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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 franzii, 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 Mexico, 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 Mexico, Oaxaca, 1 km. e. jct. Rtes. 125 and 190); E. globipennis whiteheadi (type locality Mexico, Morelos, 5.4 mi. E. Cuernavaca); E. globipennis rotundicollis (type locality Mexico, Guerrero, Sierra Madre del Sur, 26.2 km. from jct. of road to Chichinauca on rd. to Filo de Caballo); and E. breedlovei (type locality Mexico, Chiapas, Municipio Comitan, 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 Pelecidium sulcatum Guérin-Méneville, 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. refugens* group (three species); *P. faldermannii* group (five species); and *P. laeve* group (three species). New synonyms are: *P. besckii* (Chaudoir, 1850) = *P. bisulcatum* reichardti Straneo, 1970; and *P. faldermannii* (Chaudoir, 1846) = *P. brevisulcatus* 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. longicolle impunctatum* (type locality Paraguay, Dapuca); *P. punctatostriatum* group - *P. bolivianum* (type locality Bolivia, Santa Cruz, El Cidral), *P. atrovioleaceum* (type locality Brazil, Chapada), and *P. semistriatum* (type locality Brazil, Chapada Cambaí), and *P. rotundipenne* group - *P. paulae* (type area Brazil, state of Santa Catarina), and *P. helenae* (type locality Brazil, S<170>o Paulo, Jupuvara).

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, 1928), 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 *Pelecini* postulates the following relationships: the clade *Pseudagonica + Agonica* (=Agonicina) is the sister group of the remaining taxa (=Pelecina). Within the latter group, the New World *Pelecina* is the sister group of the Old World *Pelecina*. Of the Old World *Pelecina*, *Eripus* is the sister group of *Pelecium + Stricteripus*. In the Old World *Pelecina*, *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 *Pelecina* 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 oversea, 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 oversea 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 oversea 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.

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Disphaericus Waterhouse

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Acknowledgements

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 Peleci-ium 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 Peleciium 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 he chose to include only a generic-level treatment. The Afrotropical genus Peleciium was so small (including only three previously described species) that it was an easy task to treat it at the species level. Consequently, representa- tives were obtained of described genera from the Afrotropical and Australian regions. After a prelimi- nary study of this material, we thought it necessary to see specimens from the Oriental fauna, thinking that they might represent a phylogenetically impor-tant 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 D.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 Dyschi-ridium 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 re-focused.

Historical Aspects

Descriptions of Taxa

Knowledge of the Neotropical peleciine 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-Méneville 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 faldermannii. To this monobasic genus in 1850, he added A. besckii and A. iridescentis, in 1854 synonymizing the latter name and A. faldermannii. In 1854, also, Chaudoir described Pelecium laeve, comparing it to A. faldermannii; and P. aterrimum, comparing to A. faldermannii and A. besckii - 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.


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 Oertbeit-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 (Périn-gney, 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 Eriplus to the Harpalini, 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 Cychrus and Panageus, 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 secundiform 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 Panageini, 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 peleciines 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 pelecines 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 Panageini; 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 Pelecidae, recognizing that these groups exhibited an "Inabresian" (from India + Africa + Bresil) distribution pattern. In 1948 (p. 376) he placed the Pelecidae 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 peleciines and disphaericines were in a basal position in the latter group. Because the *Carabidae Uniperforatae* includes the brosciines 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 peleciines near the Brosciini, and Horn and Csiki placed at least *Pelecium* near the Brosciini. Chaudoir and Lacordaire also implicitly placed the peleciines in a primitive position.

Other authors, who have recognized the relationships of at least the Inabresian peleciine stocks, have placed them differently: Jeannel and Basilewsky, with the Odacanthini (*Odacanthomorphi* of Jeannel; Lebiitae of Erwin), whereas Kryzhanovsky, 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 peleciines, locating *Disphaericus* near more derived stocks (the old and polyphyletic Truncaclitenes), *Agonica* near moderately derived callistomorph groups, and *Pelecium* (*sensu lato*) near comparatively primitive groups (amarines and brosciines [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 peleciines. We have attempted this for the Neotropical and Oriental assemblages, only.
2. Make possible identification by others of species of Neotropical and Oriental peleciines, without recourse to comparative material or types.
3. Establish the monophyly of the peleciine assemblage.
4. Establish the relationships of the peleciine 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 peleciine affinities are odacanthomorphi, panaeite, 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.

**Methods**

**Material and Methods**

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.
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 peleciines 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.

Secondary, 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 peleciines.

Species level work was confined to the Oriental and Neotropical pelecinine 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 peleciines 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. HT- 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, P1, 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 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 pelecines, line drawings of habitus are provided for adults of most species. Habitus is illustrated for the other genera by photographs. Palpomeres of Neotropical pelecines 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 (f) 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 pelecines 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 peleciine 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. 15A 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
dense 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, ovate to broadly securiform (cf. Fig. 41). 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 narrowly triangular or ovate to broadly securiform (cf. Fig. 41).

Elytral striaion. 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 peleciine elytra exhibit a remarkable range of striaion, 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 parascutellar seta, with middle legs, and on various tarsomeres of the hind legs.

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carabids with the body subpedunculate, pedunculate, or not pedunculate, with pronotum extended over bases of elytra, metasternum 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 pergicones.

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, with parascutellar seta, discal setae, and preapical setae in Interneur 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 medi ally 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 postauricular transverse impression (cf. Figs. 34A-E). Supraantennal grooves narrow or broad, lateral supraantennal ridges narrow or broad. Vertex posteriorly marked or not by sharp or smooth transverse groove (Fig. 1, potg). Occipital 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. Antennal 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 striate, glabrous 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). Surface smooth (Figs. 11A and B). Ventral surface with long ventral groove, densely setose (Figs. 11C and D, 16C and D, 17C and D, and 19B). Lateral surface basally narrow (Figs. 11G and H) or markedly broad, ventral parascrobal area angular (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 ple cious. 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 reticulate (Allen and Ball, 1980: 487), or various parts smooth, microlines effaced. Ventral surface with mesh pattern trans verse, 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 stripes each with one seta preapically, basally with one longer seta (Fig. 8A, ae) 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 palpmere 2 trisetose (Fig. 8A).

Pronotum: one to several pairs of marginal setae, posterior pair clearly anterior of, or at, postero-lateral angles. Elytron: without parascutellar setae, discal setae, and parascutellar setae in Interneur 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.

Pleurostichinae.
Spermatheca. Bulb unipartite, bulbus, duct without sclerite at base.

Way of life. Data about how peleciines 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 leptocephal 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 peleciine 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, unravels, and the beetle eats out the soft inner parts.

Together, the data about a few immature and adult peleciines indicate a clear association of these beetles with millipedes. Can these limited data be generalized? We think so. Since peleciine 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 peleciines 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 agonicines with millipedes may not be as close as is the association of peleciines (*sensu stricto*) with these myriapods, since agonicine adults lack some of the special features of the Peleciina.

Geographical distribution (Map 1). The tribe Peleciini 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 pteroschicine subgenus Stereodema (Müller, 1944: 151, and Figs. 8 and 9), and Cuupiesis (= Basoilia, Horn, 1881: 107). However, peleciines differ too much in too many other features to be considered as related to hiletines, Pasimachus, Stereodema, or Cuupiesis.

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, 197919. We believe, however, that these similarities are homoplastic, since other features (disjunct middle coxal cavities plus setiform unguitractor plates of promecognathines) indicate that the Promecognathini (Promecognathini + Axinidiini; Basilewsky, 1963) and Peleciini belong to different major lineages: promecognathines to Loxomeriformes, 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 supraorbital 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.

Jeanne 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 Lebiltae (Erwin, 1985: 468), but peleciines do not have this modification. Liebherr (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 pana-

gaeines implies close phylogenetic relationship probably inferred from the seemingly similar tarsal vestiture of the Inabresian peleciines and the male Panagaeini. However, the adhesive vestiture char-

acteristic 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 Pele-

cini 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 setiger-

ous punctures ........................................... 5

4'. Head with two pairs of supraorbital setiger-

ous punctures (Neotropical Region) ............ 7

5. Maxillary palpomere 3 much shorter than 4. Elytron with preapical setigerous puncture in interneur 2, plica prominent in lateral aspect. Hind coxa with deep notch in posterior margin (Neotropical Region)... Peleciuni Kirby

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 markedy iridescent ....... Pseudagonica Moore

7(4'). Head with frontal impressions long, extend-

ed 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

Agonicini Sloane, 1920: 129. TYPE GENUS Agonica
Subtribe Agonicina, new rank


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 setae, preapical setae in interneur 2 and 7, disc acetose, 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 (squamosetae), 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 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-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: 32), (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; glossectic dorsally continuous with paraglossae; palpomere 3 securiform, apical margin broad, truncate (Fig. 8B).

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

Pronotum longer than wide or subquadrate, postero-lateral angles broadly rounded. Metathorax with 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: 10).

Included taxa. Two genera are members of this sub-tribe: 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 markedely 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 supraorbital 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.


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.


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.


Phylogenetic relationships. See above, under Pseudagonica. The autotypic 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.


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, semihypognathous 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 palpmere 3 much shorter than 4 (Fig. 6A), maxillary palpmere 4 at least broadly ovate, apical margin broadly or narrowly truncate (Figs. 57 - 66); mentum astose (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 styliomere 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: metasternopleural sutures 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.


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 Agoninae. 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 metasternal 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; par-
ocular impressions broad, supraantennal ridges
broad, temples enlarged, post-ocular transverse
groove developed; maxillary galeomeres slender,
markedly sinuate, maxillary palpmere 4 with
apical margin truncate, maxillary palpmere 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 to at least 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 palpmomere. Range of variation in form of
maxillary palpmomere 4 and labial palpmomere 3 is
illustrated in Figs. 35 - 66. The range is from ovate
(cf. Fig. 35), through broadly ovate (Fig. 64), triangular
(Fig. 41) to secorial form (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 Stric-
teripus, 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 Stric-
teripus and is most pronounced in the species of
Pelecium, and principally in the more distinctly
strate 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
cytra 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 Stricteri-
pus, though the basal depression is shallow, the
humeral projections are marked, and project for-
ward and laterally (Figs. 126 - 128).

Elytral striation ranges from complete (exclud-
ing the basal part of interneur 1), with eight inter-
neurs extended from basal to apical margin (cf. Fig.
87) to 1 - 7 completely reduced (subgenus Eripidi-
us). 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
- Lacordaire, 1854: 251. - Dupuis, 1913: 2. - Csiki,

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


Pelecium (in part); Chaudoir, 1846: 529. - 1861: 127.
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; female sternum VII with six to ten setae apically, in single row.

Description. In addition to the features noted in the description of *Pelecini* and *Pelecina*, 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 *Pelecina*, but restricted as noted in “Recognition and diagnosis”; also, in one species, marginal setae of pronotum more than two, and in one species, proepical setae 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 pelecinine 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. 69). 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)
Eyes of normal size, longer than temples. Pronotum with postero-lateral impressions deep or not. 5

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

Pronotum with two pairs of marginal setae. Range various. 6

Pronotum with lateral marginal grooves interrupted medially and postero-lateral angles rounded, lateral margins sinuate (Fig. 82). Range: Sierra Madre de Oaxaca and Mixteca Alta, in Oaxaca (Map 5). E. oaxacanus, new species

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

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 5). E. nitidus (Chaudoir)

Right mandible with anterior part of retinacular ridge (Fig. 12). Pronotum with postero-lateral angles various in form. 8

Pronotum (Figs. 83 - 85) with lateral margins evenly incurved posteriorly, not sinuate; postero-lateral angles rounded, not denticulate. 9

Pronotum (Figs. 75 - 81) with lateral margins markedly or slightly sinuate, or convergent toward base; postero-lateral angles denticulate. E. scydmaenoides Dejean

Pronotum subcircular, with postero-lateral angles broadly rounded (Fig. 84). Range: Sierra Madre del Sur, Guerrero (Map 5). E. globipennis rotundicollis, new subspecies

Pronotum with postero-lateral angles more narrowly rounded (Figs. 83 and 85). 10

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)

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 or 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 Ig. 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 *Eripius*.

**Description.** Habitus as in Fig. 67. Size average for *Eripus*, overall length ca. 7 mm., Standardized Body Length 0.34 mm., width of elytra 2.40 mm.


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

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

  - Head. Frontal impressions wide and deep as far as posterior pair of setigorous 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 retinacular ridge (cf. Fig. 12B).

  - Pronotum. Surface markedly convex, especially anteriorly. Lateral margins uniformly arcuate throughout length; anterior 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 peleciine 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 *Eripius*.

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**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 *Eripius*.

**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, isosimetric lanceolate, or lines obsolete, surface shining. Pronotum with microlines fine, mesh pattern transverse, gratted, surface iridescent. Elytra with microlines fine, mesh pattern markedly transverse, gratted 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 - 69. 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 2400 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 Peleceum (Pelecidium).

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

Eripus suturalis (Chaudoir),
New Combination
Fig. 68 and Map 2

Peleceum 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 Oberthiir Collection, Box 1287.

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

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. scymnus 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 synapomorphy of markedly narrowed terminal palpomeres of small females.

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

Pelecium subcaecum Chaudoir, 1866: 110. HOLO-

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

Elytra. Smooth, without impressed interneurs on disc.

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


Note about type material. The sex of the single specimen that Chaudoir had was not specified in the original description. A second male - labelled para-
type; 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 evident (cf. Fig. 12B).

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

Elytra. Smooth, without impressed interneurs on disc.

Geographical distribution (Map 3). This species is known only from Orizaba, state of Veracruz, Mexico. 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. LECTOTYPE (here selected) first of three males in Chaudoir-Oberthür Collection, Box 199, labelled Ex Musaco Chaudoir [red print on white paper], in front of the following box label: aterrimus Chaud. Mexique Sallé (MNHP).


Note about synonymy. Bates was incorrect in combining E. aterrimus (= 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. aterrimus, 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 - 11.68 mm., of females 8.12 - 10.88 mm. Width of elytra of males 2.86 - 4.06 mm., of females 2.80 - 4.24 mm. Eye L/H. 0.28 - 0.41.

Color. Dorsal surface black.

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

Legs. Front tibia, apex, as in Fig. 26: corbel at about right angle to long axis.

Habitat. Adults of this species were collected in forests 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 sympathy.

Phylogenetic relationships. Not hypothesized here.


Eripus scydmaenoides Dejean
Figs. 12, 36, 73, 91, and Map 4

Eripus scydmaenoides Dejean, 1829: 10. HOLOTYPE male, in Chaudoir-Oberthür Collection, Box 199, labelled: Eripus; scydmaenoides; Mexico; Hopfner [all four labels on green paper); in front of the following box label: scydmaenoides Dejean (MNHP). - Dejean and Boisduval, 1832: plate 172, fig. 2. - 1834: 15.

Pelecium scydmaenoides: Chaudoir. 1861: 129. -
Pelecium aterrimum  

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

Pelecium subdentatum  

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. Eriplus 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 5.62 - 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. 55.

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 9300 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 Potosi.

Chorological affinities. The extensive range of this species overlaps or contacts the ranges of most other species of *Eripus* (*sensu stricto*), except that *E. oaxacanus* has 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*.


**Eripus oaxacanus**, new species


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 Omilteene 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 internerves.

Description. Body form stout. Overall length ca. 8 - 10 mm. Standardized Body Length of males 8.36 - 8.66 mm., of females 6.42 - 6.68 mm. Width of elytra of males 3.34 - 3.56 mm., of females 2.65 - 3.80 mm.


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.


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...
Insecta Mundi (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. 78), 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


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 5.84 - 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.


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-palmeto-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 madronos 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 Omitlémé, 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 4600' 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 Huahuaan de Leon, Oax. 3 Aug. 1988 1600 w. 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 7.29 - 8.12 mm., of females 7.15 - 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 Comitan 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 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 - 5.15 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. 19B).
- 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. Hall and Koughley, 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


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 *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.

Recognition and diagnosis. Adults of *Pelecium* are at once distinguishable 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 *Pelecina*, 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 Peleciun 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 Peleciun (sensu stricto).

Geographical distribution. The known range of this genus extends from northern Argentina to Panámá. 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 Peleciun 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

1'. Labrum with six setae. Pronotum with two or more pairs of marginal setae; median longitudinal impression various. Elytron with parascutellar seta Subgenus Peleciun (s. str.)

2(i). Elytron with only interneur 1 deeply impressed, and only thus in medial part of disc (Fig. 114A) ............... P. lacunatum Guérin-Méneville

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. 85) .............. P. sulcatum Guérin-Méneville

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 Chaudri

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. longicolle 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

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

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-parallell (Fig. 93) parallelum, new species

11'. Pronotum with lateral margins more arcuate; postero-lateral impressions longer (Fig. 92). Apical declivity of elytra more gradually sloped

12(10'). Eyes small. Elytra elongate, not markedly arcuate laterally; ratio length/width ca. 1.80 (Fig. 90) striatipenne Chaudoir

12'. Eyes larger. Elytra widened, lateral margins markedly arcuate

13(12'). Dorsal surface bright green, pronotum with or without bluish reflections

13'. Dorsal surface violaceous or bluish

14(8'). Pronotum short, wider than long; stouter species (Fig. 96) punctatum Straneo

14'. Pronotum elongate, longer than wide

15(14'). Elytron with interneurs punctate through out length. Head with frontal impressions shorter, not sinuate laterally (Fig. 94)

15'. Elytral interneurs with punctures on apical declivity, only. Frontal impressions elongate, markedly sinuate laterally (Fig. 95)

16(4'). Head with frontal impressions elongate, extended posteriorly to postocular transverse impression (as in Eripus exx.)

16'. Head with frontal impressions shorter, punctiform or not, not extended beyond posterior margin of compound eye

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)

17'. Elytron with more than four interneurs impressed. Pronotum and elytra bright coppery

18(17'). Elytron with interneurs 1 - 5 deeply impressed, but 5 very short (Fig. 112)

18'. Elytron with interneurs 1 - 6 deeply impressed, but 6 very short (Fig. 111)

19(16'). Elytron with more than three discal interneurs deeply impressed in at least part of length

19'. Elytron with three or fewer discal interneurs deeply impressed, or wholly smooth

20(19). Tarsomere 5 with row of few slender setae on each ventro-lateral margin

20'. Tarsomere 5 glabrous ventrally

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)

21'. Elytron interneurs markedly punctate

22(21'). Elytron with interneurs 1 - 6 impressed. Pronotum wider than long. Dorsal surface black with faint violaceous reflections (Fig. 104)

22'. Elytron with not more than interneurs 1 - 5 impressed. Pronotum at least as long as wide

23(22'). Elytron with interneurs 1-5 impressed. Pronotum longer than wide. Dorsal surface coppery (Fig. 106)
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 postero-lateral 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 posteral of anterior margin of compound eyes (Fig. 115). Dorsal surface green ...................... P. foveicolle 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 Ménénville.

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

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

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 subtranslucent. Elytra with meshes transverse, surface subiridescent.


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 peleciines, 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 stipes, and deep sulcation of the pronotum. This combination of apotopic 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


Note about type material. According to the original description, the type material was obtained by Goudot, from "Colombie, Vallee 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, 1.6b, 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 (Laudot 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 (Coll. Van Emden, BMNH); Sevilla, Magd. many exx. (MCZ)

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


Note about type material. According to the original
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. suicatum.

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


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


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 Comayma 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 decivity 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., Colombia, Ex Musaeo Mniszech (Chaudoir-Obertür Coll., MNHP); one ex., Colombia, Ibaque Fr. Clever (Chaudoir-Obertür 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 striaion. 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) posteriorily 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 Pelecium for details. The most important apotypic feature of Peleciurn (sensu stricto) is the loss of the anterior part of the retinacular ridge (Fig. 15B; cf. Fig. 14B).

Peleciurn violaceum group

Included species. These are: P. striatipenne Chaudoir, P. violaceurn Brullé, P. drakei Quedenfeldt, P. tenellurn Schaum, P. parallelurn, new species, P. punctaturn Straneo, P. longicolle Straneo, and P. brasiliume 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, grater 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 secundiform (Figs. 40A, 42A, and 44); of females, rather narrowly triangular (Figs. 41A and 43A).

Labium. Labial palpomere 3 secundiform 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 6 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.

Peleciurn striatipenne Chaudoir

Fig. 90 and Map 7.

Peleciurn striatipenne Chaudoir, 1866: 10. Holo-


Recognition. The type of this species is most like adults of P. violaceum and P. longicolle (Fig. 90; cf. Figs. 91 and 96). 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.

Peleciurn violaceum Brullé

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

Peleciurn violaceum Brullé, 1838: 34. Type material not seen. - Chaudoir, 1846: 545. - 1861: 12.


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 Brulé 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. Habit 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 known only from the following localities.


**Pelecium drakei** Quedenfeldt

Figs. 40, 41, and Map 7


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

habitue 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 - MNHP) is included in this species.

Measurements and descriptive notes. Habit 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 palpmere 4 as in Figs. 40A and 41A. Labial palpmere 3 as in Figs. 40B and 41B. Note that terminal palpmeres 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, Guacirucus (MZSP). 2 exx., Mato Grosso 3 VI 1896, Andere (CN, CS). 2 exx., "Brazil" (MNMB). PARAGUAY. One ex., Chaco, P.N. Defensores de Chaco Madrejon, 8 12 1881, bosque bajo por el camino de Agua Dulce, J.A. Kochalka (CNHM).

**Pelecium tenellum** Schaum

Fig. 92 and Map 7


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.


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. Striaion 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

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 punctuate 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

Recognition. See key and Fig. 95. 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.


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, 25 mm.), pronotum more elongate, with lateral marginals 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.
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, Dapucai (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, Sào Paulo Rio Claro V. 1925 (MZSP); PARATYPE (teneral specimen), labelled Brazil Sào 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 Sào 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. Striaion complete, with eight deep impunctate interneurs, extended length of elytra. Legs. Tarsomere 5 with row of setae on ventro-lateral margins.

Geographical distribution (Map 7). This group is known only from eastern Brazil, from the states of Sào Paulo, Rio de Janeiro, Minas Gerais, Bahia, and Espirito Santo.

*Pelecium cyanipes* Kirby

Fig. 45, 46, 97 - 100, and Map 8


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


*Pelecium ovipenne* Chaudoir, 1861: 128. LECTOTYPE (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]
Pelecium humeratum Chaudoir, 1866: 108. 
LECTOTYPE (here selected): male in Chaudoir-Oberthür Collection, Box 199, in front of the following box label: humeratum Chaud Brasil 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 paralec- totype 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 project- ed prominently anteriorly (Fig. 97). Intervals convex to carinate (Fig. 99), interval 5 most promi- nently 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 obs- curing 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 rectangu- lar 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 cyan-
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P. cyanipes 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 humeratum 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.

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

Chaudoi 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., Barro Homen de Mello 700 m., Zikau (ex coll. Van Emden -MBNI). 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 "Brazilia" or "Brasilien": 3, von Langsdorf (MUB); 1, Schaum (MUB); 3, coll. Schaufuss (MUB); 1 (MNID); 1, of large size, Coll. Spinola, D. Estevan (MRSNT); 1 (MNMB); 1, coll. Fry, Bowring (BMNH); 1, coll. Spaceo (CS). COLOMBIA. 1 ex., Columbus 2255, Bowring 5317 (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 "Braziliens": 3 (MNH); 3 (MUB); 3 (Basch); 2 BMNI, Fry (coll) 2 (CS), and one (UASM).


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 graterd, 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 intervals, 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


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


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 9). 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 punctatosstriatum_ group

Map 9


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, graded 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 further posterior 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 secundiform, 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


Recognition. See key and Fig. 103. This is the only member of the _P. punctatosstriatum_ group with impunctate elytral interneurs.

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


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, subsinate 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 - 5 extended to apical declivity, 3 and 4 and 5 and 6 connected proximally.

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


Microsculpture and luster. Pronotum and elytra with meshes transverse, not gratted, 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 postercad of base of pronotum.

Mouthparts. Maxillary palpomere 4 as in Fig. 48.

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

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 only from western Brazil, from the type locality, only.

**Pelecium semistriatum**, new species
Figs. 49, 50, 105, and Map 9

Type material. HOLOTYPE male, labelled: Brazil Chapada Campo Oct. Acc. No. 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. atroviolaceum*, 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 0.5 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 general). Legs piceous, except tarsi, latter and palpomeres rufo-piceous.

Microsculpture and luster. As for *P. atroviolaceum*.

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


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.


Recognition. The diagnostic combination of features is: pronotum with base bordered by a shallow
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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. Pronotum and elytra with meshes transverse, grated, surface iridescent.

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

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

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

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


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 complete, 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

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 Luderv (MZSP); one, São Paulo, Capital, 1902 (CS); one, Sapucai 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.


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.

Maxillary. 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 subincurved posteriorly; postero-lateral 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. Interneurs smooth, not puncate, 1 - 4 deep; interneur 1 nearly complete, 2 - 4 progressively shortened; 5 moderately impressed, short; in some specimens, interneur 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


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. besckii; pronotum subcordate, with basal impressions shallow; elytra short, wide, with interneurs 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. besckii. Actually, only details of head and pronotum are similar to those of P. besckii, 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 Espírito 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


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 Espírito Santo, eastern Brazil.

Material examined. In addition to the types, we have
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seen four specimens as follows: 2, Brazil (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, graded or not, surface iridescent or shining coppery.

Head. Frontal impressions elongate, extended to or nearly to post-ocellar 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


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 greenish reflections. Elytral interneurs 1 - 5 are short-cned 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


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. refugens 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 4.5mm. Maxillary palpomere 4 of male as in Fig. 55; of female, as in Fig. 56.

Variation. Elytral color varies from rather dull cuppery-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).

Maxilla. Palpomere 4 of males broadly ovate to triangular (Figs. 87, 88, and 89); of females, broadly ovate (Figs. 88 and 90).

Labium. Palpomere 3 of males narrowly secundiform; 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


Notes about type material. Chaudoir (loc.) 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. 59).

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., Riberão Préto, 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


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 13860, respectively (MUB).

Pelecium besckii (Chaudoir) Figs. 59, 60, 118, and Map 11

Augasmosomus besckii Chaudoir, 1850: 436. Type material in Chaudoir-Oberthur Collection, Box 199, four specimens, each labelled Ex Museo Chaudor [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).


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-Oberthur 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 striaion. Interneur 1 and anterior half of 2 arc 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 Oerturth, MNHP), two ex., "Brazil" (ex. Museo Thorey and Ex. Museo Mniszech, coll. Oerturth, 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. São Paulo State, MHammer Coll. (CUIC).
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 secundiform, 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 Espiritu Santo (*P. laeve*) and Santa Catarina (*P. nicki* and *P. obscurum*).

**Pelecium laeve** Chaudoir
Fig. 120 and Map 12


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 besides 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.

Peleciurn nicki Straneo
Figs. 63, 122, and Map 12


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. S. Catharina (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 Musaco E. Allard 1898 (MNHP).

Stricteripus, new genus
Fig. 34E and Map 13

Type Species: Peleciurn 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 8.0-14 mm.


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 gratted, surface subiridescent.

Fixed setae. Labrum with six setae. Clypeus with single pair of setae. Pronotum with two pairs of marginal setae. Maxillary stipes without setae at base. Elytron with parascutellar setae, and one or two setae in interneur 7, prepically; 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; teeth area with occlusal margin sloped mediulary in relation to cerebral area, and with series of shallow grooves; deep notches not evident. Maxilla with palpomere 4 of males and females broadly ovate, but not secundifem (Figs. 64, 65, and 66A), male palpomeres broader than those of females. Palpomere 5 very short, much shorter than other palpomeres. Labium with palpomere 2 shorter than palpomere 3, latter secundifem 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 cornets 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


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


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 palpmere 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 Lambaycque 19.I.1955, E. I. Schlinger and E. S. Ross (CAS and CS); one specimen, labelled Peru, 17 km. NE Balzás road to Chachaboyas 28.I.1986, dry gully, acacias-grassland #862015, R. J. J. M. Smith (ROM).

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


Note about type locality. We think that, as N. Grena-
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 expiante 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**


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 occusal 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. 125. Body pedunculate, with both pronotum and elytral humeri narrowed basally (Fig. 129). 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, grater 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, acrobes 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 delimitated 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 Pelcicini, 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.

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. Dänninger 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).

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). - ALLO-
TYPE male, labelled: Ceylon Yerburg 92-58; El Coll. Brit Mus; Velverry 10.1.92; Disphaericus Myrmex Andr. cotype [handwritten] H. E. Andrewes det; H. E. Andrewes Coll. BM 1945-

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 palpmeres 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 mediately 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-

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.


Vestiture. Tarsomeres 2-4 of front, middle and hind legs with adhesive vestiture (cf. Fig. 29B).

Mouthparts. Terminal maxillary and labial palpomeres broadly oval, similar to one another in form and size. 

Pronotum. Relatively narrow, elongate.

Elytra. Narrowly oval, 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 mediately, 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 II. E. Andrews det, II. E. Andrews Coll. B. M. 1945-97 [BMNH].

Derivation of specific epithet. Patronymic adjectival form, genitive case of the surname of H. E. Andrews, 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. 29).

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


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.

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. 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


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. concinnum (Péringuey, 1926)
D. ebeninum Chaudoir, 1861
D. iasti (R 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.

Disphaericus Waterhouse


Included species. We list here, in alphabetical sequence, the names of the currently recognized 17 species.
Description. Restriction of tribal and subtribal descriptions, as follows. Habitat 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 ventrally with meshes transverse (or effaced dorsally), not grained. 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. 10A-C, cf. Figs. 18A-D) each with large anterior or terebral tooth; retinaculum long toothed or not; basal area with five or more parallel grooves; dorsal surface with group of short strigles 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 2 broadly securiform.

Thorax. Prothorax without lateral grooves, dorsal surface markedly vaulted. Mesosternopleural sutures reduced, mesoscutum and mesepisternum fused.

Elytra. Basal ridge not evident. Interneurs deep, distinctly punctate or not, intervals markedly convex.

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 synapomorphic 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 homoplasyy 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, the 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., \( a^1, a^2, a^3 \)), with \( a^1 \) being the first-stage derived condition, and \( a^2 \) and \( a^3 \) 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 (Piaynnini, Pterostichini, etc.) are regarded as having labial palpmomere 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 palpmomers.

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 latu]) as independent losses and thus reversals.

Characters 10 and 32, form of terminal palpmomeres of labium and maxilla, respectively. They exhibit marked intrageneric variation, especially in subgenus Pelecium. In Eripus, females of E. subcaecus have labial palpmomere 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., microphthalmmy 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 Pelecini, 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 apotyes, 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 form 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 (once; 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 Peleciun (total, four times, minimum). Interneurs have been reduced, leaving at least interneur 1, in species of subgenus Eripus, subgenus Peleciun (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 pelecinines.

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 pelecinid 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 Calcriitini, and Ball and Shepley (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 pelecinine 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 extensice setation in the ventral groove of the mandibles and on the occlusal margins of the laciniae, and the lack of a terminal lacinial tooth (cf. Furstine, 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.
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. Agonines 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; Peleciun (sensu lato) is represented south of the Amazon Basin by Peleciun (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 Agonicina; 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 Palaeartic 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 subcontinent.

Erwin and Stork (1985: 444-445, Figs. 36-37), in explaining the distribution pattern of the pan-tropical Hiletini, proposed a southern Palaearctic 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 vicarians 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 vicarians surviving in Neotropical Middle America and northern cis-Andean South America. The South American vicar becomes Eripi-
dius, and the Middle American vicar, Eripus (sensu stricto).
10. Dispersal of Pelecidium stock (in form of P. suispenne) into Lower Middle America.

Entry of the ancestral stock F (Fig. 129) into Middle America probably occurred in early Paleocene 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 Shepley 1986: 339, and the references cited therein). Entry into Middle America by Pelecidium was probably a relatively recent event, i.e., Plio-Pleistocene, and certainly more recent than invasion of South America by the ancestral stock of Eripi-
dius (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 geographi-
cally. On the other hand, for Eripus, the subgenus Eripi-
dius 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 geo-
graphical 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 Pleisto-
cene 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 agree-
ment 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 (i.e., 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 footsteps 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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We thank the curators of the institutional collections and owners of private collections whose names are listed in the "Material" section above, who made it possible for us to study the peleciine material on which this paper is based. The junior author takes the opportunity to express appreciation to those who extended generous hospitality to him while he worked in their institutions during intermittent visits in the course of the past 17 years: M. E. Bacchus, M. J. D. Brendell, P. M. Hammond, and N. E. Stork, BMNH, in London; and A Bons, J.-J. Menier, and H. Perrin, MNHP, Paris.

The junior author also records appreciation of the efforts made by others to find specimens of *Eripus* at one time or another during the past 22 years, on forays into the Mexican hinterland: his wife, Kathleen E. Ball; and J. S. Ashe, T. L. Erwin, H. E. Frania, B. S. Heming, R. E. Leech, P. A. Meyen, D. Shipeley, and D. R. Whitehead. The last-named's patience, persistence, and enthusiasm for the hunt are especially appreciated.

Technical assistance in preparation of study material was provided by staff members of the junior author's Department, G. D. Braybrook and D. Shipeley. J. S. Scott prepared the plates and diagrams, including final copies of the maps. D. S. Mulyk and W. B. Barr prepared preliminary versions of the distribution maps. Various drafts of the manuscript were prepared by I. E. Everitt and S. L. Stein, members of the office staff of the Department of Entomology.

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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museum study in Europe was provided by the National Science Foundation (grant GB-3812) and by the Natural Sciences and Engineering Research Council of Canada (grant A-1399).

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Westwood, J.O.


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Wiley, E.O.

Figures 1-10. SEM photographs of structural features of Pelecini. 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 um, Fig. 7; 200 um, Figs. 3-6B, and 8A-10B.
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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 *Pelerium* (*Pelcidium*)
LEGEND

- *P. striatipenne* (state of Minas Gerais, Brazil)
- *P. violaceum* * (to be confirmed)
- *P. violaceum* (state of Goias, 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 refugens 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.
Table 1. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

<table>
<thead>
<tr>
<th>NUMBER and CHARACTER</th>
<th>CHARACTER STATES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PLESIOTYPIC</td>
</tr>
<tr>
<td>01. Setae, Lab. Palp. 2</td>
<td>2</td>
</tr>
<tr>
<td>02. Setae, El. discal</td>
<td>present</td>
</tr>
<tr>
<td>03. Setae, Ab St. VII, d-f</td>
<td>2-4</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>04. Labrum, ant. margin</td>
<td>straight</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>05. Mand.: ventral groove &amp; setae</td>
<td>ca. 1/2 length terebra, setae mod. dense</td>
</tr>
<tr>
<td>06. Left. mand., terebral marg. &amp; retinacular ridge</td>
<td>separated by sharp notch; ret. ridge extended beneath terebral margin</td>
</tr>
<tr>
<td>07. Maxilla, Lacinia, apex</td>
<td>sharp hook</td>
</tr>
<tr>
<td>08. Labium, Mentum, lat. lobes</td>
<td>much longer than tooth</td>
</tr>
<tr>
<td>09. Labium, Mentum, trans. groove</td>
<td>absent</td>
</tr>
</tbody>
</table>
Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

<table>
<thead>
<tr>
<th>Character Description</th>
<th>Character Designation</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Labium, Pal. 3. form</td>
<td>slender, parallel-sided, apex narrow</td>
<td>broad, ovate, apex truncate</td>
</tr>
<tr>
<td>11. Elytra, devel. interneurs</td>
<td>8 int., parascut. int. sep. from int. 1, base of latter ended in parascut. setig. puncture</td>
<td>8 int., base int. 1 absent, int. 1 &amp; parascut. int. joined as in (a''), &amp; discal int's. except 1, more or less reduced, all interneurs absent, or nearly so</td>
</tr>
<tr>
<td>12. Flight complex</td>
<td>wings long, el. separate metathorax large</td>
<td>wings reduced, el. fused metathorax short</td>
</tr>
<tr>
<td>13. Tarsi: adhesive vestiture</td>
<td>biseriate squamo-setae, ♂♂; absent from females</td>
<td>♂♂ - biseriate squamo-setae, (Fig. 21), ♂♂ - Type I adhes. setae (Fig. 22) ♂♂ &amp; ♀♀: Type II adhesive setae</td>
</tr>
<tr>
<td>14. Ovip., Stylomere 1, setae</td>
<td>present</td>
<td>absent</td>
</tr>
<tr>
<td>15. Ovip., S-2, ensiform setae</td>
<td>3 or more, short</td>
<td>2 or long (Fig. ) absent</td>
</tr>
<tr>
<td>16. Body form</td>
<td>jct. pro- &amp; mesothorax short, broad</td>
<td>subped., mod. narrowed pedunculate, myrmecoid</td>
</tr>
<tr>
<td>17. Setae, head, supraorbital</td>
<td>2 pair</td>
<td>1 pair</td>
</tr>
<tr>
<td>18. Antenna, scape</td>
<td>less than length of A2+3</td>
<td>as long as 2+3 longer than 2+3</td>
</tr>
<tr>
<td>19. Mand., terebral tooth</td>
<td>small, not prominent (Figs. 14A-B)</td>
<td>enlarged, prominent (Figs. 17A-B) absent</td>
</tr>
</tbody>
</table>
Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

<table>
<thead>
<tr>
<th>Character Description</th>
<th>State 1: Small, Single, Not Prominent (Figs. 11A-B)</th>
<th>State 2: Large, Double, Prominent (Figs. 17A-B)</th>
<th>State 3: Absent (Figs. 15A-B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Mand., retinac. teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Mand., basal area, notches</td>
<td>2 (Figs. 14A-B)</td>
<td>1 one</td>
<td>0 none</td>
</tr>
<tr>
<td>22. Rt Mand., retinac. ridge, anterior portion</td>
<td>present (Figs. 14B, F)</td>
<td>absent: (Fig. 15D)</td>
<td></td>
</tr>
<tr>
<td>23. Metathorax, metapl. suture</td>
<td>present</td>
<td>absen:</td>
<td></td>
</tr>
<tr>
<td>24. El., basal ridge</td>
<td>extended from humerus to vicinity of scutellum</td>
<td>confined to humeral area, or absent (Figs. 67 &amp; 123)</td>
<td></td>
</tr>
<tr>
<td>25. Ovip., S-2, nematiform setae</td>
<td>present (Figs. 31A-B)</td>
<td>absent: (Figs. 30A-B)</td>
<td></td>
</tr>
<tr>
<td>26. Ovip., S-2, apical-ventral furrow</td>
<td>present (Figs. 31A-B)</td>
<td>absent: (Figs. 30A-B)</td>
<td></td>
</tr>
<tr>
<td>27. Ovip., S-2, furrow sensory pegs</td>
<td>present (Figs. 31A-B)</td>
<td>absent: (Figs. 30A-B)</td>
<td></td>
</tr>
<tr>
<td>28. Tibiae, mid- &amp; hind, inner surface</td>
<td>rounded</td>
<td>sulcate</td>
<td></td>
</tr>
<tr>
<td>29. Male gen., int. sac</td>
<td>without spines</td>
<td>with spines</td>
<td></td>
</tr>
<tr>
<td>30. Setae, posterior PN., position</td>
<td>at post.-lat. angles</td>
<td>ant. of post.-lat. angles</td>
<td></td>
</tr>
<tr>
<td>31. Head, frontal imps.</td>
<td>broad, irreg., basin-like</td>
<td>linear, extended to level of compound eyes (Figs. 34C, E)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>linear, extended to post-cc. trans. groove (Figs. 34A, D)</td>
<td>a²</td>
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Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

<table>
<thead>
<tr>
<th>Character</th>
<th>State 1</th>
<th>State 2</th>
</tr>
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<tr>
<td>32. Max. Palp. 4, form, apex</td>
<td>narrow</td>
<td>broad, truncate</td>
</tr>
<tr>
<td>33. Setae, Labium, Mentum</td>
<td>present (Fig. 8A)</td>
<td>absent</td>
</tr>
<tr>
<td>34. Setae, El. Int. 2, preapical</td>
<td>present</td>
<td>absent</td>
</tr>
<tr>
<td>35. Head, orientation</td>
<td>prognathous</td>
<td>deflexed, semi-hypognathous</td>
</tr>
<tr>
<td>36. Eyes, prominence</td>
<td>relatively flat, temples not projected</td>
<td>temples projected, but narrow (Fig. 32)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>temples projected, broad (Figs. 34A-E)</td>
</tr>
<tr>
<td>37. Mand. Baso-lat. surface</td>
<td>narrow, vent. margin not notched (Figs. 11G-H)</td>
<td>broad, ventral margin not notched (Figs. 17G-H)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. Maxilla, galeomeres</td>
<td>broader, not sinuate (Fig. 5)</td>
<td>slender, sinuate (Figs. 6A-B)</td>
</tr>
<tr>
<td>39. Max., Palpomeres 3-4</td>
<td>subequal (Fig. 5)</td>
<td>3 much shorter than 4 (Fig. 6A)</td>
</tr>
<tr>
<td>40. Labium, paraglossae</td>
<td>short; vestiture of short setae</td>
<td>longer; vestiture of longer setae (Figs. 9B, 10B)</td>
</tr>
<tr>
<td>41. Labium, glossal sclerite</td>
<td>fused to paraglossae (Fig. 8B)</td>
<td>separate from paraglossae by distinct suture (Fig. 9E)</td>
</tr>
<tr>
<td>42. Labium, lateral sinus</td>
<td>wider, revealing lat. margin of max. cardo &amp; stipes</td>
<td>narrower, lat. margins of maxilla concealed</td>
</tr>
<tr>
<td>43. Elytron, plica size</td>
<td>rel. small, not prominent</td>
<td>large, distinctly projected</td>
</tr>
<tr>
<td>44. Elytra, form</td>
<td>rel. flat, apical declivity short, sloped gradually</td>
<td>vaulted, apical declivity longer, sloped more abruptly</td>
</tr>
</tbody>
</table>
Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

<table>
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<tr>
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<th>State 1</th>
<th>State 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>45. Legs, hind coxa, post. margin</td>
<td>straight, not notched</td>
<td>deeply notched</td>
</tr>
<tr>
<td>46. Tibia, front. term. spur</td>
<td>straight</td>
<td>markedly curved mediad (Fig. 28, 25B)</td>
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<td>47. Ab. St. IV, V, VI, posterior margins</td>
<td>straight</td>
<td>extended posteriorly laterally, lateral areas lobate</td>
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<tr>
<td>48. Male gen., med. lobe apical portion &amp; apex</td>
<td>tapered, long</td>
<td>short, broad, truncate</td>
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<tr>
<td>49. Setae, Labrum</td>
<td>6</td>
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<tr>
<td>50. Seta, El. parascutellar</td>
<td>present</td>
<td>absent</td>
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<tr>
<td>51. Setae, clypeal</td>
<td>present</td>
<td>absent</td>
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<tr>
<td>52. Setae, El. int. 7</td>
<td>present, single</td>
<td>2</td>
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<tr>
<td>53. Elytron, humerus</td>
<td>rounded, or rectangular</td>
<td>angulate, projected lat. (Fig. 75) or ant.-lat. (Fig. 106)</td>
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<tr>
<td>54. Setae, max. stipes, base</td>
<td>1</td>
<td>several (Fig. 7)</td>
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<tr>
<td>55. Setae, PN, lateral</td>
<td>2 pair</td>
<td>1 pair</td>
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<tr>
<td>56. Mesothorax, scutellum</td>
<td>long, post. margin narrowly triangular</td>
<td>short, broad, post. margin broadly triangular</td>
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<tr>
<td>57. Head, occipital area</td>
<td>broad, only slightly narrower than int. oc. width (Figs. 34A-D)</td>
<td>markedly constricted (Fig. 34E)</td>
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Table 1 continued. Characters and phylogenetic designation of character states for analyses of relationships of subtribes, genera, and subgenera of Peleciini.

<table>
<thead>
<tr>
<th>Character</th>
<th>Designation</th>
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<tr>
<td>58. Mandibles, basal area</td>
<td>smooth (except one or two notches)</td>
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<tr>
<td>59. Legs, tibiae, corbels</td>
<td>at right angles to long axis (Fig. 25)</td>
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<td>60. Legs, mid-tibia, spine</td>
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<tr>
<td>61. Mandibles, incisors</td>
<td>gradually curved medially (Figs. 11A-B)</td>
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<tr>
<td>62. Mandibles, post, retinac. ridge, relative length</td>
<td>shorter (Figs. 11A-B, 16A-B)</td>
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<tr>
<td>63. Labium, mental tooth</td>
<td>moderate in size (Figs. 8A, 9A)</td>
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<tr>
<td>64. Setae, mandibles, basal occlusal area</td>
<td>without setae</td>
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<tr>
<td>65. Pronotum, lateral grooves</td>
<td>extended each side length of lateral margin</td>
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<tr>
<td>66. Mesothorax, mesosternopleural sutures</td>
<td>present</td>
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*Symbols below are: 0- plesiotypic character state; X- apotyptic 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 apotyptic states, or to indicate multiple appearances of homoplastic states. Characters (01-96) 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 Pellecini.

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Insects Mundi
Table 2 continued. Phylogenetic designation and distribution of character states among the genera and subgenera of Peleciini.

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Table 2 continued. Phylogenetic designation and distribution of character states among the genera and subgenera of Pelocini.

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| 62. | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | x   | x   | x   |
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| 65. | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | x   |
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