelled: Type H. T. [circular, ringed with red]; Palni Hills Kodaikanal S.W.K. 6850'; Indian Mus. Calcutta; This species is not *marginicollis* H.E.A. [BMNH]. ALLOTYPE female, labelled: ALLO TYPE [red paper]; Shembaganur INDIA; 26; Ex coll Touzalin; *Disphaericus marginicollis* Schaum H. E. Andrewes det; H. E. Andrewes Coll. B. M. 1945-97 [BMNH].

Derivation of specific epithet. Patronymic adjectival form, genitive case of the surname of H. E. Andrewes, the great authority on the Carabidae of the Oriental Region. We are pleased to dedicate this species to his memory.

Recognition. See key to species. The most striking feature of the adults is the proximally located antennal cleaner on the front tibia (Fig. 28).

Description. Habitus as in Fig. 126. Standardized Body Length of male 6.60 mm., of female 7.18 mm. Width of elytra of male 2.50 mm., of female 2.60 mm.

Color. Body integument black. Femora and tibiae rufous. Antennomeres, palpomeres and tarsomeres rufo-flavous.

Microsculpture and luster. Head with microlines effaced, surface shining. Pronotum and elytra with meshes transverse but not grated, surface shining, not iridescent.

Fixed setae. As described for genus, and head with single pair of supraorbital setae. Sternum VII of male posteriorly with four setae, female with 10 setae irregularly distributed.

Vestiture. Tarsomeres 2-4 of front, middle and hind legs with adhesive setae (cf. Fig. 29B).

Mouthparts. Maxillary palpomere 4 ovate, apical margin much narrower than length of lateral margin. Labial palpomere 3 ovate in female, narrowly triangular in male. Mandibles as in Figs. 17A-I.

Pronotum. Relatively narrow, elongate; apical declivity rather gradual, not steep.

Elytra. Narrowly ovate, interneurs finely punctate.

Legs. Front tibia (Fig. 28) with notch of antennal cleaner much closer to base than to apex.

Male genitalia. Median lobe as described for genus. Internal sac with microspines in patches: one patch of long spines apico-ventrally; two patches of shorter spines medially; and one patch baso-dorsally.

Geographical distribution. This species is known from

South India, only, from Shembaganur and the Palni Hills.

Chorological affinities. The collecting localities for this species and *A. marginicollis* are close together, and so the two species may be sympatric.

Phylogenetic relationships. See this section under *A. ovicollis*.

Material examined. Types, only.

Ardistomopsis batesi,

New Species

Type material. HOLOTYPE male, labelled: India Cent. Jabalpur IX.57 1600 ft.; *Disphaericus ovicollis* Bates S. L. Straneo det 1960 (o specie proxima) (CS).

Derivation of the specific epithet. A patronymic based on the surname of the incomparable Henry Walter Bates, in his memory, and in recognition of his outstanding work on carabid beetles, during the latter part of the 19th Century.

Recognition. See key to species.

Description. Standardized Body Length 3.88 mm. Width of elytra 1.48 mm.

Color. Body piceous (nearly black - probably partly teneral). Antennae, mouthparts (including mandibles) and legs rufo-flavous.

Microsculpture. Dorsum of head smooth, microlines not evident. Pronotum with meshes transverse, microlines effaced toward medial part of disc. Elytra with meshes transverse.

Luster. Dorsal surface generally shiny, without indication of iridescence.

Fixed setae. Supraorbital setae one pair. Sternum VII with single pair of setae.

Vestiture of dorsal surface. Absent.

Pronotum. Form typical for *Ardistomopsis* (cf. Fig. 126).

Elytra. Form average for *Ardistomopsis* (cf. Fig. 126). Intervals only slightly convex. Interneurs finely punctate, 6 and 7 each represented by row of punctures in about basal half.

Legs. Front femur with notch of antennal cleaner as in Fig. 29A.

Male genitalia. Median lobe as described for genus (basal bulb small, apex in ventral aspect broad, truncate). Internal sac with circle of spines medially and patch dorsally at base, with sac everted.

Geographical distribution. Known from central India only, at the type locality.

Chorological affinities. The single known locality is far to the north of the next nearest locality for members of *Ardistomopsis*.

Phylogenetic relationships. See this section, under *A. ovicollis*.

Material examined. Type only.

Dyschiridium Chaudoir

Dyschiridium Chaudoir, 1861: 130. TYPE SPECIES: *Dyschiridium ebeninum* Chaudoir, 1861: 131 (by monotypy). - Burgeon, 1935: 192. - Basilewsky, 1953: 113.

Spanus Westwood, 1864: 3. TYPE SPECIES: *Spanus natalicus* Westwood, 1864: 3 (by monotypy). - Kolbe, 1895: 347. - 1898: 65. - Péringuey, 1926: 613. - Csiki, 1929: 401. - Burgeon, 1935: 192.

Disphaericus (in part); Péringuey, 1896: 537. - Csiki, 1929: 400.

Notes about synonymy. The generic names *Dyschiridium* Chaudoir and *Spanus* Westwood refer to the same taxonomic group, and are thus synonyms. Péringuey (1896: 537) treated these names and *Disphaericus* Waterhouse as synonyms, and used the latter name as the valid generic name for the inclusive taxon. Later (Péringuey, 1926: 613) he recognized *Spanus* as generically distinct, describing *S. concinnus*, thus implicitly recognizing two disphaericine genera: *Disphaericus* and *Spanus*. Burgeon (1935: 192) also recognized two genera, but used *Dyschiridium* for the valid name of one of these, listing as its junior synonym the name *Spanus*. Basilewsky (1953: 113) also recognized the same two genera and used the names as Burgeon had. We have not located a reference in which either ranking was discussed, or in which reasons were given for using the names chosen. Nonetheless, it is obvious that *Spanus* Westwood, 1864 is a junior synonym of *Dyschiridium* Chaudoir, 1861, if it is accepted that the type species of these two groups, *D. ebeninum* and *S. natalicus*, respectively, are congeneric.

Ranking. A close relationship seems clear between *Disphaericus* and *Dyschiridium*, with each exhibiting unique apotypic features and each being hypothesized as monophyletic. The morphological gap between the extant members of these two polybasic groups renders each sharply defined and easily recognized. This combination of features seems to meet our criteria for ranking at the generic level, a

conclusion that is consonant with the preference of specialists on Afrotropical Carabidae.

Included species. Currently, five species of this genus have been recognized, as follows. We have seen material that represents several additional presently undescribed species.

D. concinnus (Péringuey, 1926)

D. ebeninum Chaudoir, 1861

D. lasti (Bates, 1886)

D. natalicum (Westwood, 1864)

D. subdepressum (Kolbe, 1895)

Recognition. Adults of this genus are recognized by features presented in the key, the most striking of which is development of only the sutural interneur of the elytra.

Description. Restriction of tribal and subtribal descriptions, as follows. Habitus as in Fig. 127, similar to adults of *Disphaericus* in most features, except: size smaller, on average, Standardized Body Length. ca 3.0-9.0 mm.

Microsculpture and luster. Dorsal surface without micro-lines, except transverse meshes on labrum. Ventral surface with meshes transverse. Dorsal surface shining; ventral surface iridescent.

Fixed setae: Maxillary stipes with seta at base.

Geographical distribution (Map 1). This genus is known only from southern and eastern Africa, in the Afrotropical Region.

Chorological affinities. The geographical range of this group overlaps that of *Disphaericus*.

Phylogenetic relationships. *Dyschiridium* is the sister group of *Disphaericus* (for details, see section about evolutionary aspects, and Fig. 129).

Disphaericus Waterhouse

Disphaericus Waterhouse, 1842: 211. TYPE SPECIES: *Disphaericus gambianus* Waterhouse, 1842: 212 (by monotypy). - Duponchel, 1844: 80. - Lacordaire, 1854: 249. - Kolbe, 1895: 346. - 1898: 64. - Péringuey, 1926: 613. - Csiki, 1929: 400. - Burgeon, 1935: 191.

Disphaericus Basilewsky, 1953: 113.

Included species. We list here, in alphabetical sequence, the names of the currently recognized 17 species.

D. alluaudi Basilewsky, 1938
D. benadirensis Müller, 1941
D. carinulatus Basilewsky, 1955
D. clavicornis Kolbe, 1895
D. conradti Kolbe, 1895
D. deplanatus Müller, 1949
D. gambianus Waterhouse, 1842
D. insulanus Basilewsky, 1955
D. katangensis Burgeon, 1935
D. kolbei Alluaud, 1914
D. meneghettii Müller, 1949
D. multiporus Bates, 1886b
D. quangoanus Quedenfeldt, 1883
 q. quangoanus (*sensu stricto*)
 q. upembanus Basilewsky, 1953
D. rhodesianus Perinquey, 1904
D. silvestrii Müller, 1949
D. tarsalis Bates, 1886
D. zavattarii Müller, 1939

Recognition and diagnosis. Adults of this Afrotropical genus are readily recognized by a combination of: absence of lateral grooves of pronotum, mesosternopleural sutures reduced, mandibles with occlusal surface of basal area with parallel series of short notches, dorsal surface not setose, body pedunculate, integument black, and elytra with a full complement of deep interneurs.

Description. Restriction of tribal and subtribal descriptions, as follows. Habitus as in Fig. 128. Body pedunculate, with both pronotum and elytral humeri narrowed basally. Size moderate to large, Standardized Body Length ca. 8.5 to 16 mm.

Color. Black.

Microsculpture. Head, pronotum and elytra dorsally and ventral surface with meshes transverse (or effaced dorsally), not grated. Surface shining, but not iridescent.

Fixed setae. Labrum with six, head with two pairs of supraorbital setae, and maxillary stipes with seta at base. Umbilical setae about 20, in continuous series. Elytral disc basally with or without several long setae.

Vestiture. Front and middle tarsomeres 1-4 with or without pads of Type II setae. Pronotum and elytra with or without long sparsely distributed setae.

Head. Frontal impressions linear, elongate, extended posteriorly to about middle of compound eye. Temples, immediately behind compound eyes, deeply notched. Occiput not constricted as neck. Antenna with scape broad but relatively short, less than length of pedicel + antennomere 3.

Mouthparts. Labrum with anterior margin deeply and broadly notched (Fig. 4). Epipharynx in form of short ridge. Mandibles (Figs. 19A-C; cf. Figs. 18A-D) each with large anterior terebral tooth; retinaculum long toothed or not; basal area with five or more parallel grooves; dorsal surface with group of short strigils near base of terebra; scrobe broad, ventral margin evenly curved, not angulate. Maxillary palpomere 4 broadly securiform. Labium (Figs. 10A and B) with mental tooth very small, labial palpomere 3 broadly securiform.

Thorax. Prothorax without lateral grooves, dorsal surface markedly vaulted. Mesosternopleural sutures reduced, mesosternum and mesepisternum fused.

Elytra. Basal ridge not evident. Interneurs deep, distinctly punctate or not, intervals markedly convex.

Male genitalia. As described for *Peleciina*, internal sac without apical sclerite.

Geographical distribution (Map 1). This genus ranges widely in the Afrotropical Region.

Chorological affinities. The range of *Disphaericus* is overlapped in the Afrotropical Region in the east, by that of *Dyschiridium*.

Phylogenetic relationships. *Disphaericus* and *Dyschiridium* are sister groups, as indicated by the synapotypic grooving of the occlusal surface of the basal area of the mandibles.

Evolution of Peleciini - Reconstructed Phylogeny of Subtribes, Genera, and Subgenera

Methods

Characters and character states used were also used in the taxonomic diagnoses. We did not use microsculpture because of the presumptive extensive homoplasy that this system exhibits in Peleciini. Color was also excluded because it varies strikingly in one genus, only - *Pelecium*. Each character was numbered (Tables 1 and 2) primarily in sequence of first appearance of its apotypic state in the reconstructed phylogeny (Fig. 129), and secondarily in sequence of its appearance in taxonomic descriptions, *i.e.*, for a given branching point, seta characters were listed before those of sclerites, and external body sclerites preceded those of the genitalia.

Character states were polarized by outgroup comparison (Wiley, 1981: 139-146). The only weighting used was that of selection of the characters from among those that could conceivably be used. We did not bother with assigning weights because it was not necessary to do so, to find a reasonably clear-cut evolutionary pattern.

Autapotypic and synapotypic character states are indicated in Tables 1 and 2 and in Fig. 129, by number, and are sequenced by letters and superscript numbers and letters. Character states involving losses are indicated by a superscript minus sign. For characters with two or more apotypic states, each is designated by a different lower case letter if each was hypothesized to be separately derived from the plesiotypic condition, thus forming a

branched transformation series. If the apotypic states were hypothesized to form an unbranched transformation series, each was labelled with the same letter, but with a different number implying direction of change (*i.e.*, a^1 , a^2 , a^3). If branching was hypothesized to occur among the apotypic states, each such branch received a superscript letter (*i.e.*, a , a^a , a^b), with "a" being the first-stage derived condition, and a^a and a^b being independent second-stage derivatives.

Out-group for the Peleciini

Because we are quite uncertain about relationships of the Peleciini, we did not select a specific taxon as out-group. Believing that peleciines are a primitive group, either at the base of the Pterostichitae or near that base, we assembled a set of features that we thought from previous experience and from consulting Liebherr (1986: 90) ought to be ancestral within this complex, and used that set as features of a generalized out-group, or as a pterostichite ground-plan. Character states within the Peleciini that matched those of the generalized out-group were regarded as plesiotypic, and those confined to the Peleciini were regarded as apotypic.

Monophyly of the Peleciini

The combination of apotypic features that we think contribute evidence of monophyly includes characters 1 to 15 of the reconstructed phylogeny (Fig. 129, branching point A). Seven, or more than half, of these features involve the mouthparts, *i.e.*, structures associated with feeding. One feature is the adhesive vestiture of tarsomeres, a system that we believe is intimately involved with a special mode of life, *i.e.*, use of millipedes as food for both larvae and adults. Probably the modified mouthparts and specialized tarsal vestiture comprise a single adaptive complex.

We would surely have argued that the combination of features of the mouthparts could only have arisen once in the Carabidae, if we did not know that a very similar complex of mandibular, maxillary and labial features also characterize the Australian psydrite Meonidini (partly documented by Moore, 1963b). Nonetheless, we do believe that this suite of gnathal features plus the others constitute sufficient evidence to hypothesize that the genera included in the Peleciini shared a common ancestry.

Notes about characters

Table 1 provides phylogenetic designations for the states of each character. Table 2 indicates distribution of character states among the genera and subgenera of Peleciini. Some characters are more complex than is indicated in Table 1, and these are discussed below.

Character 01. Although the basal pterostichites (Platynini, Pterostichini, *etc.*) are regarded as having labial palpomere 2 bisetose, in fact additional short setae are evident. Among peleciines, one of these normally shorter setae is of nearly the size of the normally longer pair of setae. Thus, we regard peleciines as having trisetose palpomeres.

Character 03, number of setae on abdominal sternum VII. Within the subtribe Peleciina, variation is more extensive than indicated in Table 1, especially in the subgenus *Pelecium*. The basic pattern, however, seems to be two in males and more than eight in females, for this subgenus. Two setae in males is a ground plan feature for pterostichites. Because of the position of *Pelecium* in the reconstructed phylogeny relative to other groups, we interpret this lower number of setae as derivative by loss, and thus as a reversal to a more primitive condition. The bisetose abdominal sternum VII of the *Eripidius* male is similarly regarded.

The alternative would be to regard this bisetose condition as plesiotypic, with higher numbers (four and six) as independently derived apotypic conditions, having arisen: once in Agonicina (four setae); once in subgenus *Eripus* (four setae); once in *Stricteripus* (six setae); and once in the Old World Peleciina (four setae). It seems more parsimonious to accept the more numerous condition as part of the ground-plan of the Peleciini, and to regard the lower number (two setae) attained in two lineages only (*Eripidius* and *Pelecium* [*sensu lato*]) as independent losses and thus reversals.

Characters 10 and 32, form of terminal palpomeres of labium and maxilla, respectively. They exhibit marked intrageneric variation, especially in subgenus *Pelecium*. In *Eripus*, females of *E. subcaecus* have labial palpomere 3 very narrow apically, the seemingly plesiotypic condition. We regard this, however, as a reversal, being associated with a general reduction in size of body parts (*i.e.*, microphthalmia and narrowed tarsal articles), and thus not part of the ground-plan of *Eripus* nor of still more inclusive taxa of Peleciini.

Character 11, development of interneurs. This character varies markedly among the species of *Pelecium*. We have used only the hypothesized ground-plan condition in designating the character state for this genus, in the reconstructed phylogeny.

Character 12, the flight complex. This consists of wings, elytra and metathorax. In all peleciines, highly derived conditions are exhibited (reduction of wings to short stubs, reduction of the metathorax and probably loss of flight muscles, and fusion of the elytra) that are associated with loss of flight. We have treated this feature as a synapotypy in the ground-plan of the Peleciini, though we acknowledge that the ancestral peleciine may have been macropterous, and thus, that wing loss occurred several times within the group. This is because such reductions have occurred many times in the Carabidae, even within closely related groups of species.

Character 17, number of supraorbital setae. These have been reduced to one pair within the genus *Ardistomopsis*; as well, this character state is part of the ground-plan for the subtribe Agonicina and genus *Pelecium*.

Character 22, right mandible, anterior part of the retinacular ridge. This was lost within the subgenus *Eripus*, as well as in the groups as shown in Fig. 129.

Characters 30, 31 and 32, respectively position of the posterior setae of the pronotum, development of frontal impressions of the head, and form of terminal maxillary palpomeres. In each of these characters, adults of *Agonica* exhibit the apotypic states and thus resemble the Peleciina, rather than *Pseudagonica*, whose adults exhibit the plesiotypic conditions. These similarities between *Agonica* and subtribe Peleciina appear in the reconstructed phylogeny to be homoplastic. Perhaps it would be equally reasonable to interpret these supposed apotypic conditions as plesiotypic within the Peleciini, and the features of *Pseudagonica* as a reversal, and thus apotypic within this tribe. Considering, however, the general primitiveness of the Agonicina, and the evident lability of at least frontal impressions and palpomere form in the Peleciina, we think it more reasonable to regard the seemingly primitive features of *Pseudagonica* as indeed plesiotypic. On the other hand, we treated the narrowed labial palpomeres of *Eripus subcaecus* as an evolutionary reversal - but that, too, seems reasonable considering the position of *Eripus* in the reconstructed phylogeny.

The reconstructed phylogeny

This is illustrated in Fig. 129. Most branching points and terminal lineages (each labelled with a capital letter, in alphabetical sequence) are supported by at least two synapotypic features. The subgenus *Eripus* does not have any structural apotypies, but forms a homogeneous and discrete geographical unit, and is thus likely monophyletic. *Dyschiridium* adults differ in only one autapotypy from those of *Disphaericus*, but the geographical ranges of the two groups are partially different, and as well, *Dyschiridium* adults lack two autapotypies of *Disphaericus*. We accept these facts as evidence for the monophyly of both Afrotropical genera.

Character evolution. Of 66 characters used in the reconstructed phylogeny, the apotypic states of 48 of them are expressed in the ancestral stock (A), and in the first two branches (B and E) that mark off the subtribes and the first dichotomy. By the second dichotomy, that divides the ancestral Peleciina into the New World and Old World assemblages, the apotypic states of 51 characters have been expressed. From these observations, one gets the impression of intense early differentiation, followed by a later period of less change. Much, but not all, of the more recent changes have involved losses, principally of setae.

Losses. Excluding ground-plan features, losses are postulated for: setae, head grooves, parts of mandibles, thoracic sutures and grooves, various components of the elytral surface, and features of the ovipositor.

Of 13 non-ground-plan setal groups, all show at least partial loss. More than one loss is exhibited by the following: one pair of supraorbital setae (three times - once, Agonicina; once, genus *Pelecium*; and once in *Ardistomopsis*; character 17); one pair of labral setae (twice; character 49); parascutellar setae (twice, character 50); anterior pair of pronotal setae (twice - once, subgenus *Pelecium*; and once in *Ardistomopsis*; character 55).

Posterior parts of the head grooves (character 31) have been lost in the subgenus *Pelecium*.

Various parts of the mandibles have been lost: left mandible, ventral part of retinacular ridge (once; character 06); terebral teeth (twice; character 19); retinacular teeth (twice; character 20); basal notches (reduced to one, twice; to zero, once; character 21); right mandible, anterior part of retinacular ridge (four times - once, in subgenus *Eripus*; once, in subgenus *Pelecium*; once, *Stricteripus*; and

once, Old World assemblage of Peleciina; character 22).

The basal ridge of the elytron has been lost at least partially three times (once, Agonicina; once, subgenus *Eripidius*; and once, Old World assemblage of Peleciina; character 24).

Elytral interneurs (character 11) have been totally lost from subgenus *Eripidius*, *Stricteripus*, most species of subgenus *Eripus*, and a few species of subgenus *Pelecium* (total, four times, minimum). Interneurs have been reduced, leaving at least interneur 1, in species of subgenus *Eripus*, subgenus *Pelecium* (several times), and in genus *Dyschiridium*.

Pleural sutures have been lost once from the thorax of adults of Agonicina (metapleurals; character 23); and once from *Disphaericus* (mesosternopleurals; character 66). Lateral grooves of the pronotum have been lost from *Disphaericus*, and from some species of *Dyschiridium* (character 65).

The preapical ventral furrow has been lost from stylomere 2 of the ovipositor in females of the Agonicina (character 26). Losses have appeared in 25 of the 66 character used in the analysis, or more than one third, and thus reduction seems to have been an important part of character evolution in peleciines.

The significance of these losses is not immediately apparent. Reduction in numbers of setae seems to be a correlate of reduction of flight wings, since it is observed in numerous groups of carabids with brachypterous adults (Darlington, 1971: 246-247). Loss of thoracic sutures may be associated with a general strengthening and consolidation of the thorax.

Evolution of mechanisms for prey capture and feeding. Hengeveld (1981: 312) emphasizes that "the pattern of adaptations for a particular type of feeding is relevant to the understanding of the phylogeny of carabid beetles". He states also that "the adaptations necessary for a beetle to be able to specialize on a certain kind of prey may involve an extensive reorganization of several quite different body functions". We agree, and to the extent possible, we follow Hengeveld by drawing together in one unit those features of peleciine adults that are probably related to specialized feeding.

Just as Erwin and Stork (1985: 409-412) reported for the Hiletini, Ball (1985: 308-309) for the Galeritini, and Ball and Shpeley (1983: 799) for eucheiloid Lebiini, features associated with prey capture and feeding have been of substantial importance in evolution of Peleciini, also. For this taxon,

we believe the following features and structures can be ascribed to these functions: tarsi, head orientation, mouthparts, and body form. In all of these features, the Peleciina is the more progressive of the two subtribes.

Assuming that peleciine adults are specialized for capturing and eating millipedes in the fashion described by Erwin (1979: 550-551), we imagine that initial steps in evolution involved prey finding and capture of, perhaps, small, slightly sclerotized millipedes. We suspect that extra-intestinal or preoral digestion is probably the principal mode of feeding, with the mandibles adapted for slicing through sclerotin and holding, and the maxillary laciniae for triturating, rather than for tearing tissue. This belief is based on comparisons with modes of feeding in other carabids that exhibit similar gnathal adaptations, particularly the extensive setation in the ventral grooves of the mandibles and on the occlusal margins of the laciniae, and the lack of a terminal lacinial tooth (*cf.* Forsythe, 1982: 67).

Beginning with simplified mandibles (*i.e.*, reduced grinding function by reduction of the basal molar area, and left mandible with a single edge), the right mandible has become further simplified at least four times by reduction of the anterior part of the retinacular ridge. The basal area has become more complex at least twice, with development of a series of parallel grooves. Such modifications might be for enhanced shearing of tissue, a function possibly important for cutting quickly into the ventral surface of living and potentially dangerous prey (millipedes have powerful chemical defences). On the other hand, the large teeth developed in the Old World Peleciina may be an adaptation for firmly gripping the prey, after shearing through the integument.

The deflexed, semi-hypognathous head of the Peleciina must be some kind of adaptation for dealing with the large, powerful millipedes that are quick to go into a defensive coil, when disturbed. The vaulted elytra with enlarged plical locking devices may also be adaptive for dealing with large coiling millipedes, by strengthening the posterior part of the beetle's body as a firm wedge to minimize coiling. In turn, the enlarged tarsi with sexually homonomous adhesive vestiture are almost certainly adaptations for running on and clinging to the smooth surfaces of large millipedes. Development of adhesive setae on the tarsi of females must have been a crucial adaptation for the Peleciini.

Evolution of the ovipositor of Peleciini. Major trends

have involved simplification. Beginning with the ground plan condition of loss of trichoid setae from stylomere 1 and reduction in number of ensiform setae on stylomere 2, the stylomeres have been further simplified in agonicine females by loss from stylomere 2 of all ensiform setae, the preapical ventral furrow, nematiform setae, and the furrow pegs. Such changes suggest a simplification of egg laying, to the point at which females do not need a very precise sense of the location of the ovipositor that would presumably normally be provided by such sense organs. Thus, instead of being placed in a precisely prepared burrow in the soil, perhaps agonicine females attach the eggs to some surface object, or perhaps the eggs are simply dropped on the ground, near potential prey for the larvae. Because females of the Peleciina retain many of the ancestral sense organs of stylomere 2, we assume that they also retain a more plesiotypic mode of oviposition.

Evolution of Peleciini - Chorological Aspects of Subtribes, Genera and Subgenera

In this section, the word vicariance and its derivatives is used to indicate complementary rather than overlapping geographical ranges of taxa. Vicariance comes about either by rare dispersals across barriers, or through division of once continuous ranges that have been interrupted by interposition of unfavorable conditions.

Distribution pattern

Map 1 shows a markedly disjunct pattern, with each genus confined to a single continent either in the southern hemisphere, or at low latitude in the northern hemisphere. Agonicipines are Australian, with *Agonica* in Tasmania and southeastern Australia, and *Pseudagonica* also in the southeast, but ranging farther north. For Peleciina, Fig. 129 shows that both New World and Old World assemblages are monophyletic: in the Old World, *Ardistomopsis* is in India and Sri Lanka, only, and *Disphaericus* and *Dyschiridium* are confined to the Afrotropical Region. The range of *Disphaericus* is more central, with *Dyschiridium* extending farther south and more to the east.

In the New World, all three genera occur in South America, and both *Pelecium* and *Eripus* are

in Middle America. At the subgeneric level, the pattern is one of vicariance, or complementarity: *Eripidius* is known only from South America and *Eripus* only from Nuclear Middle America; *Pelecium* (*sensu lato*) is represented south of the Amazon Basin by *Pelecium* (*sensu stricto*), and to the north by *Pelecidium*, whose range extends marginally into Lower Middle America.

We note that the distribution pattern of the South American peleciines is referable to the tripartite zoogeographical division of *cis*-Andean South America proposed by Croizat (cited by Brooks *et al.*, 1981: 166, Fig. 24), with only the northern and southern areas occupied.

The overall pattern is similar to that of the notiobioid genera of anisodactyline Harpalini (Noonan, 1985: 339; note especially Fig. 8).

Geographical history

We hypothesize that ancestral peleciines were distributed in southern Gondwanaland in Upper Jurassic time (Map 14.1), and may have been adapted to warm-temperate-subtropical conditions. Subsequently, and possibly even preceding the break-up of Gondwanaland, two lineages emerged: a northern one that maintained and perhaps even extended a broad range of climatic tolerance (ancestral Peleciina); and a southern one that specialized for life in cool temperate conditions (the ancestral Agonicipina; see Darlington, 1961, especially pp. 16 and 23).

A reduced-area cladogram (Fig. 130A; for an explanation of such diagrams, see Wheeler, 1986 and references therein) based on the reconstructed phylogeny of the Peleciini suggests a sequence of splits of land masses that is generally in accord with the reconstructed break-up of Gondwanaland (Fig. 180B and Maps 14.1-14.3; cf. Howarth, 1981). India is exceptional: evidently, it was the first fragment to be isolated from the rest of Gondwanaland by oceanic sea (Howarth, 1981: 210, Fig. 13.12). The area cladogram indicates a separation of India and Africa after the latter continent separated from South America. Accepting both the geological evidence and reconstructed phylogeny at face value, an incongruence in the two patterns must be accounted for.

India must have been reached overseas, when that land mass was still close to Africa, or overland by way of the Palaearctic Region, following the mid-Tertiary connection of India with the rest of what is now Asia. Since *Ardistomopsis*, the only peleciine

genus in India and Sri Lanka, probably evolved early in the history of the Peleciina, it seems likely that its ancestor reached India directly from Africa, and is thus a long-time resident of the Indian sub-continent.

Erwin and Stork (1985: 444-445, Figs. 36-37), in explaining the distribution pattern of the pan-tropical Hiletini, proposed a southern Palaeoartctic route for *Eucamaragnathus* from Africa. In the Old World, this genus occurs now in southeastern Asia and the Afrotropical Region, and nowhere between. Although hiletines and peleciines were probably both Gondwanian residents during the Mesozoic era, it seems that the former group either did not reach India, or became extinct there.

The ranges of the Afrotropical genera now broadly overlap, so it is not clear that the two groups differentiated in isolation - though it seems likely that such happened. Possibly *Dyschiridium* developed as a peripheral isolate in South Africa.

Turning to the geographical history of Peleciina in the New World, the reduced-area cladogram seems to imply a late separation of Lower Middle America from South America. This is simply an artifact of construction of the diagram. In fact, Middle America and South America joined, rather than separated, and the joining occurred late in the Tertiary period.

The geographical basis for differentiation of the New World genera is not readily apparent, since the ranges of all three taxa overlap, at least in part. However, the following sequence of events seems possible,

1. Invasion of Middle America by ancestral + peleciine stock, across a salt water barrier.
2. Isolation as geographical vicars, and differentiation into *Eripus* (Middle America) and ancestor of *Pelecium* + *Stricteripus* (cf. Map 14.4).
3. Isolation and resulting vicariance of the latter, with ancestral *Stricteripus* in northern cis-Andean South America, and ancestral *Pelecium* in the Atlantic Forest area, south of the Amazon Basin.
4. Differentiation into *Pelecium* and *Stricteripus*.
5. Range expansion of ancestral *Pelecium* westward and northward, probably around rather than through the Amazon Basin.
6. Division of range of *Pelecium*, with stocks surviving as vicariants north and south of the Amazon Basin.
7. Differentiation: ancestral subgenus *Pelecium* to the south of the Amazon Basin, and ancestral *Pelecidium* to the north.

8. Dispersal of ancestral *Eripus* across a narrow sea barrier and into northern South America, along slopes of Andes.

9. Elimination of ancestral *Eripus* from Lower Middle America with vicariants surviving in Nuclear Middle America and northern cis-Andean South America. The South American vicar becomes *Eripidius*, and the Middle American vicar, *Eripus* (*sensu stricto*).

10. Dispersal of *Pelecidium* stock (in form of *P. sulcipenne*) into Lower Middle America.

Entry of the ancestral stock F (Fig. 129) into Middle America probably occurred in early Palaeocene time, when, it seems, the opportunity for such dispersal was better than in mid-Tertiary time (Savage, 1982: 487-496. See also the discussion by Ball and Shpeley 1986: 339, and the references cited therein). Entry into Middle America by *Pelecidium* was probably a relatively recent event, i.e., Pliocene, and certainly more recent than invasion of South America by the ancestral stock of *Eripidius* (stock I). This assertion is based on degree of differentiation: for *Pelecidium*, the same species is in both northern South America and Lower Middle America, and populations on the two land masses are not far from one another geographically. On the other hand, for *Eripus*, the subgenus *Eripidius* is quite different from *Eripus* (*sensu stricto*). Furthermore, a wide geographical gap separates the two subgenera, at present. These considerations suggest an extensive period of geographical isolation.

We do not have any convincing way of timing for differentiation of *Pelecium*, but since *Pelecidium* comprises at least three species, presumably the ancestral stock L (see Fig. 129) of the extant species was probably to the north of the Amazon Basin by Miocene or Pliocene time.

Differentiation of the agonicine genera may have taken place in allopatry, with the ancestral stock of *Agonica* isolated in Tasmania, and that of *Pseudagonica* in the mountains of southeastern Australia. According to Darlington (1965: 94) "At the beginning of the Tertiary, Tasmania was still part of Australia. It became separated by formation of Bass Strait, perhaps as early as the Oligocene... although the times when Tasmania has and has not been connected to the mainland before the Pleistocene are somewhat uncertain." Although an exact dating cannot be provided for differentiation of the ancestral agonicine stock, the two extant taxa are sufficiently different to suggest certainly at least early Tertiary isolation, a period that is in agreement with an Oligocene-age break between Tasma-

nia and the adjacent mainland. Subsequently, probably in the Pleistocene, with lower sea levels as a result of water being locked in glacial ice, one stock of *Agonica* made the crossing on a land bridge to southeastern Australia, and that lineage became divided, probably by the re-opening of Bass Strait in an inter-glacial. The Australian vicar became *Agonica victoriensis*.

Potential falsifiers

The zoogeographic hypotheses presented above can be tested through discoveries in future of additional character systems, new taxa, and range extensions of presently known taxa. Any such character systems that indicate groups hypothesized as monophyletic are in fact polyphyletic, would falsify portions of the zoogeographic hypothesis. Discoveries of new taxa that modify the ranges of the known genera and subgenera could falsify portions of the zoogeographic hypothesis.

Predictions

Based on the hypotheses presented here, we predict the following:

1. Additional species of any of the groups treated will be on the continent appropriate for each group. We make two exceptions:
 - a. If the Agonicina is found anywhere outside of the Australian Region, it will be in South Temperate South America, or in New Zealand, and the species will represent a previously undescribed genus; or undescribed genera.
 - b. If the Peleciini is represented on Madagascar, the representative will be a member of the subtribe Peleciina, and furthermore, it will represent one of the known clades of *Disphaericus* or *Dyschiridium*; i.e., such a representative will be a comparatively recent (Tertiary) arrival from Africa.
2. In the New World, undescribed species of subgenus *Eripidius* will be discovered in northern cis-Andean South America.
3. If any species of subgenus *Eripus* is discovered in South America, it will be in the north, and will be closely related to or conspecific with some presently unknown Lower Middle American species, which, in turn, will be closely related to Nuclear Middle American stocks, rather than to the ancestral stock of subgenus *Eripus*.

Taxon Pulses and Peleciini

Erwin (1985), extending ideas previously developed by him and other authors (*l.c.*, references by Brown, Darlington, and Wilson) hypothesized for carabids a repeating cycle of driving forces and events such that a structurally and ecologically generalized tropical waterside taxon becomes biologically highly successful, thus geographically widespread in the world, only subsequently to be replaced by a still more successful taxon, initially at the geographical and ecological center of the range, and gradually elsewhere as the next successful group spreads. Extinction of the first group to become widespread is avoided by its specialization of one kind or another, thus opening a route of escape from the effects of the subsequent successful group.

Specialization takes a variety of forms - different in different taxa, and involving place and/or way of life. Ball (1985: 308) used this general hypothesis to analyze the evolution of the Galeritini. We offer a similar analysis here.

Peleciines are basically inhabitants of forests or montane forests, where they live in the leaf litter. They are not waterside generalists, and have thus shifted from that ancestral carabid habitat. Although the ranges of most taxa are located within the tropics, many are montane, and some have entered seasonal forests or semi-grassland situations. These are derivative habitats, in terms of the hypothesized common ancestral habitat. Agonicines seem to have withdrawn completely from the tropics, surviving as cool temperate relicts (Darlington, 1961: 16).

Adults are brachypterous with pronounced reduction in the flight mechanism, and are thus specialized in this respect. Body form is sub-pedunculate to pedunculate, and a certain amount of consolidation of thoracic sclerites has taken place. Modifications of the ovipositor suggests modified oviposition habits.

The most striking shift, however, involves prey and feeding: from generalized predation to specialized millipede predation and probably parasitoidism as larvae. Specialization in mouthparts, food, and food capture is characteristic of many of the older carabid lineages (Hengeveld, 1981: 314). Such specialization, then, may be a type of shift that is especially important in enabling survival of older lineages of carabids in the face of competition from younger, more successful taxa.

In summary, although peleciines continue to occupy terrestrial habitats in tropical to warm

temperate forests, and thus are not far removed from ancestral carabids in these respects, in others, strong divergence seems to have taken place. These shifts seem to be profound, and they probably account for the ability of this old taxon to survive and maintain a modest level of diversity.

Concluding Remarks

The more specific goals of research in systematics are to recognize taxa on the basis of natural relationships, to provide the means of identification of all life stages of individuals of those taxa, and to provide a unique and distinctive name for each taxon. A more general goal is to achieve understanding of the evolutionary history of each taxon, including transformation of holomorphological features through time and space. Such achievement is conceptual, and is based on application of evolutionary theory to the objects of study.

We have sought these goals for the Peleciini, but only on the basis of structural features observable on dead adults, plus even more limited observations of a few living peleciines. We have provided a skeleton that must be fleshed out (if not rebuilt) by additional knowledge of all aspects of the group, most pressing of which concerns way of life. How do peleciines make a living? Are all of them associated with millipedes?

If morphological differences can serve as a guide to seeking ecological and life history differences, one of the more pressing demands in studies of Peleciini is to determine way of life of members of the subtribe Agonicina. This is the most primitive extant group in structural features, and it may be thus in other features, also. Evidence might be found of the first stages of association with the type of prey that has served as the basis for differentiation and survival of this tribe.

In stressing the need for information about living peleciines, we are not unmindful of the basic taxonomic work that remains to be undertaken, nor are we unmindful of our predecessors in whose foot steps we follow. We know much more about peleciines than William Kirby knew, when, in 1817, he described the first species of this tribe. But there is much more to be found out. We hope that this contribution will serve as a focus and stimulus for future work on this enigmatic Gondwanian relict lineage.

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A previous draft of the manuscript on which this paper is based was read with care by our colleagues Yves Bousquet (Biosystematics Research Centre, Agriculture Canada, Ottawa), Barry P. Moore, Gerald R. Noonan, and Donald R. Whitehead. To our initial chagrin, they discovered numerous minor errors of commission, and as well some matters that required considerable thought on our part. We corrected the mistakes, and made additions that addressed some of the substantive comments raised by the reviewers. We declined to make suggested changes of substance that did not seem defensible to us, or that seemed to lead to results different from but not superior to our original conclusions. We do not deny the validity or importance of the declined changes, and indeed hope that they might be pursued by their proposers. In any event, we appreciate the cooperation of our reviewers, and thank them for their generous assistance.

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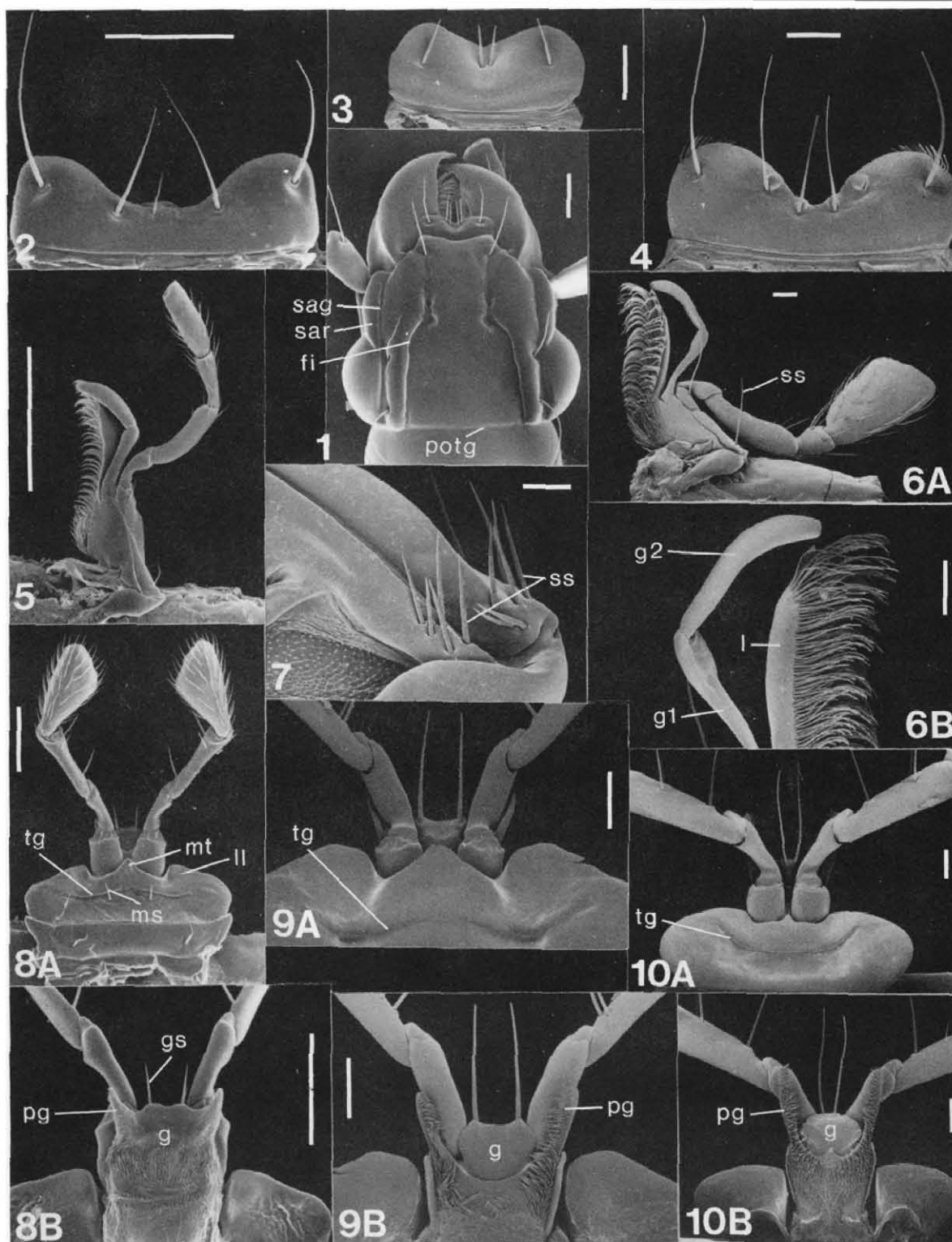
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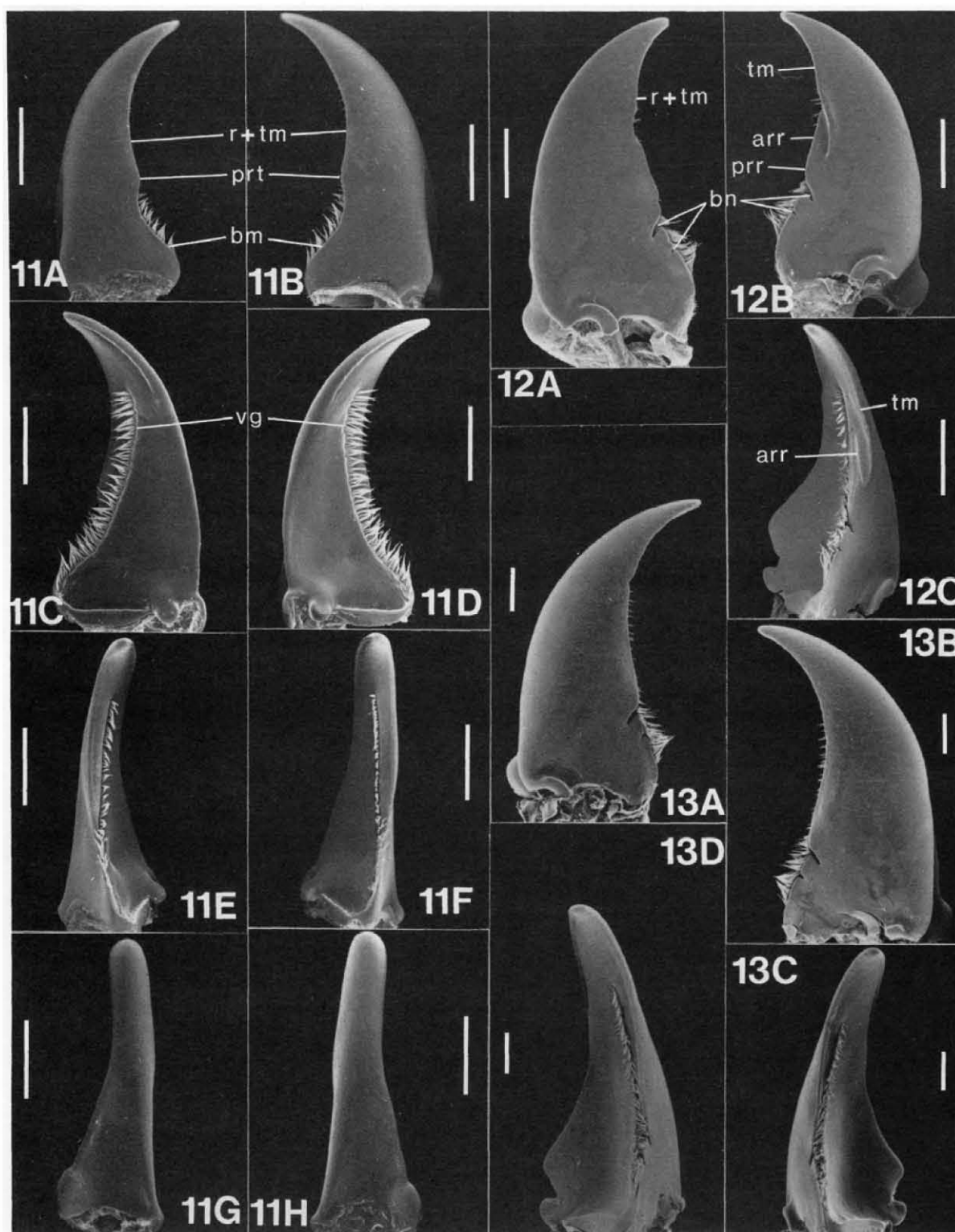
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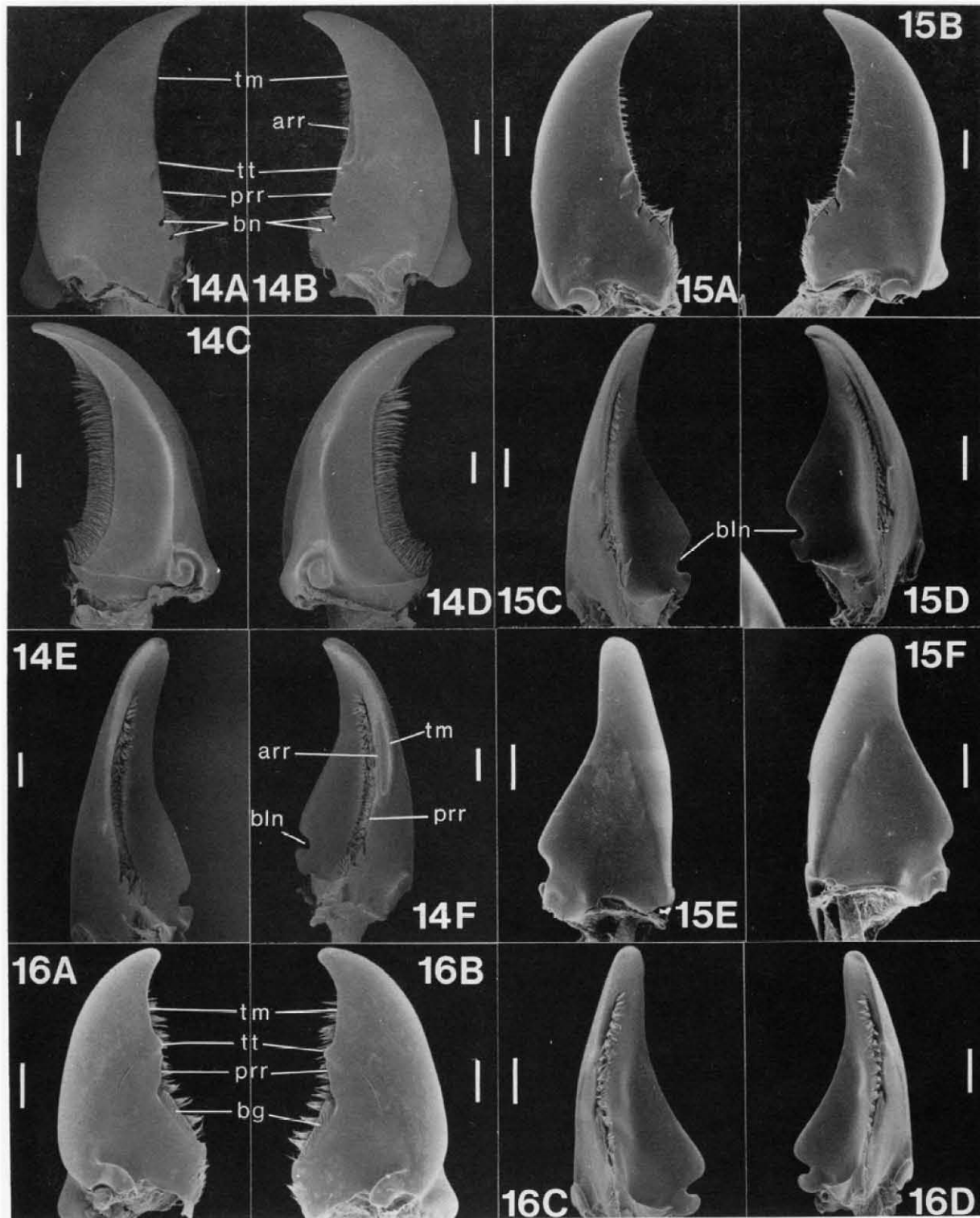
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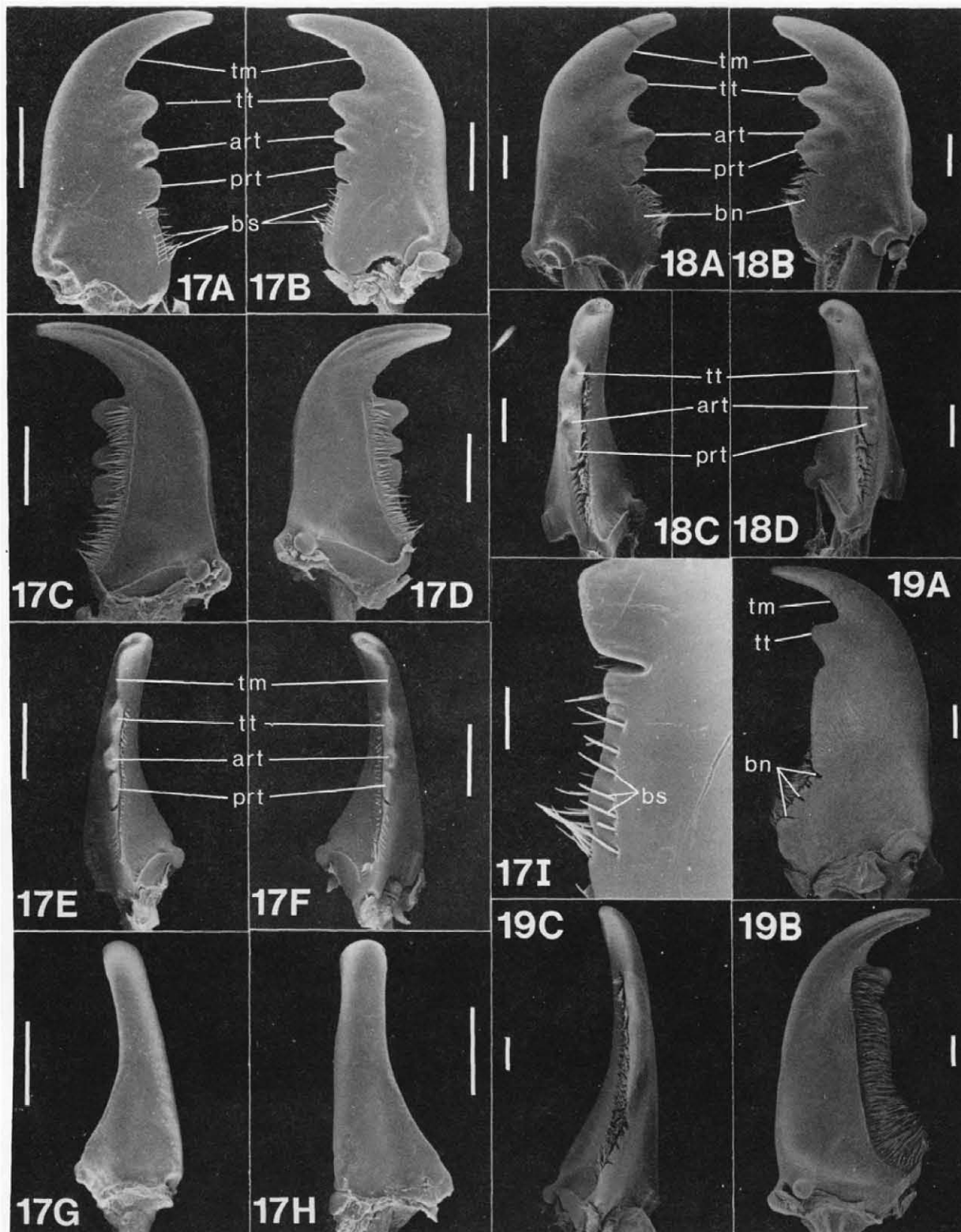
Figures 1-10. SEM photographs of structural features of Peleciini. 1, Head, dorsal aspect, of *Eripus globipennis whiteheadi*, new subspecies. 2, Labrum, dorsal aspect, of *Agonica simsoni* Sloane. 3, Labrum, dorsal aspect, of *Pelecium sulcipenne* Chaudoir. 4, Labrum, dorsal aspect, of *Disphaericus* species. 5, Left maxilla, ventral aspect, of *Agonica simsoni* Sloane. 6, Left maxilla of *Disphaericus* species: A, ventral aspect; B, left lacinia and galea, apical portion, ventral aspect. 7, Left maxilla, base of stipes, ventral aspect, of *Pelecium sulcipenne* Chaudoir. 8, Labium of *Agonica simsoni* Sloane: A, ventral aspect; B, glossal sclerite, dorsal aspect. 9A and B, same, of *Pelecium sulcipenne* Chaudoir. 10 A and B, same, of *Disphaericus* species. Legend: fi, frontal impression; g, glossal sclerite; g1, galeomere 1; g2, galeomere 2; gs, glossal seta; l, lacinia; ll, lateral lobe of mentum; ms, mental seta; mt, mental tooth; pg, paraglossa; potg, post-ocular transverse groove; sag, supraantennal groove; sar, supraantennal ridge; ss, stipital seta. Scale bars = 0.25 mm., Fig. 1; 50 μ m, Fig. 7; 200 μ m, Figs. 3-6B, and 8A-10B.



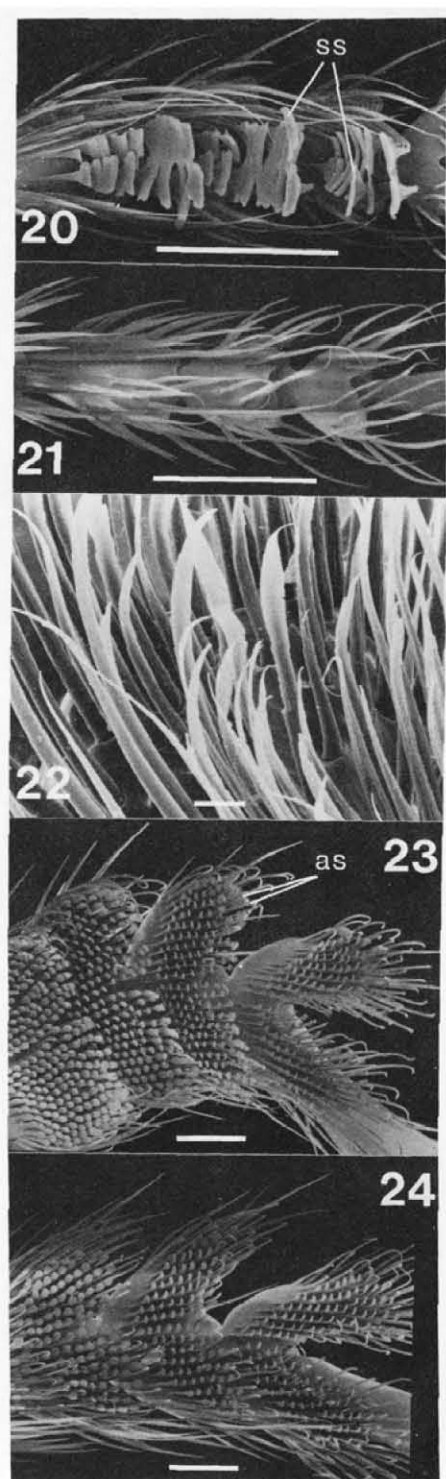
Figures 11-13. SEM photographs of mandibles of Peleciini. 11, *Agonica simsoni* Sloane: A and B, left and right mandibles, dorsal aspect; C and D, same, ventral aspect; E and F, same, occlusal aspect; G and H, same, lateral aspect. 12, *Eripus scydmaenoides* Dejean: A and B, left and right mandible, dorsal aspect; C, left mandible, occlusal aspect. 13, *Eripus nitidus* (Chaudoir): A and B, left and right mandibles, dorsal aspect; C and D, same, occlusal aspect. Legend: arr, anterior retinacular ridge; bm, basal margin; bn, basal notch; prr, posterior retinacular ridge; prt, posterior retinacular tooth; r + tm, retinacular ridge + terebral margin; tm, terebral margin; vg, ventral groove. Scale bars=200 μ m.



Figures 14-16. SEM photographs of mandibles of Peleciini. 14, *Pelecium sulcipenne* Chaudoir: A and B, left and right mandibles, dorsal aspect; C and D, same, ventral aspect; E and F, same, occlusal aspect. 15, *Pelecium violaceum* Brullé: A and B, left and right mandibles, dorsal aspect; C and D, same, occlusal aspect; E and F, lateral aspect. 16, *Stricteripus peruvianus* (Straneo): A and B, left and right mandibles, dorsal aspect; C and D, same, occlusal aspect. Legend: arr, anterior retinacular ridge; bg, basal grooves; bln, baso-lateral notch; bn, basal notches; prr, posterior retinacular ridge; tm, terebral margin; tt, terebral tooth. Scale bars=100 μ m.



Figures 17-19. SEM photographs of mandibles of Peleciini. 17, *Ardistomopsis andrewesi*, new species: A and B, left and right mandibles, dorsal aspect; C and D, same, ventral aspect; E and F, same, occlusal aspect; G and H, same, lateral aspect; I, right mandible, basal occlusal area. 18, *Dyschiridium* species: A and B, left and right mandibles, dorsal aspect; C and D, same, occlusal aspect. 19, *Disphaericus* species, right mandible: A, dorsal aspect; B, ventral aspect; C, occlusal aspect. Legend: art, anterior retinacular tooth; bn, basal notches; bs, basal setae; prt, posterior retinacular tooth; tm, terebral margin; tt, terebral tooth. Scale bars = 50 μ m, Fig. 17I; 200 μ m, 17A-H, 18A-D, and 19A-C.



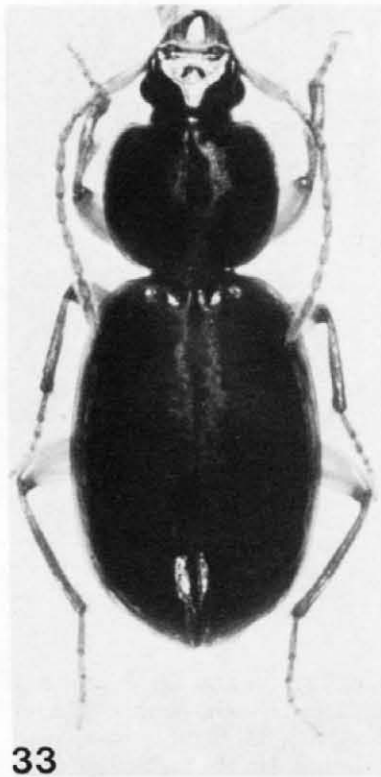
Figures 20-24. SEM photographs of tarsi of Peleciini, ventral aspect. 20-22, *Agonica* Sloane: 20 and 21, *A. simsoni* Sloane, male, front and middle tarsomeres, respectively; 22, *Agonica ovalipennis* Sloane, female, adhesive vestiture of front tarsomeres. 23 and 24, *Pelecium sulcipenne* Chaudoir, front and middle tarsomeres, respectively, adhesive setae. Legend: as, Type I seta; ss, squamo-seta. Scale bars = 20 μ m, Fig. 22; 200 μ m, Figs. 20-21, and 23-24.



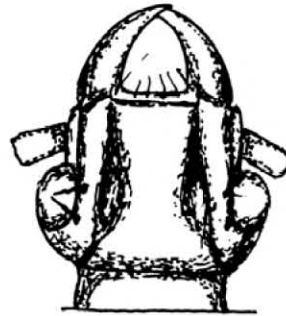
Figures 25-31. SEM photographs of legs and ovipositor sclerites of Peleciini. 25, *Eripus nitidus* (Chaudoir): front tibia, apex, and tarsus, dorsal aspect. 26, Same of *Stricteripus peruvianus* (Straneo). 27, Same, lateral aspect. 28, *Ardistomopsis andrewesi*, new species: apical portion of left front femur, tibia, and basal tarsomeres, anterior aspect. 29 and 30, *Ardistomopsis marginicollis* Schaum, right front tibia and basal tarsomeres: A, anterior aspect; B, tibia, apical portion and part of tarsomere 1, ventral aspect. 30, *Agonica simsoni* Sloane, left ovipositor sclerites, apex of stylomere 1, and 2: A, lateral aspect; B, ventral aspect. 31, *Pelecium sulcipenne* Chaudoir, same. Legend: ac, antennal cleaner; c, corbel; es, ensiform seta; ns, nematoid seta; S2, stylomere 2; ts, tibial spine; tsp, terminal spur of front tibia. Scale bars = 25 μ m, figs. 30 and 31; 200 μ m, figs. 25-29.



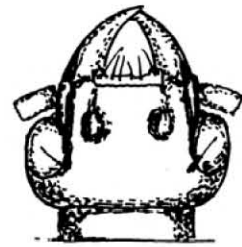
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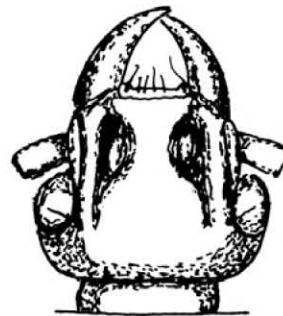
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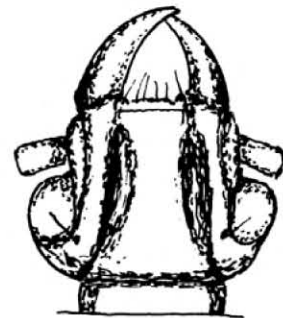
34A



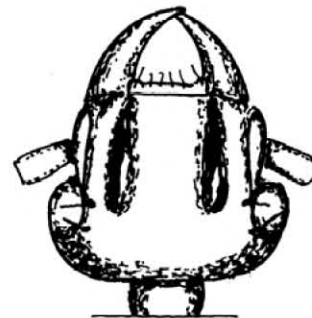
34B



34C

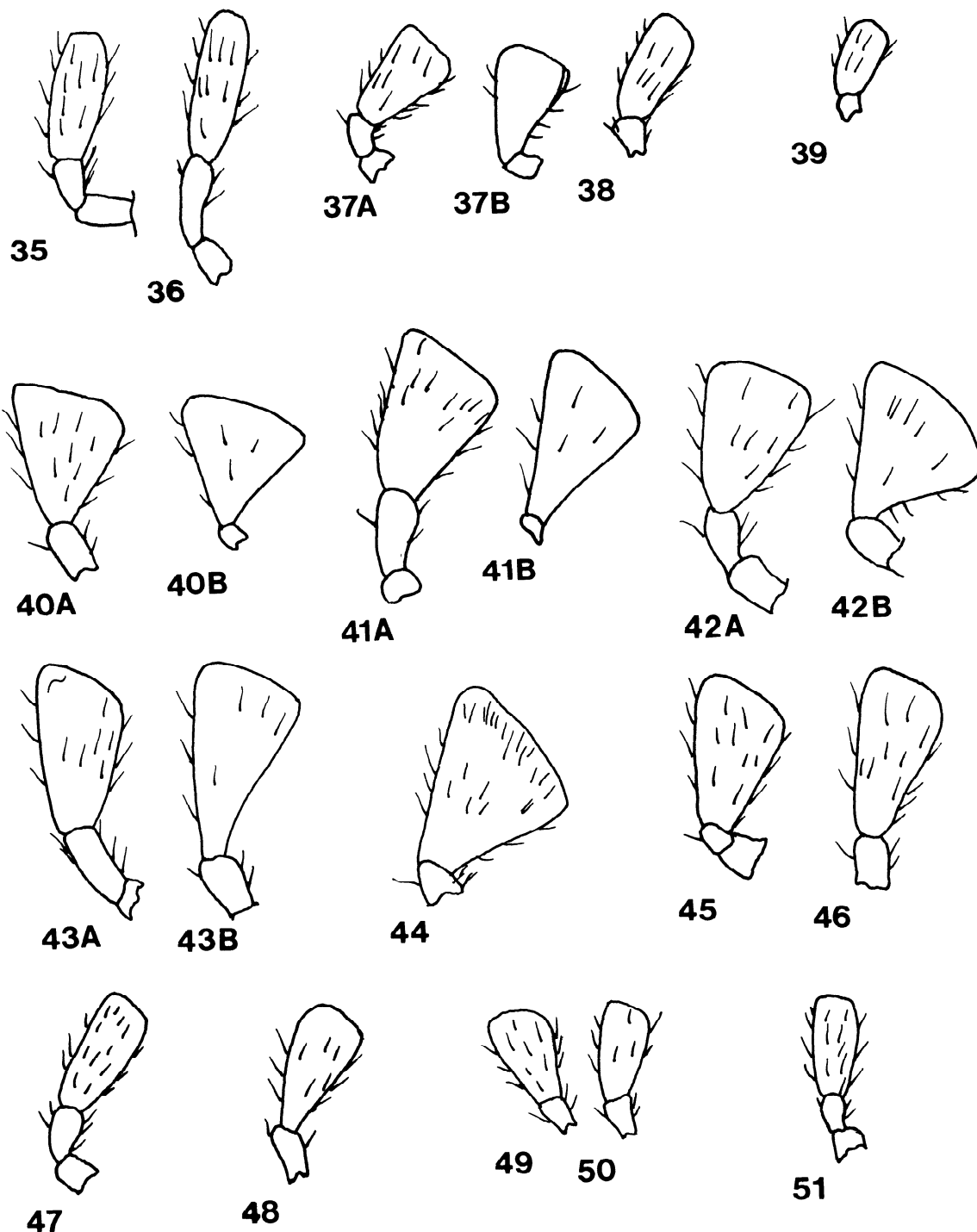


34D

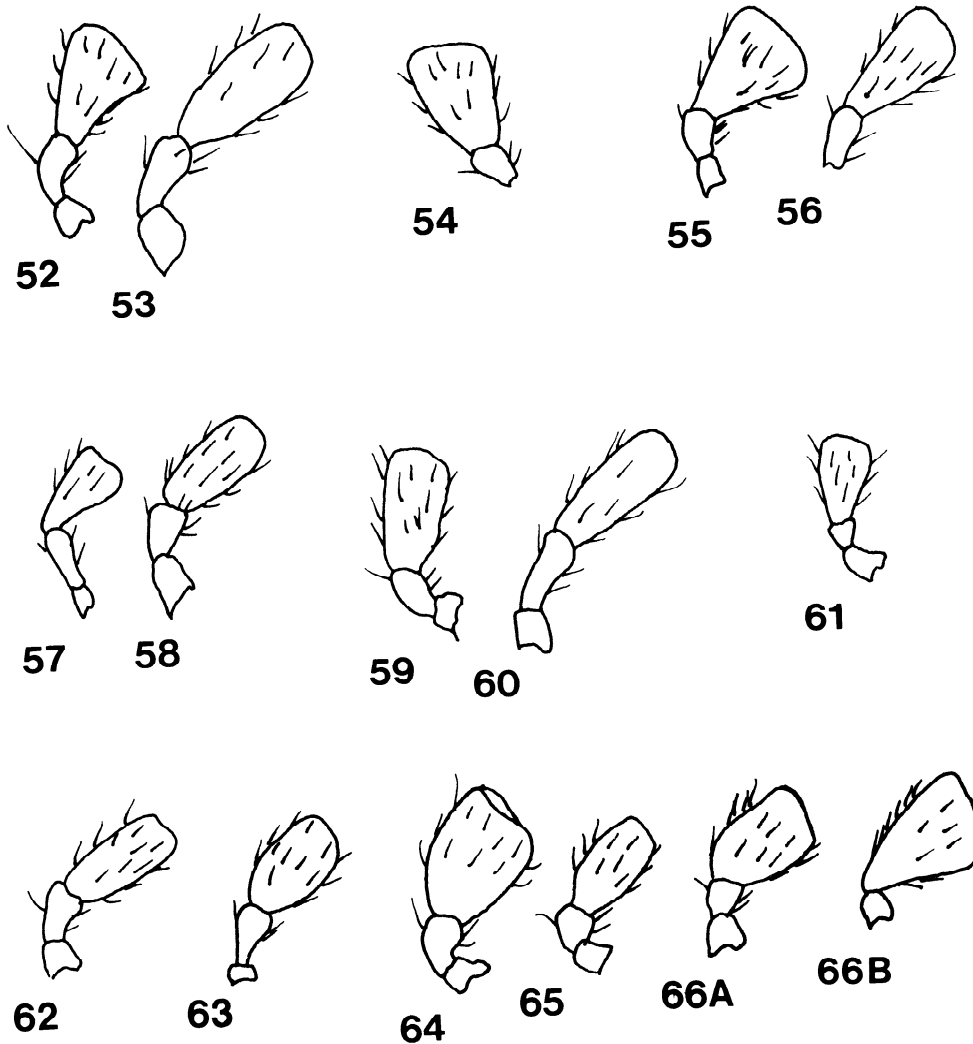


34E

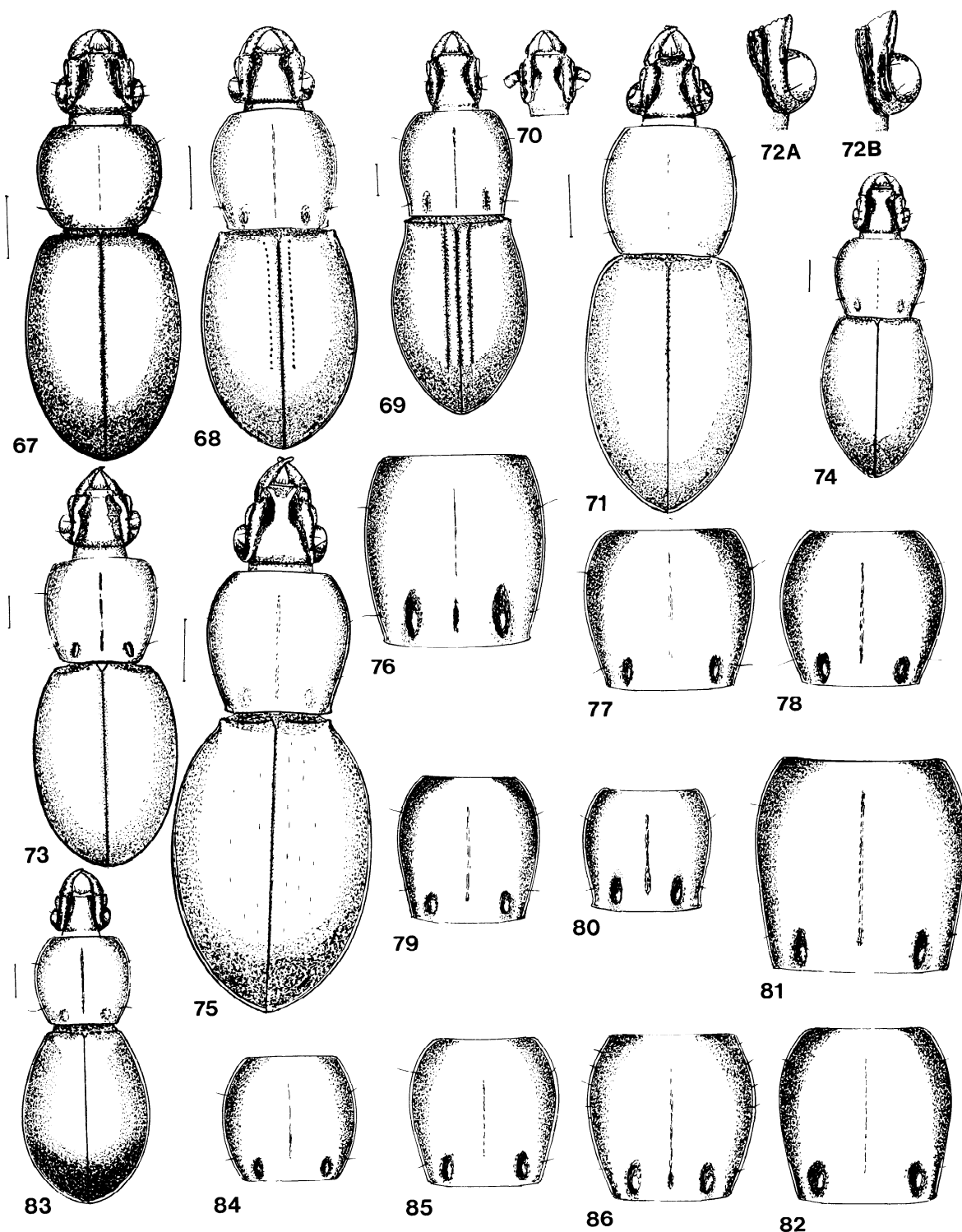
Figure 32-34. 32, Photograph of dorsal surface of an adult of *Agonica simsoni* Sloane, illustrating habitus. Standardized Body Length 6.48 mm; 33, Photograph of dorsal surface of an adult of *Pseudagonica nitida* Moore, illustrating habitus. Standardized Body Length 5.20 mm; 34, Diagrams of heads of New World peleciines, illustrating different forms of frontal impressions (see text, for details): A, *Eripus* Dejean; B, C, and D, *Pelecium* Kirby; E, *Stricteripus*, new genus.



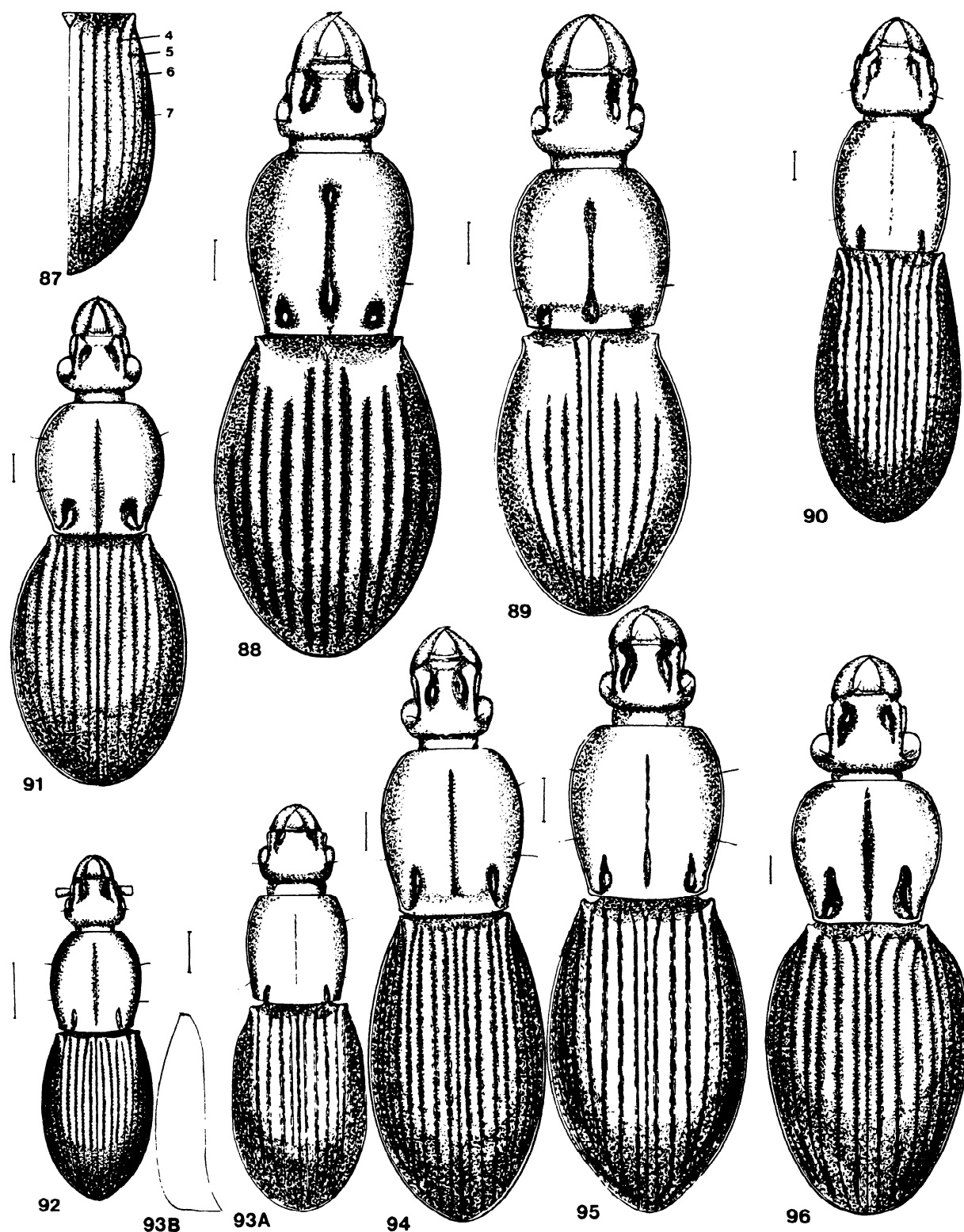
Figures 35-51. Line drawings of terminal palpomeres of New World Peleciini. 35 and 36, Maxillary palpomeres 2-4 of *Eripus*: 35, *E. nitidus* (Chaudoir), male; 36, *E. scydmaenoides* Dejean, female. 37 and 38, *Pelecium sulcatum* Guérin-Ménéville: 37, male, A- maxillary 2-4, B- labial, 2-3; 38, female, maxillary, 3-4. 39, Maxillary palpomeres 3 and 4, of *Pelecium sulcipenne* Chaudoir. 40 and 41, *P. drakei* Quedenfeldt: 40, male, A, maxillary, B, labial; 41, female, A, maxillary, B, labial. 42 and 43, *P. longicollis* Straneo: 42, male, A- maxillary, B- labial; 43, female, A- maxillary; B- labial. 44, *Pelecium brasiliense* Straneo, maxillary palpomeres. 45 and 46, maxillary palpomeres of *Pelecium carinatum* Kirby: 45, male; 46, female. 47, Maxillary palpomeres of *Pelecium renati* Straneo, female. 48, Maxillary palpomeres of *Pelecium atrovioleaceum*, new species, female. 49 and 50, *Pelecium semistriatum*, new species, maxillary palpomeres: 49, male; 50, female. 51, Maxillary palpomeres of *Pelecium paulae*, new species, female.



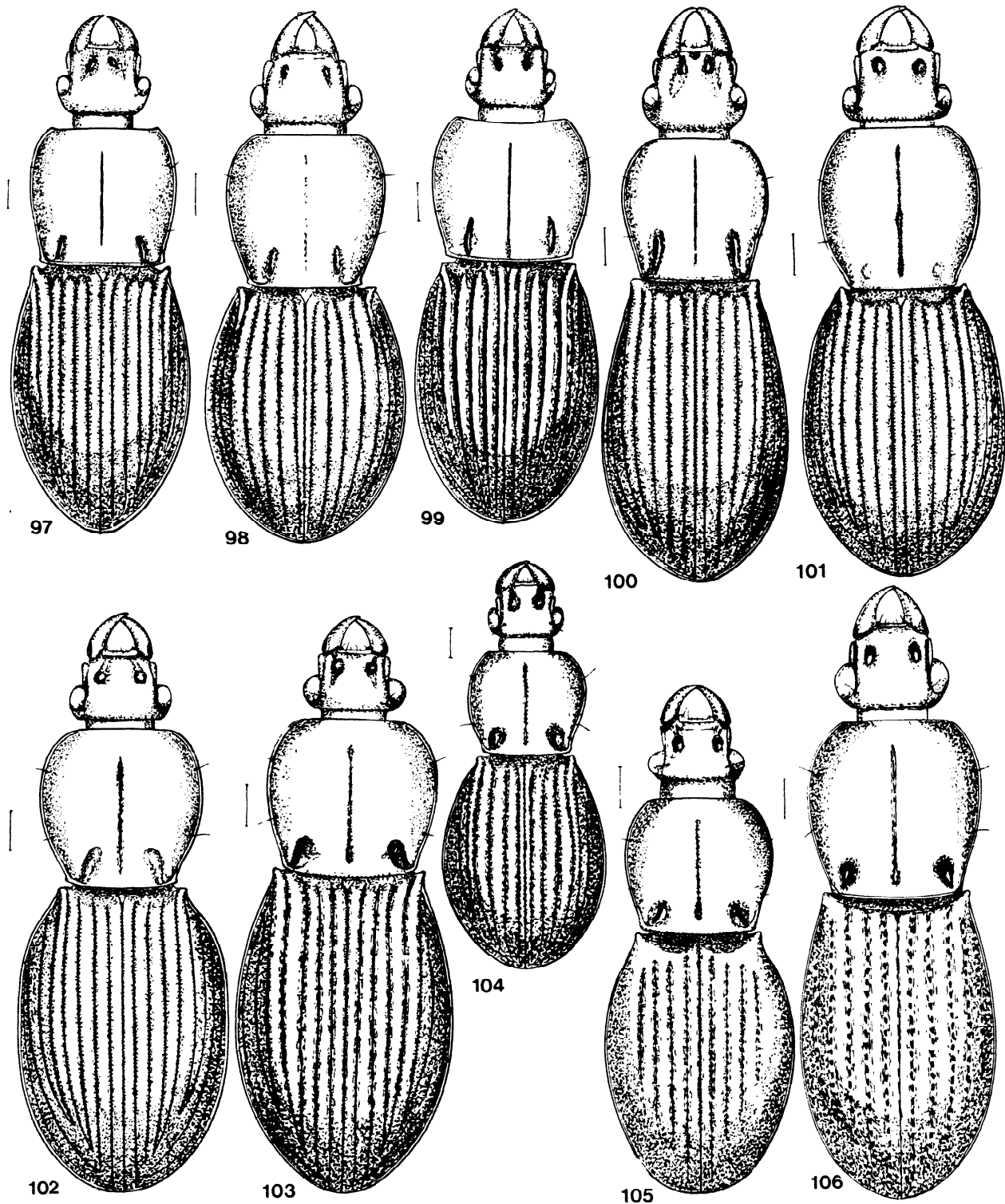
Figures 52-66. Line drawings of terminal palpomeres of New World Peleciini. 52 and 53, *Pelecium heleanae*, new species, maxillary palpomeres: 52, male; 53, female. 54, *Pelecium rotundipenne* Schaum, maxillary palpomeres, female. 55 and 56, *Pelecium negrei* Straneo, maxillary palpomeres: 55, male; 56, female. 57 and 58, *Pelecium foveicolle* Chaudoir, maxillary palpomeres: 57, male; 58, female. 59 and 60, *Pelecium beschii* Chaudoir, maxillary palpomeres: 59, male; 60, female. 61, *Pelecium faldermanni* (Chaudoir), maxillary palpomeres, male. 62, *Pelecium obscurum* Straneo, maxillary palpomeres, female. 63, *Pelecium nicki* Straneo, maxillary palpomeres, female. 64 and 65, *Stricteripus peruvianus* (Straneo): 64, male; 65, female. 66, *Stricteripus banningeri* (Straneo), male: A, maxillary palpomeres; B, labial palpomeres.



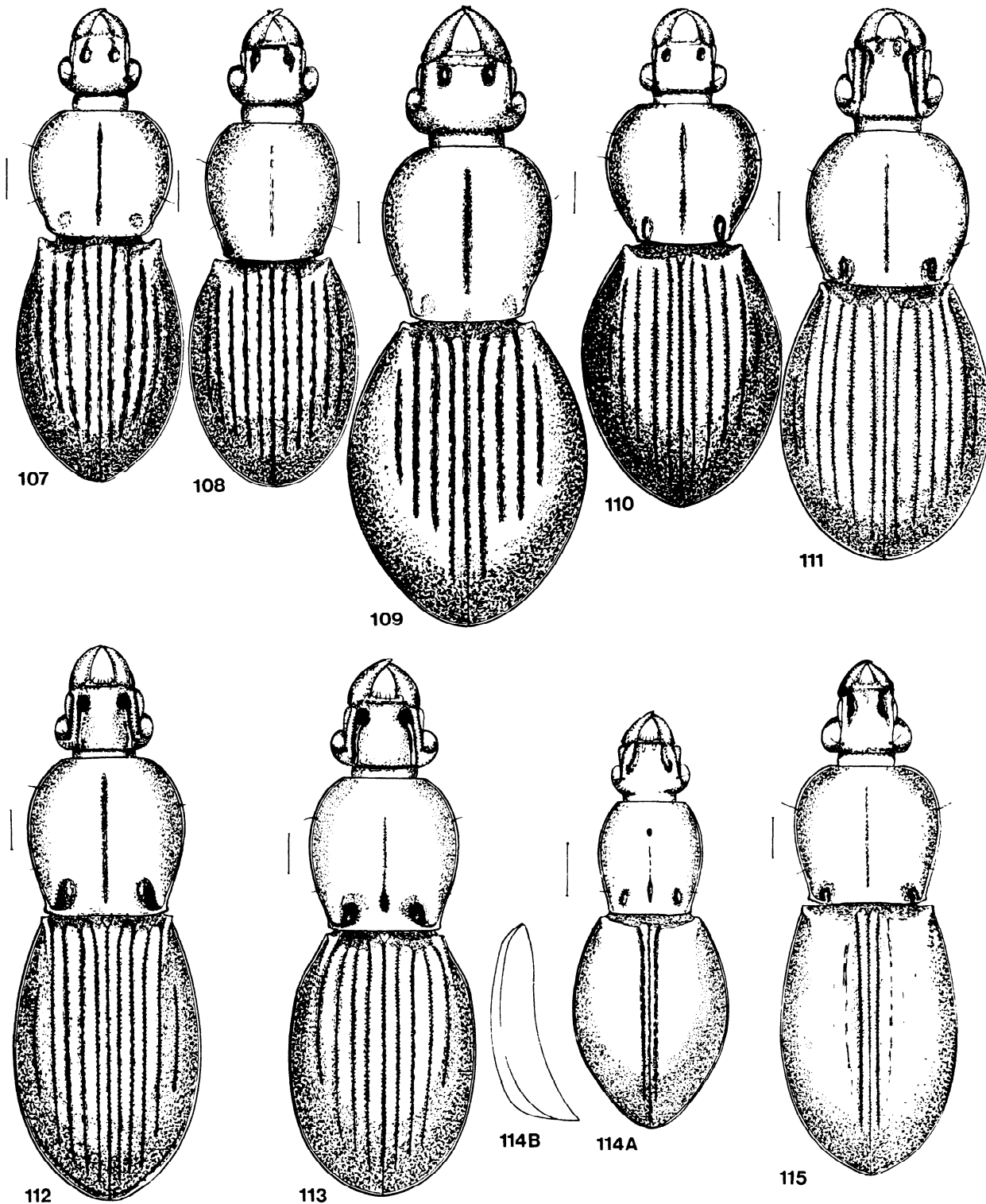
Figures 67-86. Line drawings of habitus and pronota, dorsal aspect, of adults of species of *Eripus* Dejean. 67, *E. franzi*, new species, habitus. 68, *E. suturalis* Chaudoir, habitus; 69, *E. subcaecus* (Chaudoir), habitus; 70, same, dorsal aspect of head. 71, *E. microphthalmus* (Chaudoir), habitus. 72A and B, diagrams of heads to show differences in grooving. 73, *E. nitidus* (Chaudoir) habitus. 74, 75, *E. scydmaenoides* Dejean, habitus. 76-81, *E. scydmaenoides* Dejean, pronota. 82, *E. oaxacanus*, new species, pronotum. 83, *E. g. globipennis* (Chaudoir), habitus. 84, *E. g. rotundicollis*, new subspecies, pronotum. 85, *E. g. whiteheadi*, new subspecies, pronotum. 86, *E. breedlovei*, new species, pronotum.



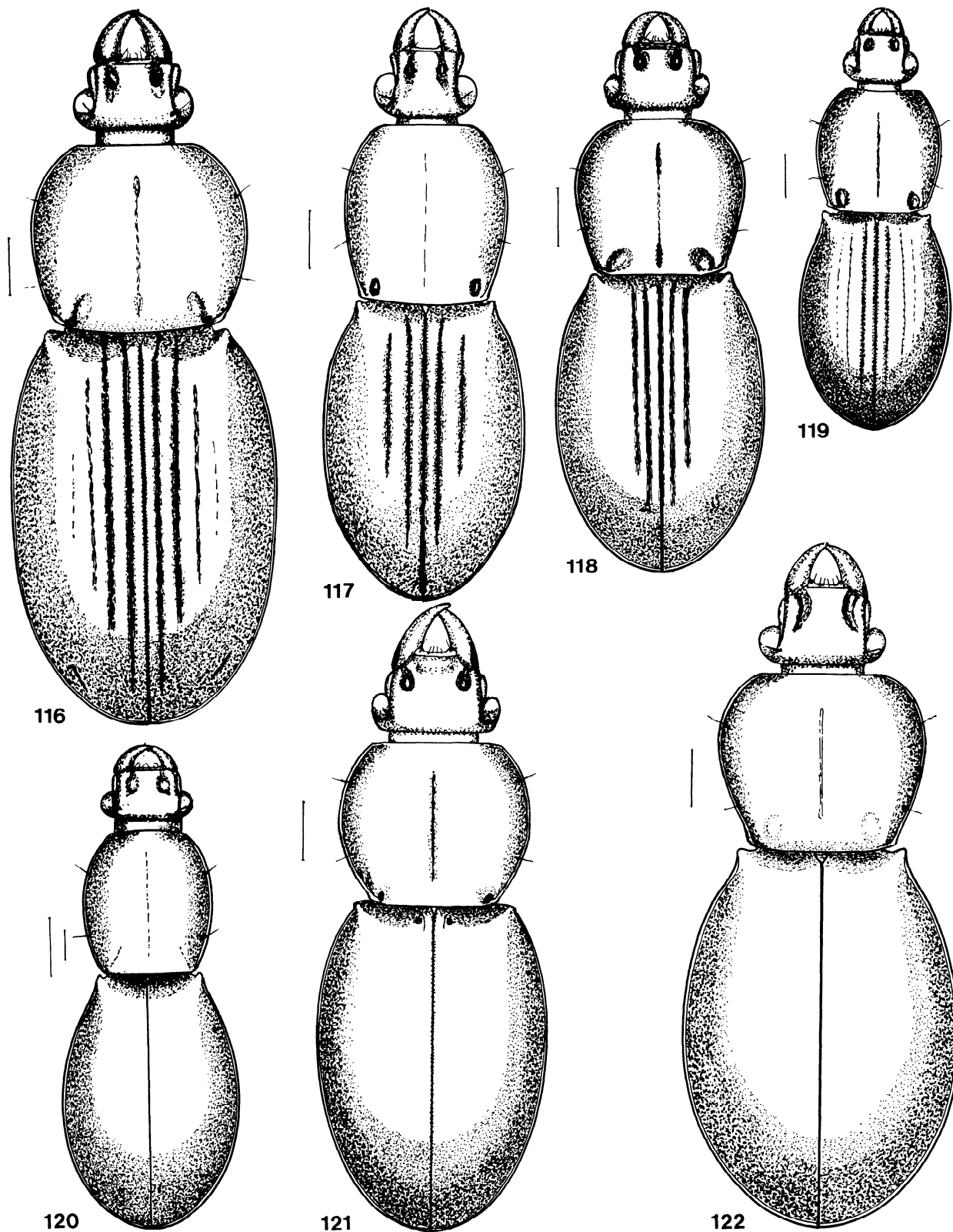
Figures 87-96. Line drawings of habitus of adults of the species of *Pelecium* (*Pelecidium*) new subgenus (in part), and *Pelecium* (*sensu stricto*) *violaceum* group. 87. Diagram of right elytron with complete striation. 88 and 89, Subgenus *Pelecidium*: 88, *P. sulcatum* Guérin-Ménéville; 89, *P. sulcipenne* Chaudoir. 90-96, *P. violaceum* group: 90, *P. striatipenne* Chaudoir; 91, *P. violaceum* Brullé; 92, *P. tenellum* Schaum; 93, *P. parallelum*, new species, A- habitus, B- diagram of elytron, lateral aspect; 94, *P. brasiliense* Straneo; 95, *P. l. longicolle* Straneo; 96, *P. punctatum* Straneo.



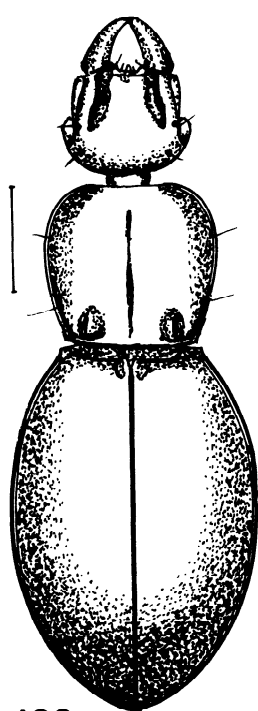
Figures 97-106. Line drawings of habitus of adults of the species of the *Pelecium* (*s. str.*) *cyanipes*, *renati*, and *striatopunctatum* groups. 97-100, *P. cyanipes* group: 97, *P. humeratum* Chaudoir morph; 98, *P. ovipenne* Chaudoir morph; 99, *P. carinatum* Chaudoir morph; 100, *P. cyanipes* Kirby morph. 101-102, *P. renati* group: 101, *P. renati* Straneo; 102, *P. striatum* Straneo. 103-106, *P. punctatostriatum* group: 103, *P. bolivianum* Straneo; 104, *P. atrovioaceum*, new species; 105, *P. semistriatum*, new species; 106, *P. punctatostriatum* Straneo.



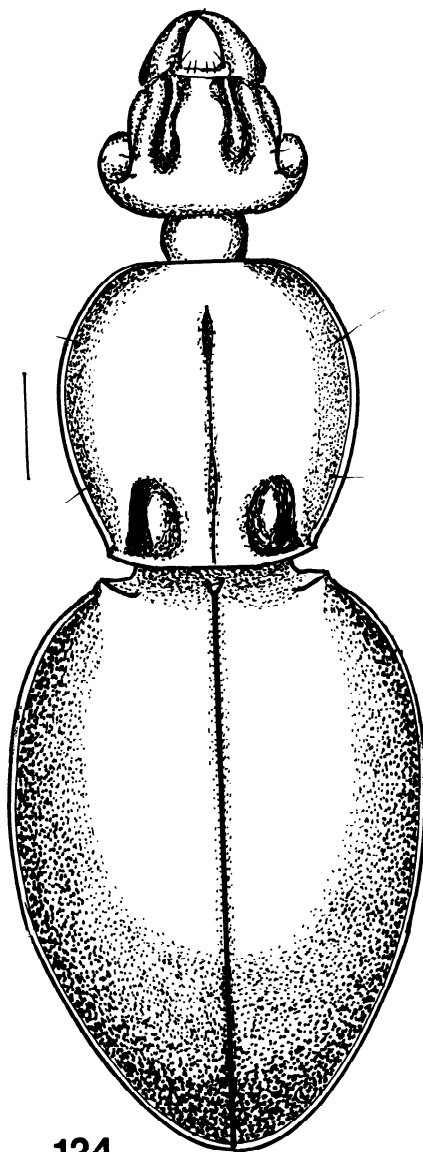
Figures 107-115. Line drawings of habitus of adults of the species of the *P. (s. str.) rotundipenne*, *refulgens* and *faldermanni* (in part) groups, and *Pelecidium (Pelecidium)* in part. Figs. 107-110, *P. rotundipenne* group: 107, *P. paulae*, new species; 108 *P. helenae*, new species; 109, *P. purpureum* Straneo; 110, *P. rotundipenne* Schaum. Figs. 111-113, *P. (s. str.) refulgens* group: 111, *P. refulgens* Guérin-Ménéville; 112, *P. fulgidum* Straneo; 113, *P. negrei* Straneo. Fig. 114, *P. (Pelecidium)* in part: *P. laevigatum* Chaudoir, A-habitus, B-outline of elytron, lateral aspect. 115, *P. (s. str.) faldermanni* group: 115, *P. foveicollis* Chaudoir.



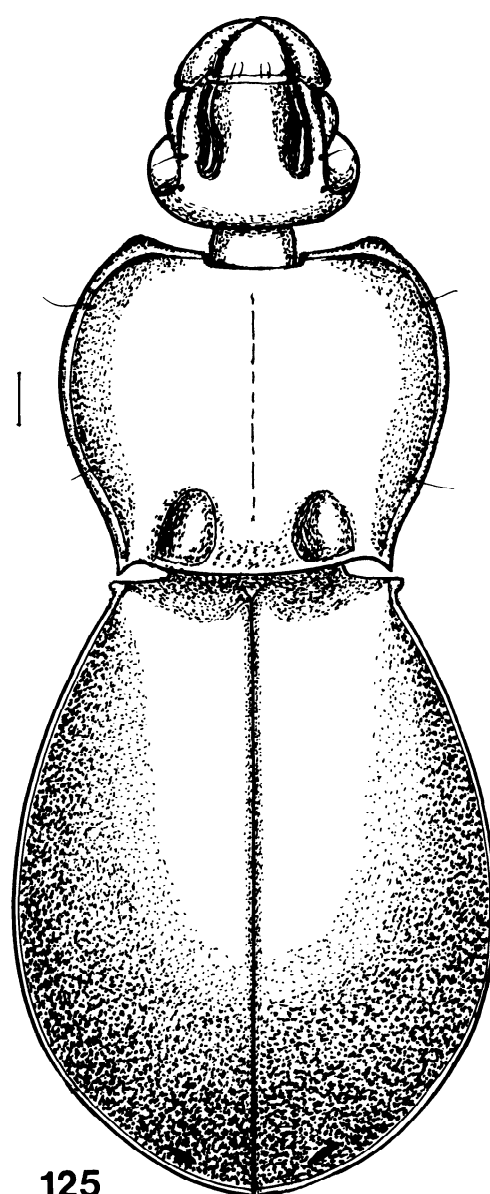
Figures 116-122. Line drawings of habitus of adults of the species of the *P. (s. str.) faldermanni* (cont.) and *P. laeve* groups. 116-119, *P. faldermanni* group: 116, *P. obtusum* Straneo; 117, *P. bisulcatum* Straneo; 118, *P. beschii* Chaudoir; 119 *P. faldermanni* Chaudoir. Figs. 120-122, *P. laeve* group: 120, *P. laeve* Chaudoir; 121, *P. obscurum* Straneo; 122, *P. nicki* Straneo.



123



124



125

Figures 123-125. Line drawings of habitus of adults of species of the genus *Stricteripus*, new genus: 123, *S. impressus* (Straneo); 124, *S. peruvianus* (Straneo); and 125, *S. banningeri* (Straneo).

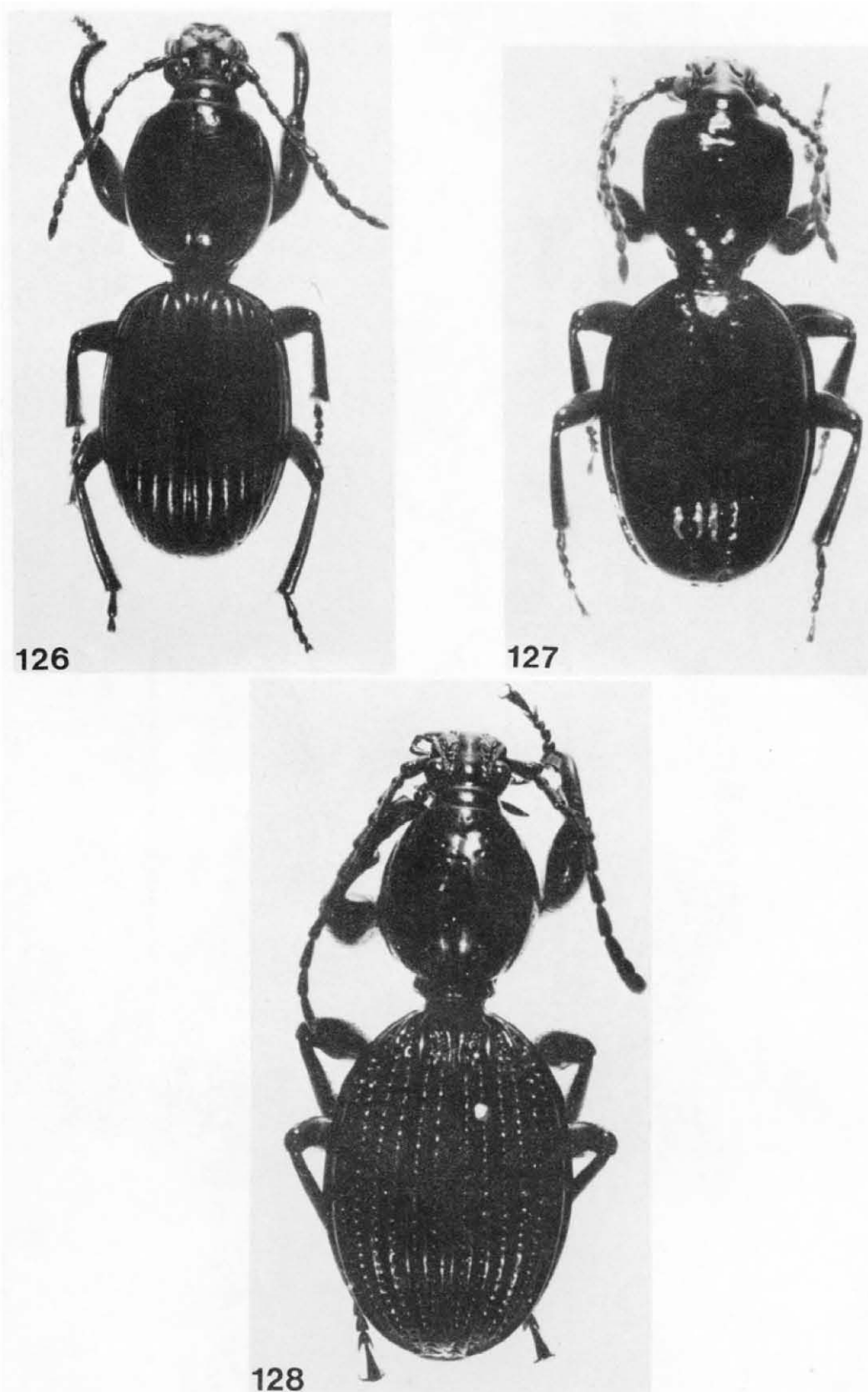


Figure 126. Photograph of the dorsal surface of adults, illustrating habitus. 126, *Ardistomopsis andrewe-si*, new species; 127, *Dyschiridium* species; 128, *Disphaericus* species.

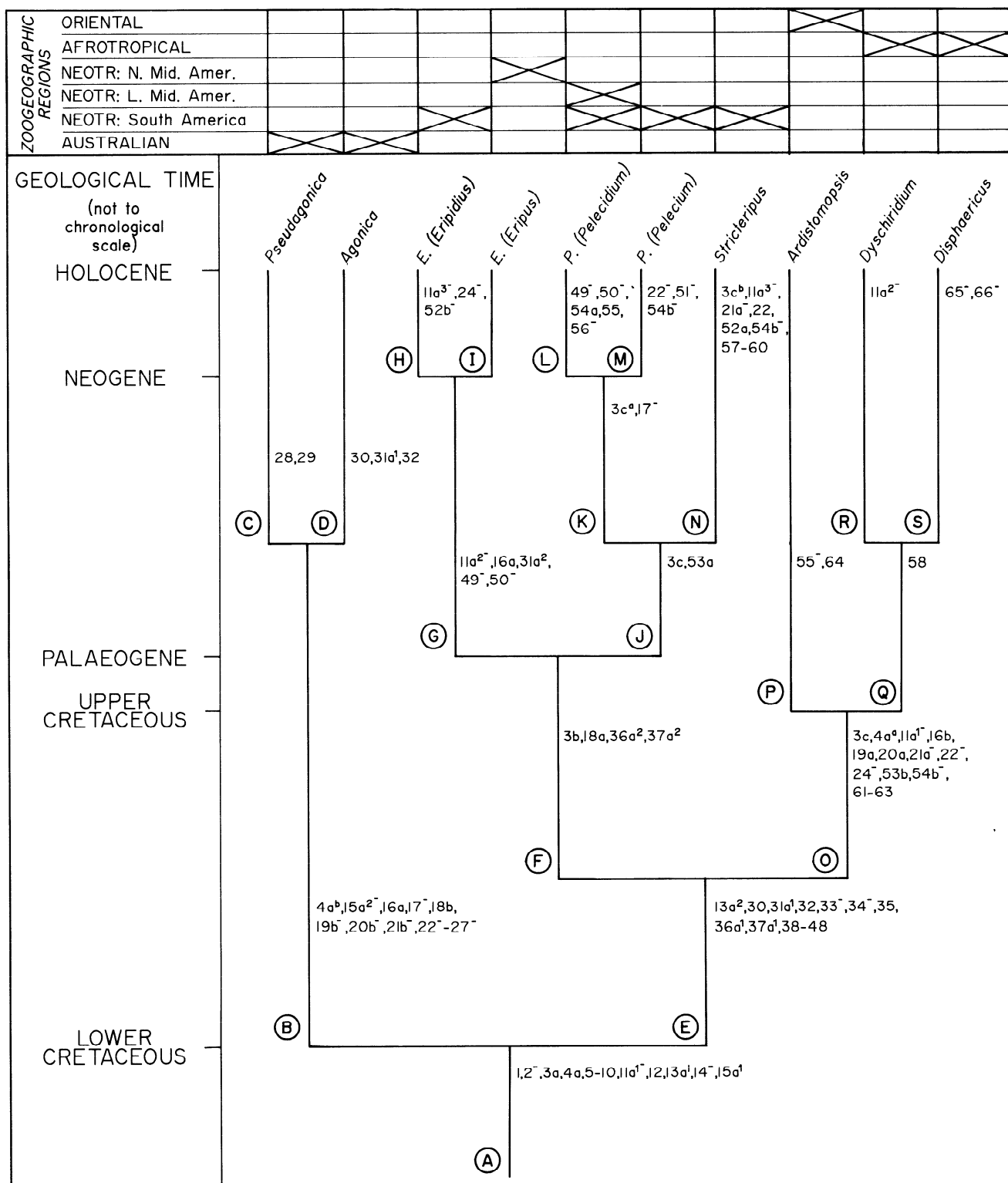


Figure 129. Reconstructed phylogeny of subtribes, genera, and subgenera of Peleciini. Numbers, letters, and symbols represent apotypic character states, as indicated in Tables 1 and 2. Relationship between branching pattern of the phylogenetic tree and geological time is highly speculative. (See also Maps 14.1-14.4).

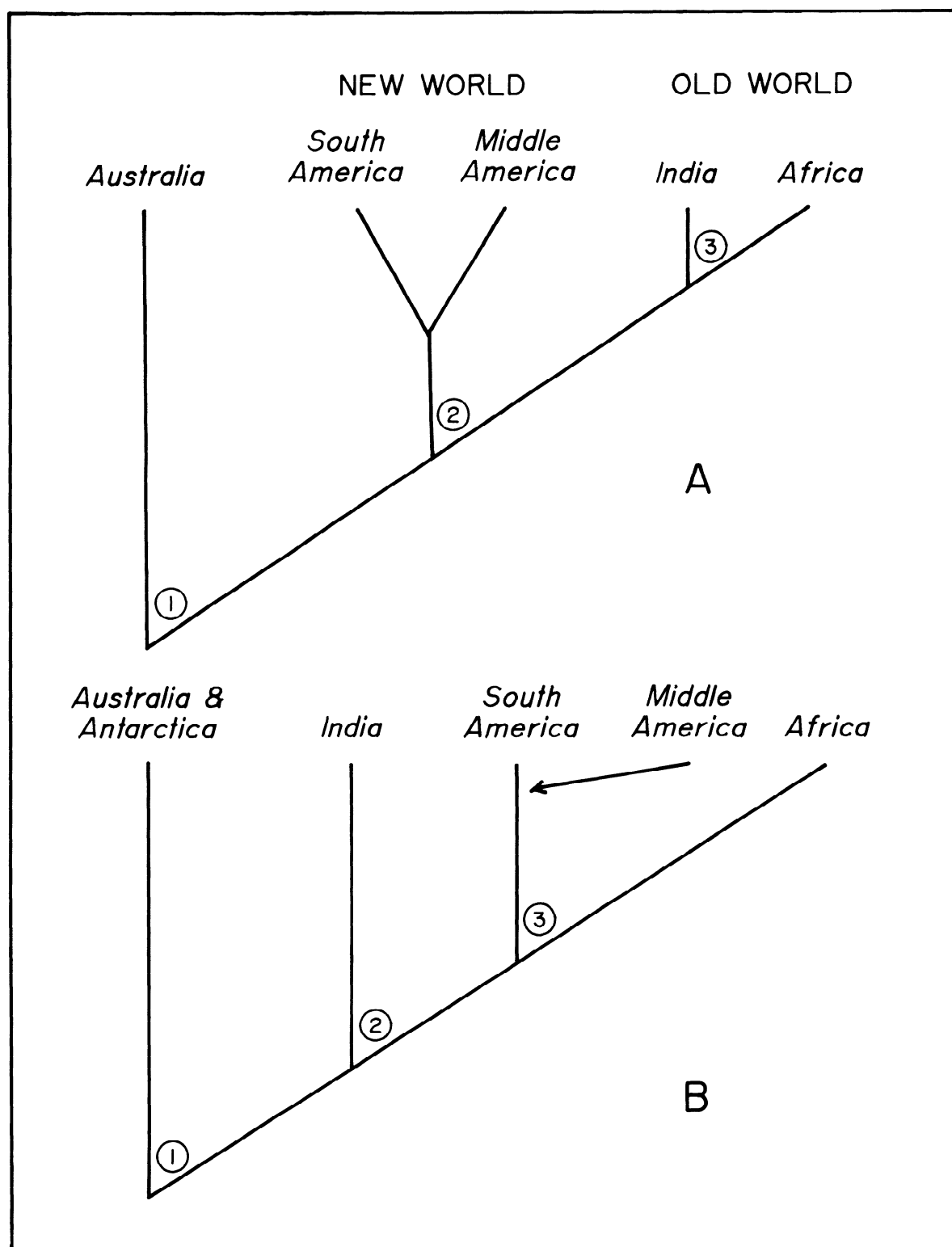
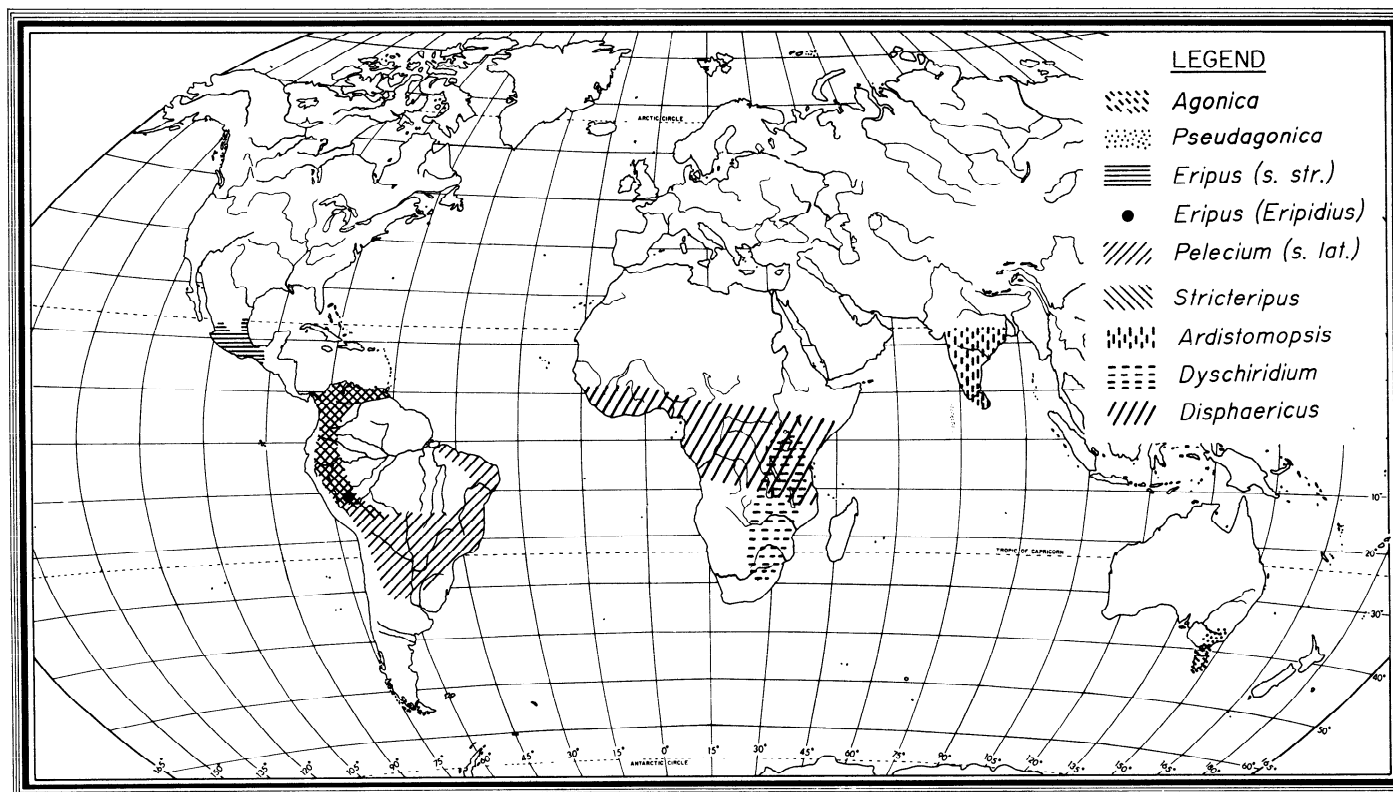
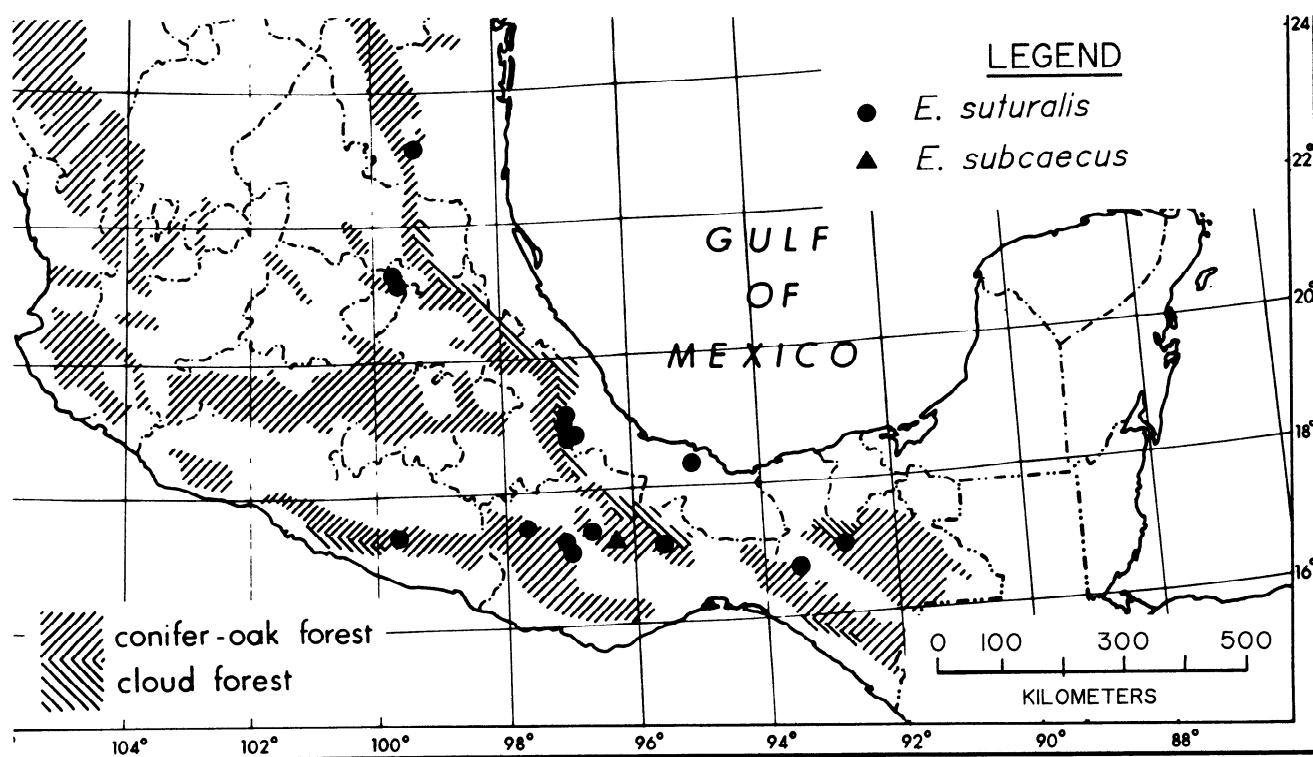


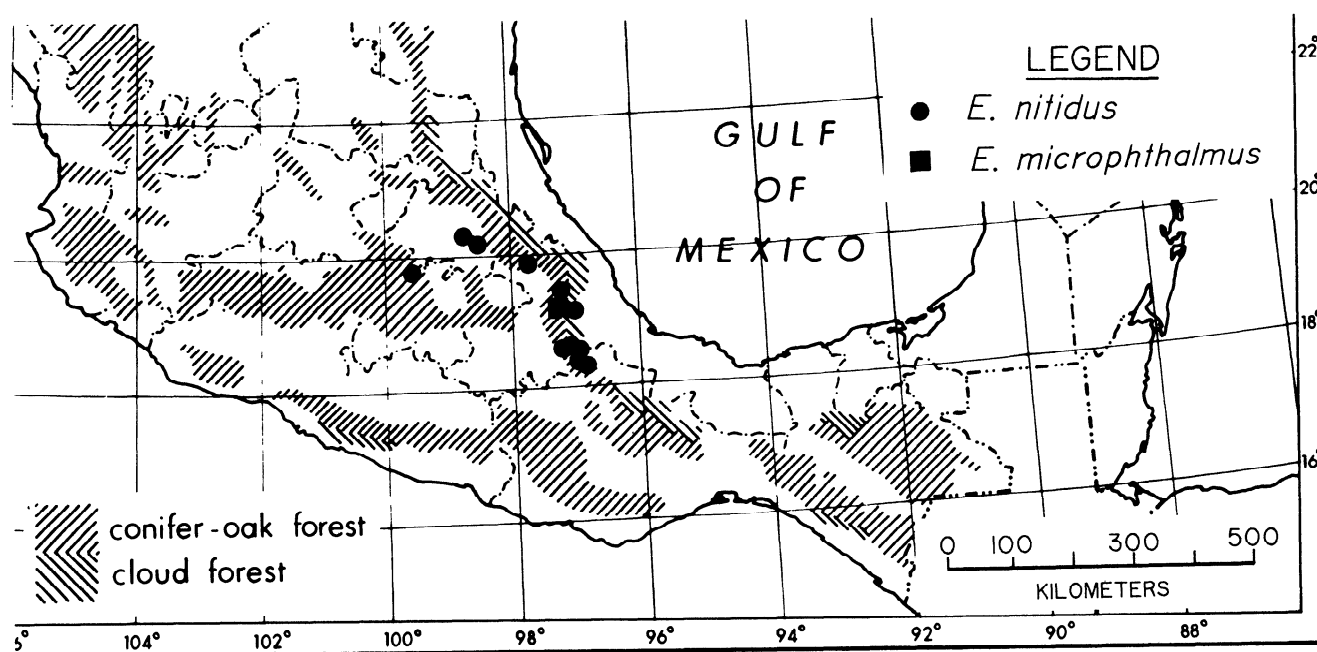
Figure 130. Relationship between branching pattern of the reconstructed phylogeny of Peleciini and hypothesized sequence of break-up of Gondwanaland (based on Howarth, 1981). A, Reduced area cladogram, with names of geographical areas of occurrence substituted for names of pelecini taxa. B, Dendrogram illustrating sequence of break-up of Gondwanaland. Numbers indicate in sequence branching points of pelecini taxa (A) (see also Fig. 129), or separation of land masses from Gondwanaland and from one another (B). The arrow indicates joining of South America and Lower Middle America in Pliocene time. Note that, in A, India is at branching point 3, whereas in B, India is at separation point 2.



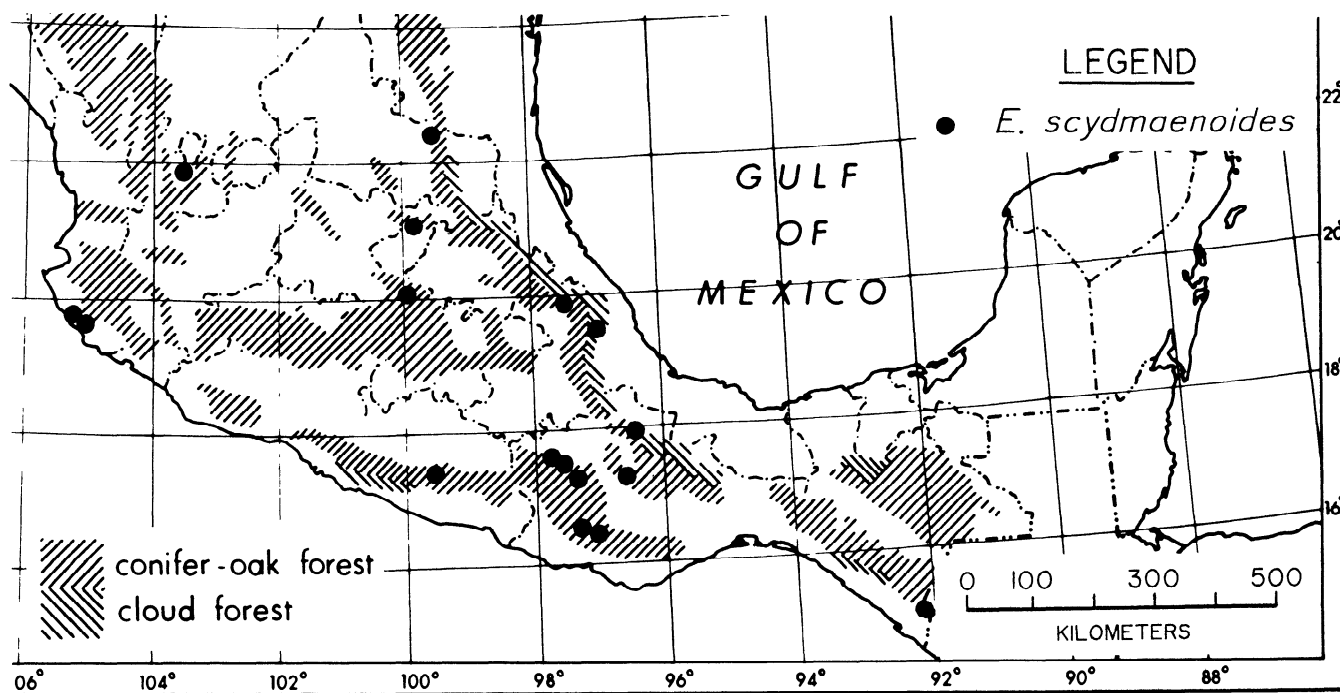
Map 1. The World, showing geographical ranges of the genera of the Tribe Peleciini



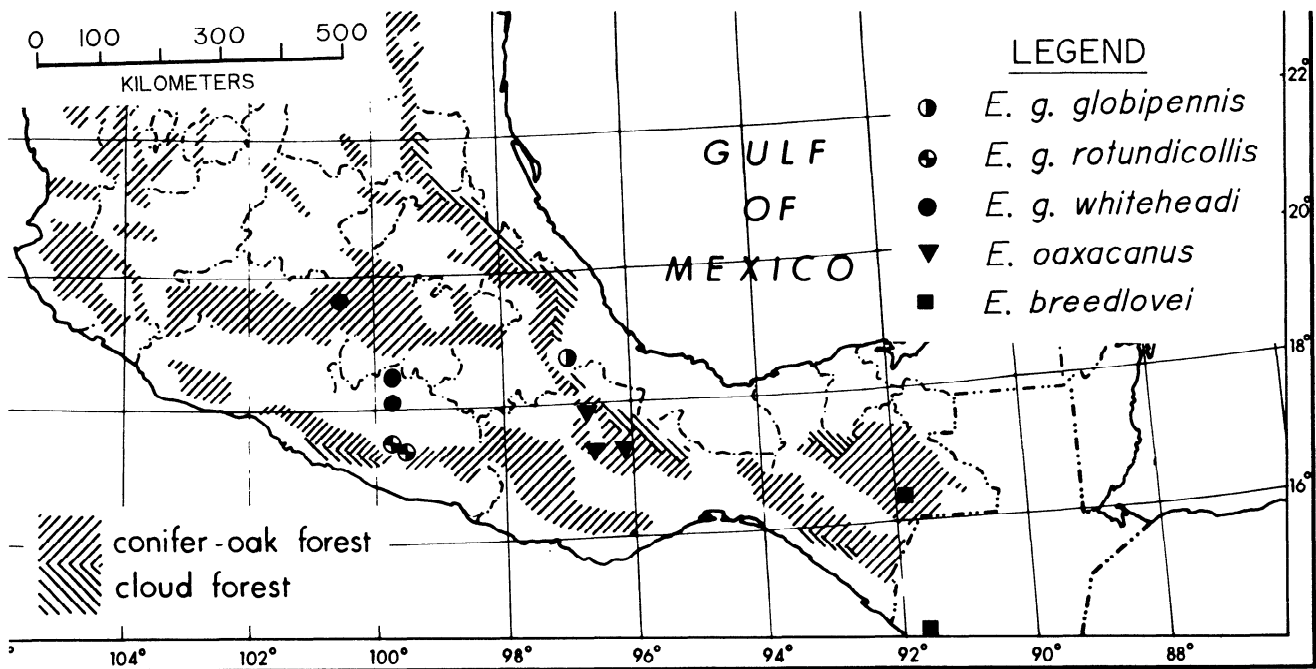
Map 2. México, showing positions of known localities for species of *Eripus* Dejean



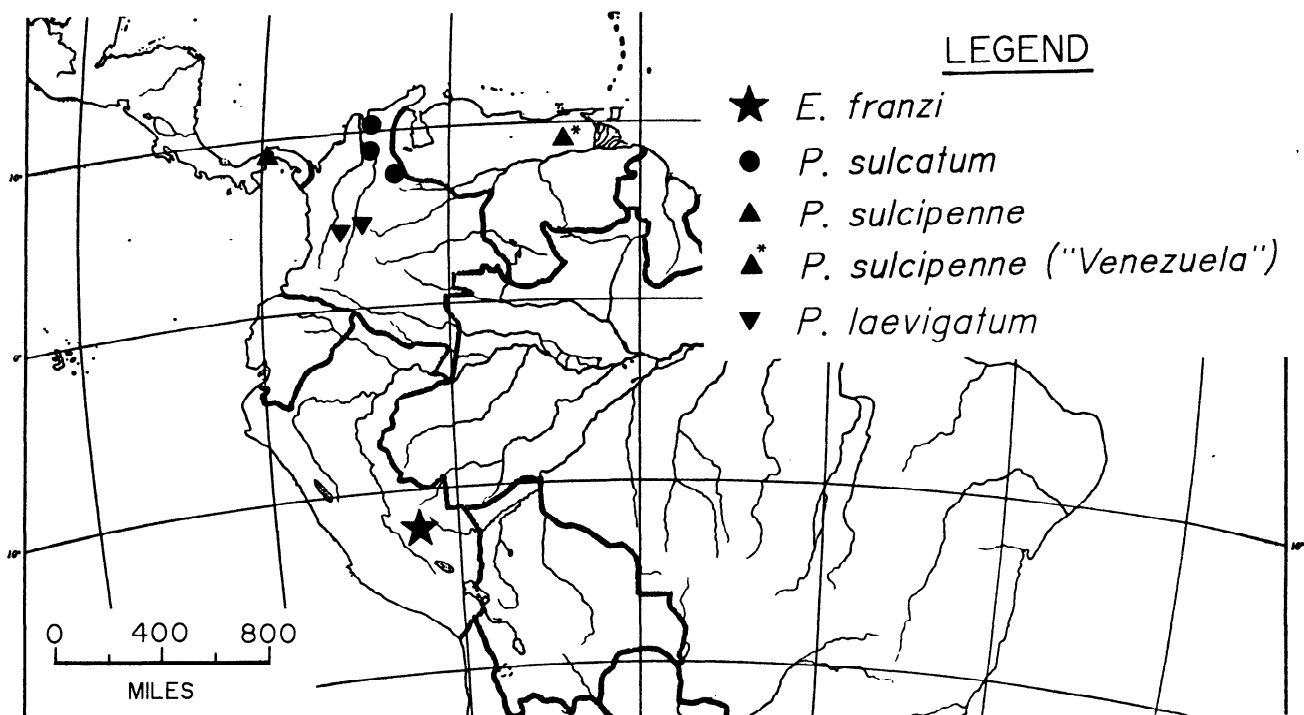
Map 3. México, showing positions of known localities for species of *Eripus* Dejean



Map 4. México, showing positions of known localities for *Eripus scydmaenoides* Dejean



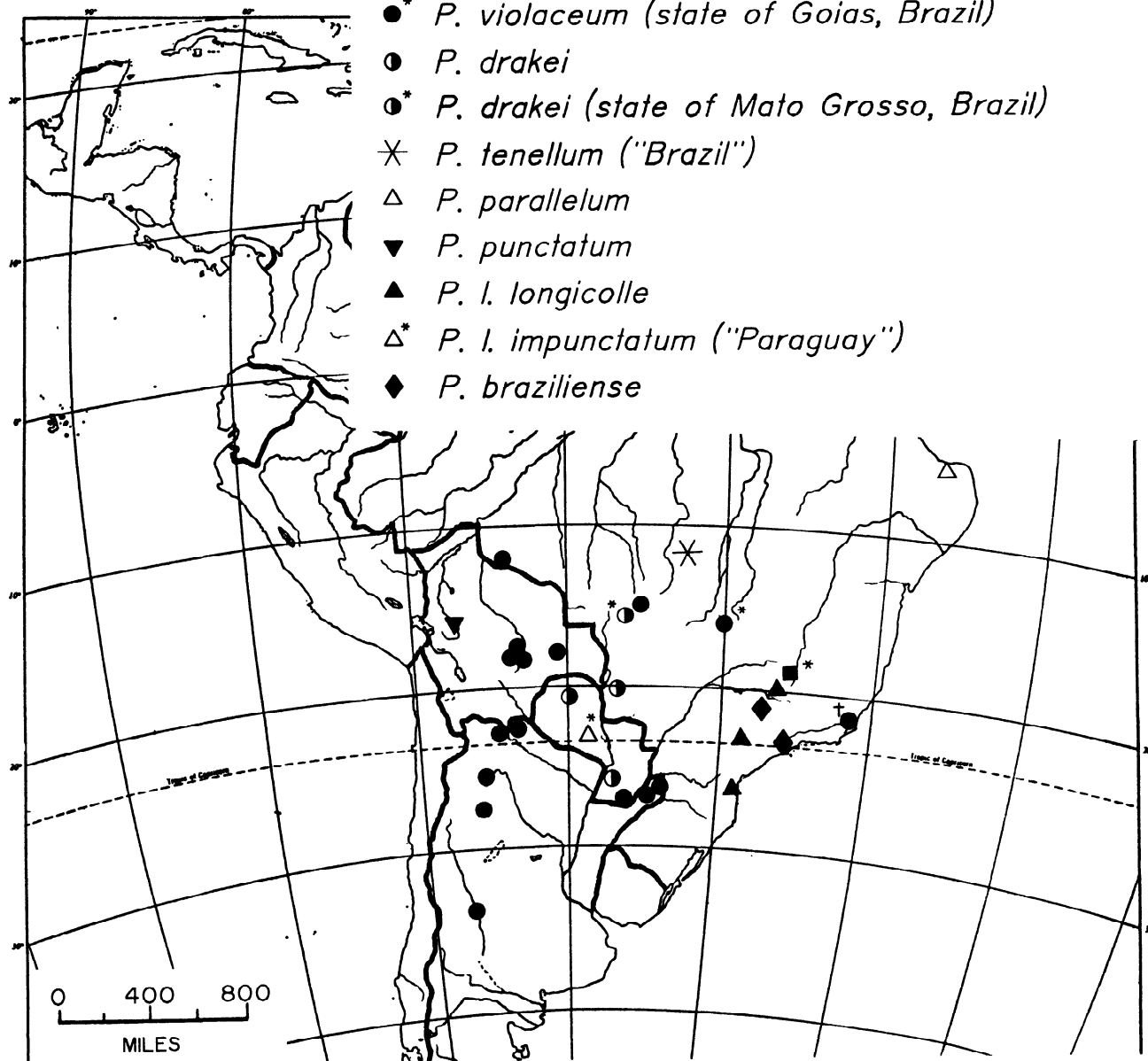
Map 5. México, showing positions of known localities for species of *Eripus* Dejean



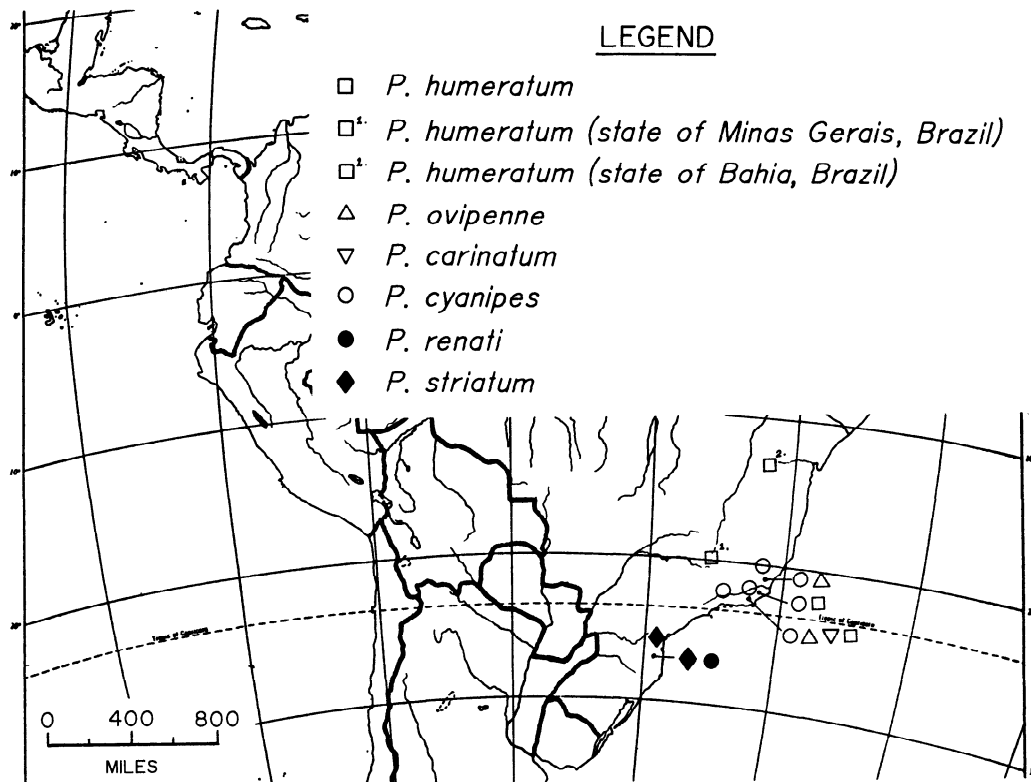
Map 6. Central and South America, showing positions of known localities for *Eripus* (*Eripidius*) *franzi*, new species and species of *Pelecium* (*Pelucidium*).

LEGEND

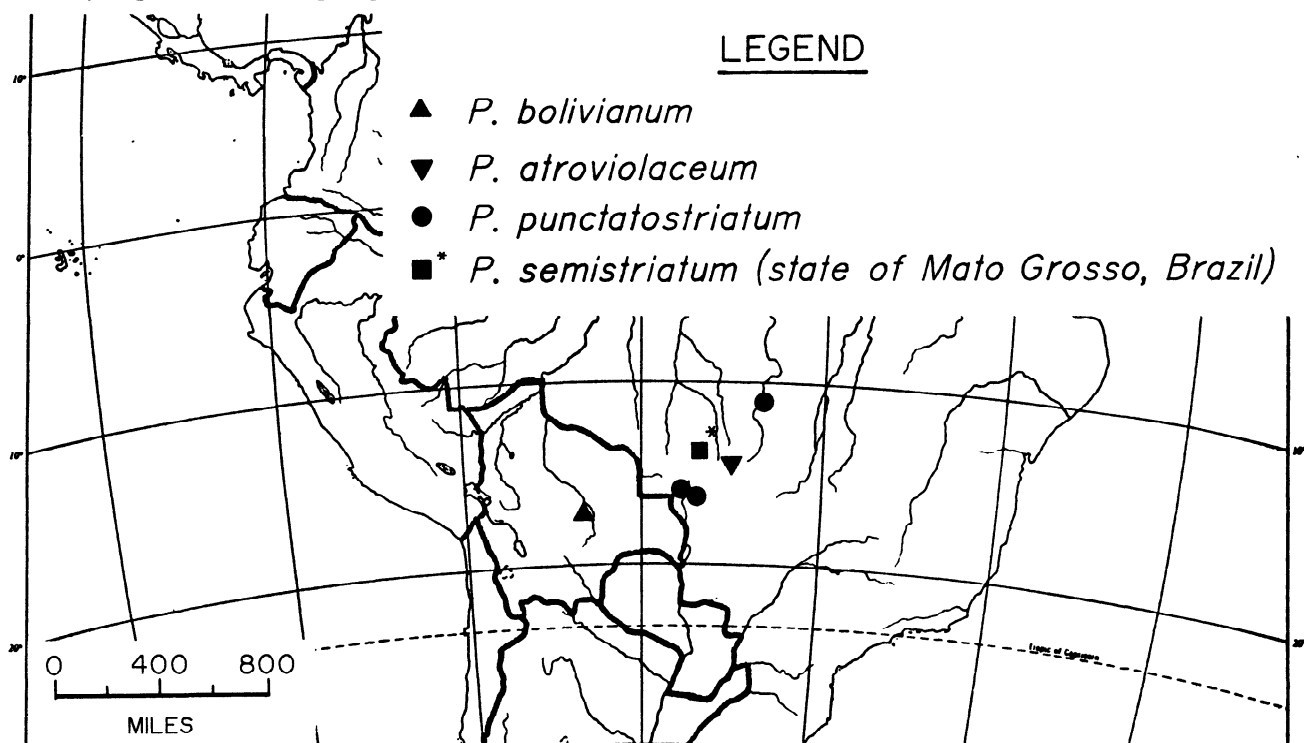
- * *P. striatipenne* (state of Minas Gerais, Brazil)
- *P. violaceum* †● (to be confirmed)
- * *P. violaceum* (state of Goiás, Brazil)
- *P. drakei*
- * *P. drakei* (state of Mato Grosso, Brazil)
- ✕ *P. tenellum* ("Brazil")
- △ *P. parallelum*
- ▼ *P. punctatum*
- ▲ *P. l. longicolle*
- △* *P. l. impunctatum* ("Paraguay")
- ◆ *P. braziliense*



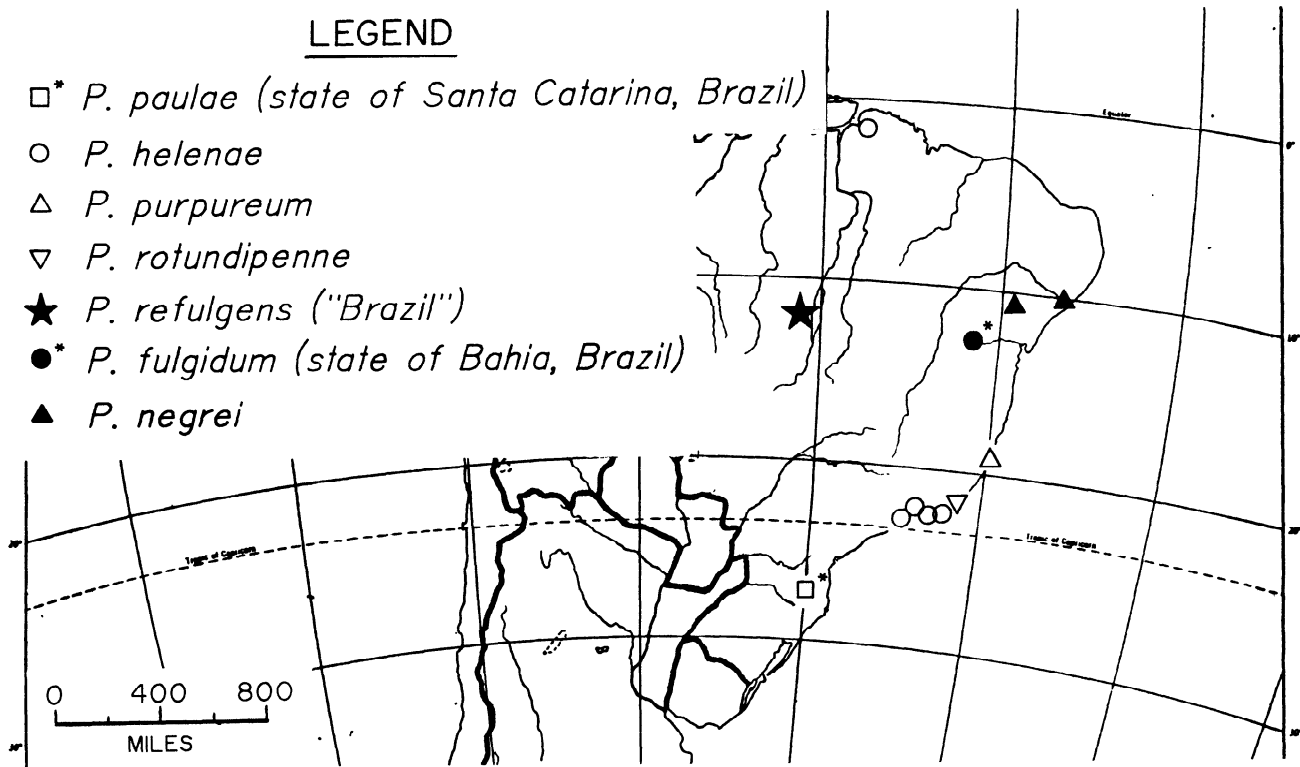
Map 7. Central and South America, showing positions of known localities for the species of *Pelecium* (s. str.) *violaceum* group.



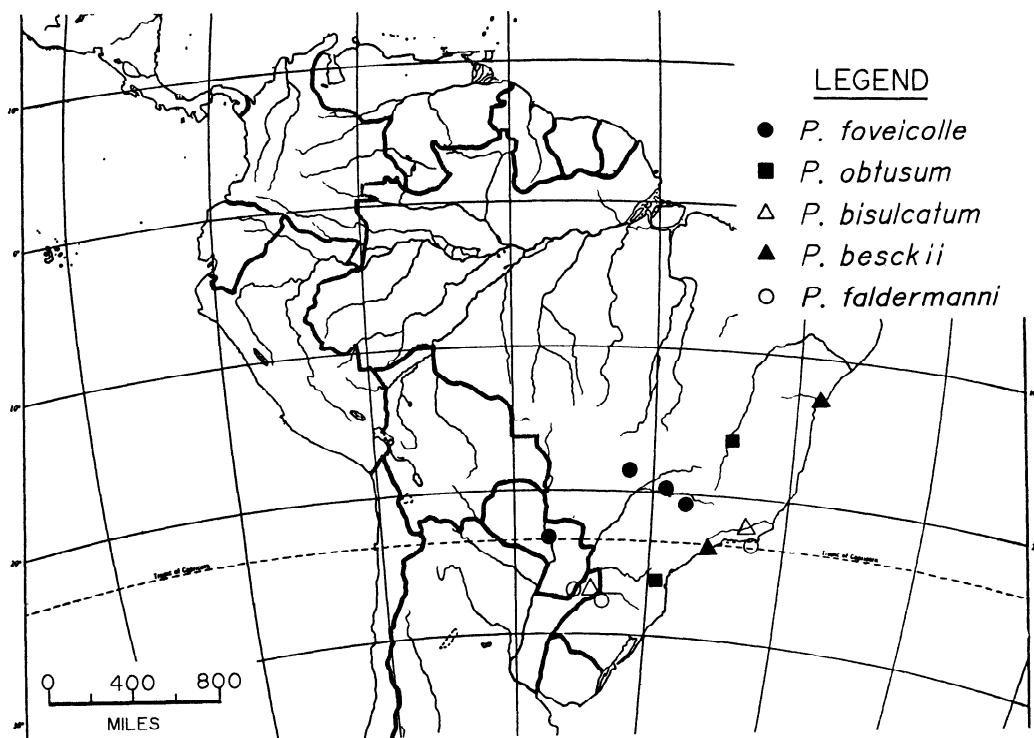
Map 8. Central and South America, showing positions of known localities for the species of *Pelecium* (s. str.) *cyanipes* and *renati* groups.



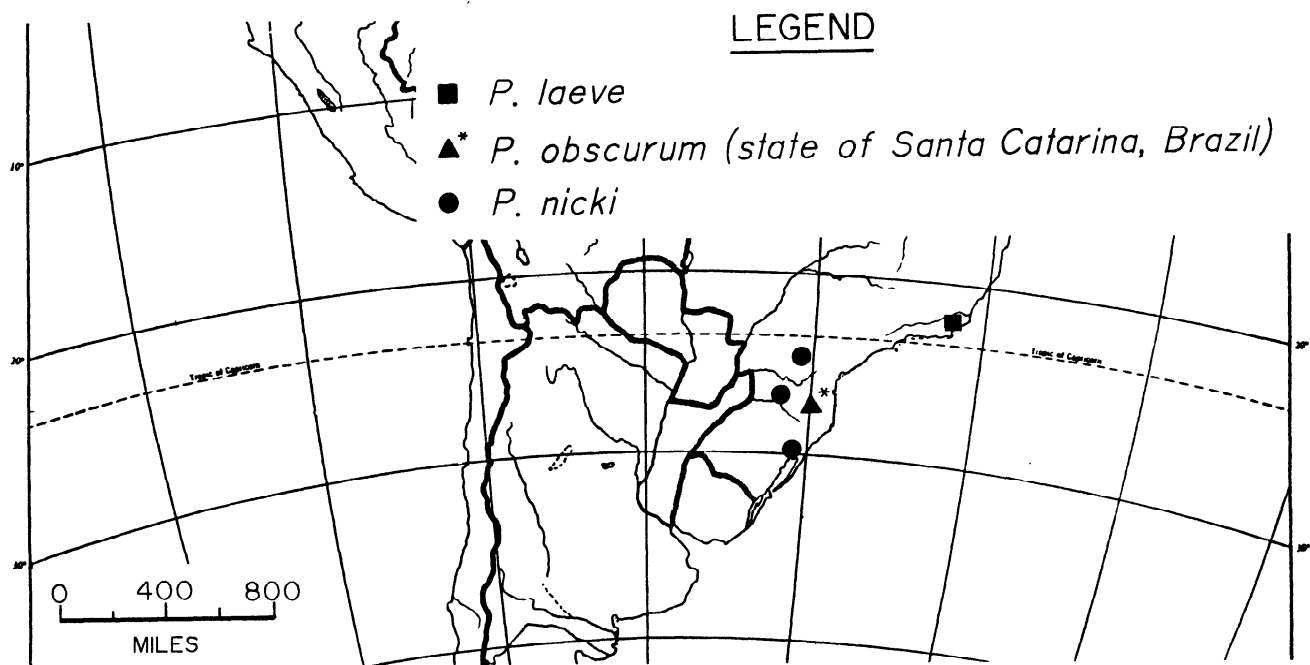
Map 9. Central and South America, showing positions of known localities for the species of the *Pelecium* (s. str.) *punctatostriatum* group.



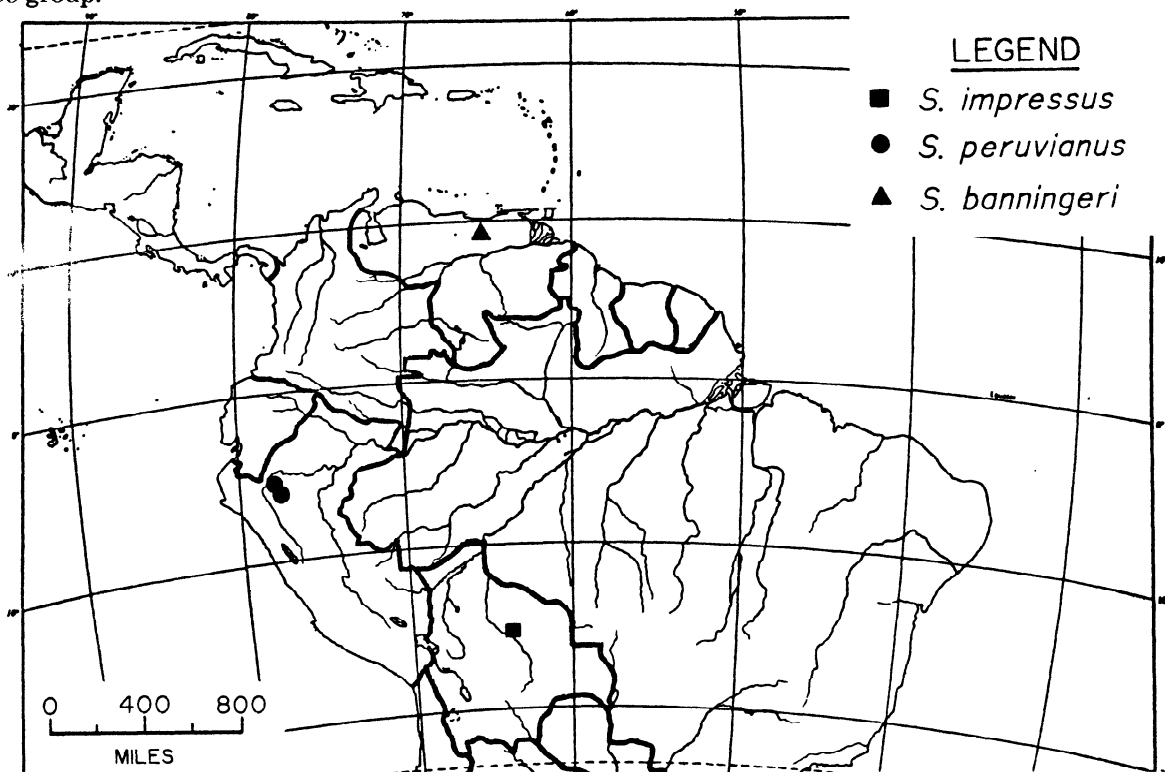
Map 10. South America, showing positions of known localities for the species of the *Pelecium* (s. str.) *rotundipenne* and *refulgens* groups.



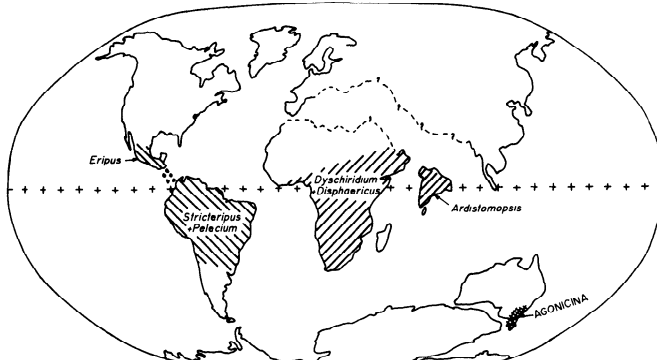
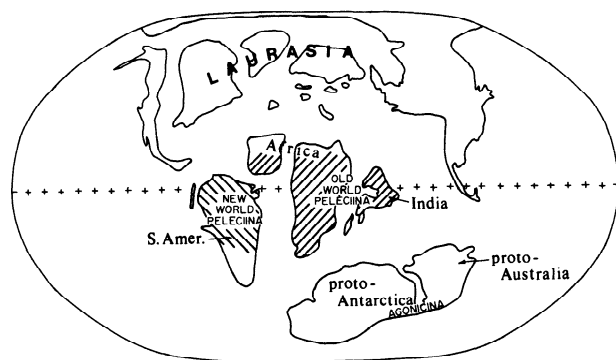
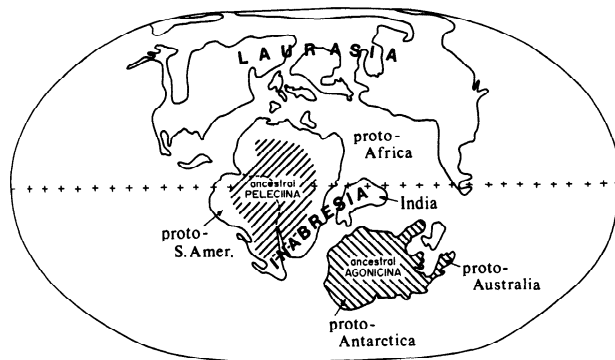
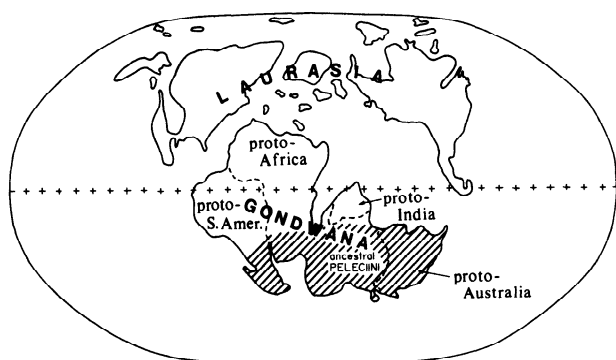
Map 11. Central and South America, showing positions of known localities for the species of the *Pelecium* (s. str.) *faldermanni* group.



Map 12. South America, showing positions of known localities for the species of the *Pelecium* (s. str.) *laeve* group.



Map 13. Central and South America, showing positions of known localities for the species of *Stricteripus*, new genus.



Maps 14.1-14.4. World palaeogeography (markedly simplified) and hypothesized geographical distribution of the Peleciini during Late Mesozoic and Early Cenozoic time. (14.1-14.3, modified from Howarth, 1981; 14.4, modified from Adams, 1981). 14.1, Upper Jurassic, Kimmeridgian Stage (145 million years before present). 14.2, Lower Cretaceous, Hauterivian Stage (125 mybp). 14.3, Upper Cretaceous, Senonian Stage (90-85 mybp). 14.4, Palaeogene, (65-30 mybp).

Table 1. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

NUMBER and CHARACTER	CHARACTER STATES	
	PLESIOTYPIC	APOTYPIC
01. Setae, Lab. Palp. 2	2	3
02. Setae, El. discal	present	absent
03. Setae, Ab. St. VII, ♂-♀	2-4	4-4 a
		4-8 b
		4-8+ c _a
		2-8+ c _b
		6-8+ c _b
04. Labrum, ant. margin	straight	emarg., shallow "V" (Fig. 1)
		emarg., deep broad "V", (Fig. 4)
		emarg., deep broad "U", (Fig. 2)
05. Mand.: ventral groove & setae	ca. 1/2 length terebra, setae mod. dense	a
		a ^a
06. Left. mand., terebral marg. & retinacular ridge	separated by sharp notch; ret. ridge extended beneath terebal margin	b
		a ^a
07. Maxilla, Lacinia, apex	sharp hook	rounded lobe (Fig. 6B)
08. Labium, Mentum, lat. lobes	much longer than tooth	subequal to tooth (Figs. 8A, 9A and 10A)
09. Labium, Mentum, trans. groove	absent	present (Fig. 9A)

Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

10. Labium, Palp. 3, form	slender, parallel-sided, apex narrow	broad, ovate, apex truncate	
11. Elytra, devel. interneurs	8 int., parascut, int. sep. from int. 1, base of latter ended in parascut. setig. puncture	8 int., base int. 1 absent, int. 1 & parascut. int. joined as in (a ¹), & discal int's. except 1, more or less reduced all interneurs absent, or nearly so	a ¹ a ² a ³
12. Flight complex	wings long, el. separate metathorax large	wings reduced, el. fused metathorax short	
13. Tarsi: adhesive vestiture	biseriate squamo-setae, óó; absent from females	óó- biseriate squamo-setae, (Fig. 21), QQ- Type I adhes. setae (Fig. 22) óó & QQ: Type II adhesive setae	a ¹ a ¹
14. Ovip., Stylomere 1, setae	present	absent	
15. Ovip., S-2, ensiform setae	3 or more, short	2, long (Fig.) absent	a ¹ a ²
16. Body form	jct. pro- & mesothorax short, broad	subped., mod. narrowed pedunculate, myrmecoid	a b
17. Setae, head, supraorbital	2 pair	1 pair	
18. Antenna, scape	less than length of A2 + 3	as long as 2 + 3 longer than 2 + 3	a b
19. Mand., terebral tooth	small, not prominent (Figs. 14A -B)	enlarged, prominent (Figs. 17A -B) absent	a. b

Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

20. Mand., retinac. teeth	small, single, not prominent (Figs. 11A-B)	large, double, prominent (Figs. 17A-B)	a ⁻ b ⁻
21. Mand., basal area, notches	2 (Figs. 14A-B)	one none	a ⁻ b ⁻
22. Rt. Mand., retinac. ridge, anterior portion	present (Figs. 14B, F)	absent (Fig. 15D)	
23. Metathorax, metap. suture	present	absent	
24. El., basal ridge	extended from humerus to vicinity of scutellum	confined to humeral area, or absent (Figs. 67 & 123)	
25. Ovip., S-2, nematiform setae	present (Figs. 31A-B)	absent (Figs. 30A-B)	
26. Ovip., S-2, apical-ventral furrow	present (Figs. 31A-B)	absent (Figs. 30A-B)	
27. Ovip., S-2, furrow sensory pegs	present (Figs. 31A-B)	absent (Figs. 30A-B)	
28. Tibiae, mid- & hind, inner surface	rounded	sulcate	
29. Male gen., int. sac	without spines	with spines	
30. Setae, posterior PN., position	at post.-lat. angles	ant. of post.-lat. angles	
31. Head, frontal imps.	broad, irreg., basin-like	linear, extended to level of compound eyes (Figs. 34C, E) linear, extended to post-oc. trans. groove (Figs. 34A, D)	a ¹ a ²

Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

32. Max. Palp. 4. form, apex	narrow	broad, truncate	
33. Setae, Labium, Mentum	present (Fig. 8A)	absent	
34. Setae, El. Int. 2, preapical	present	absent	
35. Head, orientation	prognathous	deflexed, semi-hypognathous	
36. Eyes, prominence	relatively flat, temples not projected	temples projected, but narrow (Fig. 32) temples projected, broad (Figs. 34A-E)	a ¹ a ²
37. Mand. Baso-lat. surface	narrow, vent. margin not notched (Figs. 11G-H)	broad, ventral margin not notched (Figs. 17G-H) broad, ventral margin notched	a ¹ a ²
38. Maxilla, galeomeres	broader, not sinuate (Fig. 5)	slender, sinuate (Figs. 6A-B)	
39. Max., Palpomeres 3-4	subequal (Fig. 5)	3 much shorter than 4 (Fig. 6A)	
40. Labium, paraglossae	short; vestiture of short setae	longer; vestiture of longer setae (Figs. 9B, 10B)	
41. Labium, glossal sclerite	fused to paraglossae (Fig. 8B)	separate from paraglossae by distinct suture (Fig. 9B)	
42. Labium, lateral sinus	wider, revealing lat. margin of max. cardo & stipes	narrower, lat. margins of maxilla concealed	
43. Elytron, plica size	rel. small, not prominent	large, distinctly projected	
44. Elytra, form	rel. flat, apical declivity short, sloped gradually	vaulted, apical declivity longer, sloped more abruptly	

Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

45. Legs, hind coxa, post. margin	straight, not notched	deeply notched	
46. Tibia, front. term. spur	straight	markedly curved mediad (Fig. 28, 29B)	
47. Ab. St. IV, V, VI, posterior margins	straight	extended posteriorly laterally, lateral areas lobate	
48. Male gen., med. lobe apical portion & apex	tapered, long	short, broad, truncate	
49. Setae, Labrum	6	4	
50. Seta, El. parascutellar	present	absent	
51. Setae, clypeal	present	absent	
52. Setae, El. int. 7	present, single	2 absent	a- b
53. Elytron, humerus	rounded, or rectangular	angulate, projected lat. (Fig. 75) or ant.-lat. (Fig. 106) absent	a- b
54. Setae, max. stipes, base	1	several (Fig. 7) absent	a- b
55. Setae, PN, lateral	2 pair	1 pair	
56. Mesothorax, scutellum	long, post. margin narrowly triangular	short, broad, post. margin broadly triangular	
57. Head, occipital area	broad, only slightly narrower than int. oc. width (Figs. 34A-D)	markedly constricted (Fig. 34E)	

Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

58. Mandibles, basal area	smooth (except one or two notches)	series of parallel narrow grooves or notches (Figs. 16A-B, 18A-B, & 19)
59. Legs, tibiae, corbels	at right angles to long axis (Fig. 25)	oblique angle to long axis (Fig. 26)
60. Legs, mid-tibia, spine	absent	present (Fig. 27)
61. Mandibles, incisors	gradually curved medially (Figs. 11A-B)	abruptly curved medially (Figs. 18A-B)
62. Mandibles, post. retinac. ridge, relative length	shorter (Figs. 11A-B, 16A-B)	longer, clearly marked by large teeth (Figs. 17A-B)
63. Labium, mental tooth	moderate in size (Figs. 8A, 9A)	very small (Fig. 10A)
64. Setae, mandibles, basal occlusal area	without setae	with single row (Fig. 17I)
65. Pronotum, lateral grooves	extended each side length of lateral margin	absent, dorsal surface continuous with proepipleura
66. Mesothorax, mesosterno-pleural sutures	present	absent

Table 2. Phylogenetic designation and distribution of character states among the genera and subgenera of Peleciini.

TAXA, AND PHYLOGENETIC DESIGNATIONS OF CHARACTER STATES ¹													
CHAR. Ground		NO. ²	Plan	<u>Pseuda.</u>	<u>Agonica</u>	<u>Eripid.</u>	<u>Eripus</u>	<u>Pelecid.</u>	<u>Pelec.</u>	<u>Strict.</u>	<u>Ardist.</u>	<u>Dysch.</u>	<u>Disph.</u>
		01.	X	X	X	X	X	X	X	X	X	X	X
		02.	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻
		03.	Xa	Xa	Xc ^a	Xb	Xc ^a	Xc ^a	Xc ^a	Xc ^b	Xc	Xc	Xc
		04.	Xa	Xa ^b	Xa	Xa	Xa	Xa	Xa	Xa	Xa ^a	Xa ^a	Xa ^a
		05.	X	X	X	X	X	X	X	X	X	X	X
		06.	X	X	X	X	X	X	X	X	X	X	X
		07.	X	X	X	X	X	X	X	X	X	X	X
		08.	X	X	X	X	X	X	X	X	X	X	X
		09.	X	X	X	X	X	X	X	X	X	X	X
		10.	X	X	X	X	X	X	X	X	X	X	X
		11.	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ²	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ¹
		12.	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻
		13.	Xa ¹	Xa ¹	Xa ²	Xa ²	Xa ²	Xa ²	Xa ²	Xa ²	Xa ²	Xa ²	Xa ²
		14.	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻
		15.	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ¹	Xa ¹
		16.	0	Xa	Xa	Xa	Xa	0(?)	0	0	Xb	Xb	Xb

¹Symbols below are: 0- plesiotypic character state; X- apotypic character state. For the latter, accompanying lower case letters and superscript numbers indicated states in transformation series of more than one stage. Details are explained in the text.

Minus signs (-) indicate losses or reductions. These symbols are used in Fig. 129 to indicate hypothesized first appearances of unique apotypic states, or to indicate multiple appearances of homoplastic states.

²Characters (01-66) are as indicated by the same numbers in Table 1.

Table 2 continued. Phylogenetic designation and distribution of character states among the genera and subgenera of *Peleciini*.

17.	0	X ⁻	X ⁻	0	X ⁻	X ⁻	0	0	0	0
18.	0	Xb	Xb	Xa	Xa	Xa	Xa	0	0	0
19.	0	Xb ⁻	Xb ⁻	Xb ⁻	0	0	0	Xa	Xa	Xa
20.	0	Xb ⁻	Xb ⁻	Xb ⁻	Xb ⁻	Xb ⁻	Xb ⁻	Xa	Xa	Xa
21.	0	Xb ⁻	Xb ⁻	0	0	0	Xa ⁻	Xa ⁻	Xa ⁻	Xa ⁻
22.	0	X ⁻	X ⁻	0	0	0	X ⁻	X ⁻	X ⁻	X ⁻
23.	0	X ⁻	X ⁻	0	0	0	0	0	0	0
24.	0	X ⁻	X ⁻	X ⁻	0	0	0	X ⁻	X ⁻	X ⁻
25.	0	X ⁻	X ⁻	0	0	0	0	0	0	0
26.	0	X ⁻	X ⁻	0	0	0	0	0	0	0
27.	0	X ⁻	X ⁻	0	0	0	0	0	0	0
28.	0	X	0	0	0	0	0	0	0	0
29.	0	X	0	0	0	0	0	0	0	0
30.	0	0	X	X	X	X	X	X	X	X
31.	0	0	Xa ¹	Xa ²	Xa ²	Xa ²	Xa ¹	Xa ¹	Xa ¹	Xa ¹
32.	0	0	X	X	X	X	X	X	X	X
33.	0	0	0	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻
34.	0	0	0	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻	X ⁻
35.	0	0	0	X	X	X	X	X	X	X
36.	0	0	0	Xa ²	Xa ²	Xa ²	Xa ²	Xa ¹	Xa ¹	Xa ¹

Table 2 continued. Phylogenetic designation and distribution of character states among the genera and subgenera of Peleciini.

	0	0	0	0	Xa ²	Xa ²	Xa ²	Xa ²	Xa ²	Xa ²	Xa ¹	Xa ¹	Xa ¹	Xa ¹
37.	0	0	0	0	0	Xa ²	Xa ²	Xa ²	Xa ²	Xa ²	Xa ¹	Xa ¹	Xa ¹	Xa ¹
38.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
39.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
40.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
41.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
42.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
43.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
44.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
45.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
46.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
47.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
48.	0	0	0	0	0	X	X	X	X	X	X	X	X	X
49.	0	0	0	0	0	X ⁻	X ⁻	X ⁻	X ⁻	0	0	0	0	0
50.	0	0	0	0	0	X ⁻	X ⁻	X ⁻	0	0	0	0	0	0
51.	0	0	0	0	0	0	0	0	X ⁻	0	0	0	0	0
52.	0	0	0	0	0	Xb ⁻	0	0	0	Xa	0	0	0	0
53.	0	0	0	0	0	0	0	Xa	Xa	Xa	Xb	Xb	Xb	Xb
54.	0	0	0	0	0	0	0	Xa	Xb ⁻	Xb ⁻	0	0	0	0
55.	0	0	0	0	0	0	0	X ⁻	0	0	X ⁻	0	0	0
56.	0	0	0	0	0	0	0	X ⁻	0	0	0	0	0	0

