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TAXONOMIC REVISION OF THE SOUTH AMERICAN BELIDAE (COLEOPTERA)

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ABSTRACT

The South American species of Belidae are revised. These weevils are considered primitive Curculionoidea, due to some morphological aspects, the phytophagous habits of many species, the correlation with pteridophytes (ferns) and gymnosperms (mainly conifers) and their remarkably discontinuous distribution. Living species are know only from Australia, Tasmania, New Guinea, New Zealand and southern South America. The bulk of species is found in Australia. No fossils are as yet known.

Unfortunately these weevils are very rare, at least in collections, and this scarcity may be related to the almost unknown biology of the group.

New data on the internal anatomy of Homalocerus lyciformis *Boh., as well as other data gathered in this revision, support the idea of the group's primitiveness and its family status, the latter still discussed by some authors.*

Fourteen South American species are recognized in this study, three of which described as new, all from Brazil: Dicordylus serranus, *n. sp. (type-locality, Brazil, State of Minas Gerais, Serra do Caraça);* Homalocerus flavicornis, *n. sp. (type-locality, Brazil, State of Rio de Janeiro);* Homalocerus longirostris, *n. sp. (type-locality, Brazil, State of Santa Catarina, Rio Vermelho). Two names are placed in synonymy:* Homalocerus punctum *Pascoe, syn. n. of* Homalocerus nigripennis *Boh., and* Homalocerus zikani *Bondar, syn. n. of* Homalocerus xixim *Bondar. The new genus* Atractuchus *is erected for a Chilean species formerly placed in* Dicordylus. *The splitting of* Dicordylus binotatus *and* Atractuchus annulifer *in subspecies, as suggested by Kuschel (1959), is briefly discussed and maintained, even though this subject should need further analyses, based on more representative material.*

The distribution of each species is mapped and discussed. The genus Dicordylus, *previously thought to be endemic to the Chilean Subregion is for the first time recorded from Brazil. An attempt is made to give the phylogenetic trends for the South American genera and species.*

INTRODUCTION

The purpose of this paper is a taxonomic revision of the South American Belidae, a group of primitive weevils (Curculionidae *sensu lato*), characterized

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by certain primitive morphological characters, the phytophagous habits of its species, apparently related to Pterydophyta (Filicineae) and Gymnospermae (especially Coniferae), and also because of its disjunct geographical distribution: the family is restricted to Australia, Tasmania, New Guinea and New Zealand on one side of the World, and to South America on the other side.

South American forms (14 species, placed in 5 genera, as will be seen below), had never been studied as a whole; several species were only known from their original descriptions.

Most species of Belidae are found in the Australian Region: 8 genera with some 140 species, of which *Belus* includes about 100. At this stage it is difficult to establish the relationships extant between the South American and the Australian genera, since the latter have not been revised in recent years.

Belidae are not common in collections. I have been able to assemble 476 specimens, which is not too much considering the large number of studied collections. It is probable that they are rarely collected because their biology is still unknown.

Collection of live specimens of *Homalocerus* allowed a first study of the internal morphology of the family. Some data are new, as those of the nervous and reproductive systems. The results obtained from this study stress the separate family rank given to this group of weevils.

MATERIAL AND METHODS

Most specimens studied are dried specimens from Museum collections. I have seen specimens from the following Museums (abbreviations used throughout the text according to Arnett & Samuelson, 1969):

AMNH	American Museum of Natural History, New York, U.S.A. (Mrs. Patricia Vaurie).
BMNH	British Museum (Natural History), London, England (Mr. R. T. Thompson).
CASC	California Academy of Sciences, San Francisco, U.S.A. (Dr. Hugh B. Leech).
DZUP	Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil (Pe. J. S. Moure and Mr. R. C. Marinoni).
FMNH	Field Museum of Natural History, Chicago, U.S.A. (Dr. H. Dybas).
HDEO	Hope Department of Entomology, Oxford, England (Dr. E. Taylor).
LEFA	Laboratório de Entomologia, Facultad de Agronomia, Montevideo, Uruguay (Dr. G. C. Wibmer).
MACN	Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina (Mr. M. J. Viana).
MCZC	Museum of Comparative Zoology, Cambridge, U.S.A. (Dr. J. F Lawrence).
MNHN	Muséum National d'Histoire Naturelle, Paris, France (Miss Hélène Perrin).
MNRJ	Museu Nacional, Rio de Janeiro, Brazil (Mr. Miguel A. Monné).
MZSP	Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil.

NRSS	Naturhistoriska Riksmuseet, Stockholm, Sweden (Dr. T. Nyholm).
USNM	United States National Museum (presently National Museum of Natural History), Washington, D. C., U.S.A. (Miss R. E. Warner).
VAPC	V. Alin, private collection, São Paulo, Brazil.
ZMHA	Zoologisches Museum, Hamburg, Germany (Dr. H. Weidner).

Types. I have not studied all types, but have seen the critical ones. In a few cases types were very poorly preserved and would probably not survive shipping from their Museums. In these cases material was sent for comparison with types.

The live material was fixed in Bouin for about 72 hours and then transferred to 70% alcohol; this material was used for the study of the internal anatomy.

METHODS

This revision is exclusively based on adults. Larvae of South American Belidae are thus far unknown.

Dissections of dried material were done after boiling specimens during a few minutes in water and detergent for softening of tissues. Dissections were done in water, under a stereoscopic microscope. Afterwards they were dehydrated in the alcohol series (70, 80 and 96%) and clarified in creosote or clove oil; pieces were mounted on small cardboard slides between two slidecovers, in Canada Balsam. Genitalia of larger specimens and preparations of internal anatomy were preserved in glycerin, in small plastic vials. Both cardboard slides and vials were attached to the pin of the specimen. Membranous wings, after dissection, were distended in warm water and mounted on slides in Polyvinyl Lactophenol with lignin red.

All illustrations were made with a camera lucida adapted to the microscope or the stereoscope. Photographs have been made by Rolando Carneiro and Eduardo P. Fernandes.

Measurements were taken with an eye-piece micrometric scale. The following measurements were taken for males and females: total length — distance between apex of head and apex of elytra, not including rostrum; rostral length; pronotal length (along median line); elytral length and humeral width. In species with only slight sexual dimorphism measurements have not been taken for each sex.

I have tried to furnish the bibliographic references for each species as complete as possible.

Distributional maps were prepared with data taken from the labels, as well as data taken from the literature (especially from Kuschel, 1959). Under Material Studied I give the following data: country, state (or province), locality; other data, such as date of collection, collector and altitude are given, when recorded on the label, only for type-specimens.

Statistical analysis. Atractuchus annulifer and *Homalocerus lyciformis* were subjected to an analysis of variation of quantitative characters, with the purpose of a preliminary investigation of their geographical distribution and in *A. annuli-*

fer to quantify the observed variation of 4 characters (3 body proportions and 1 meristic character) in the two known forms.

This study was difficult because of the small number of specimens available for this kind of analysis and because of the lack of proper information on labels, especially exact localities.

For comparison of samples, analysis of variance was utilized; when it was necessary to analyze proportions, I used regression analysis.

HISTORICAL REVIEW

Lacordaire (1863) separated *Belus, Rhinotia* (Australian) and *Homalocerus* (South American) from Schoenherr's "Rhinomacerides" (1833), to constitute the "Belides". Since that time these genera were included within the Curculionidae Orthoceri (weevils with straight, non-geniculate antennae) as a subfamily Belinae: Pascoe (1869); Lea & Bovie (1909); Dalla Torre & Voss (1935); Blackwelder (1947); Bondar (1947) and Lima (1956). Le Conte (1874), however, had already considered the group as a distinct family. More recent authors, as for example Crowson (1955) and Kuschel (1959), considered the group as a family within the superfamily Curculionoidea.

The first South American species to be made known was *Rhinotia lyciformis* Germar, 1833, for which Schoenherr (1839) erected the genus *Homalocerus.* Later papers only added descriptions of new species: Boheman (1839, 1845); Philippi (1859); Fairmaire & Germain (1860); Blanchard (1861); Lacordaire (1863, establishing the genus *Dicordylus*); Pascoe (1873, 1886); Voss (1937); Hustache (1940) and Bondar (1947). Bondar was the first author to key the species of *Homalocerus;* however, as he did not have access to the type-material, his work included misidentified species (as will be seen below); he was also the first author to mention the biology of *Homalocerus.* Kuschel (1955) erected two monobasic genera, *Trichophthalmus* and *Callirhynchinus,* for species originally placed in *Homalocerus;* later he revised the Chilean species of the family (Kuschel, 1959); he also divided the Belidae into two tribes: Belini and Pachyurini and presented a new generic conception for the family.

DISCUSSION OF *ITHYCERUS* SCHOENHERR

In his paper on the mouthparts of Coleoptera of the "Rhynchophora" group (= Curculionoidea), Ting (1936) cites and illustrates *Ithycerus novoboracensis* (Forster, 1771) from the United States as an example of Belidae. Bruhn (1947), studying the male genitalia of some "Rhynchophora" also cites that species as an example of Belidae. This was based on Leng's catalogue (1920 and 1933) of the Coleoptera of North America. Crowson (1954) places *Ithycerus* in the subfamily Ithycerinae, within Apionidae, but considers this status as uncertain; he showed, however, that there were some affinities with Brentidae. Kissinger (1964) places the genus in the subfamily Ithycerinae, included in Curculionidae s. str. Genitalia as well as mouthparts of *Ithycerus,* as illustrated by the two first mentioned authors, differ very much from those of Belidae and according to the characters used by Crowson, as well as examination of specimens, I conclude that *Ithycerus* cannot be maintained in Belidae.

BIOLOGY

Immature stages

Few data on the development of Belidae are available. Britton (1970: 615) mentions that "the larvae tunnel in the branches of wattles" (Leguminosae); he is not, however, explicit about the genus of Belidae.

The only reference to South American larvae of Belidae is that of Kuschel (1959: 256), saying that: "He observado las larvas de *Dicordylus marmoratus* en el interior de ramas delgadas o medianamente gruesas, moribundas o secas, de la parte superior de la copa de *Fitzroya cupressoides* (alerce)... en fines de febrero, sólo logré encontrar dos larvas que desafortunadamente he debido criar para obtener los adultos y conocer la especie. Pasan la ninfosis en las mismas ramas en una cámara especial."

Bondar (1947) and Kuschel (1959) suggest that larvae of *Homalocerus* and *Trichophthalmus* develop in ferns (Pteridophyta).

Habits of adults

Very little is known of the biology of Belidae. For the Australian Region there are references of *Agathinus* and *Pachyura* feeding on conifers (Hudson, 1934); a species of *Belus* was reared from *Bassia* (Sapotaceae).

Kuschel (1959) records *Atractuchus annulifer* feeding on the bark of young branches of *Podocarpus nubigena* (Podocarpaceae).

The two South American genera of Belinae (*Homalocerus* and *Trichophthalmus*) seem to have their development linked to Pteridophyta (Filicinae). Bondar (1947: 274) records that in the State of Paraná *Homalocerus lyciformis* and *H. nigripennis* were collected on tree ferns and that *H. xixim* was found by F. Justus, "em xixim de espinho, samambaia de tronco, com espinhos nos talos das folhas" (all different species of tree ferns).

Kuschel (1959: 254) says that E. Reed collected many specimens of *Trichophthalmus miltomerus* on the leaves of the fern *Blechnum chilense* (Polypodiaceae), in Reñaca near Valparaiso. Kuschel himself collected a specimen on a fern of the genus *Polystichum* (Polypodiaceae); other specimens were found on flowers of different trees and shrubs, all Dicotyledoneae.

At the "Estação Biológica de Boracéia", Salesópolis, State of São Paulo, I have collected a specimen of *Homalocerus plaumanni* and a small series of *H. lyciformis* on leaves of *Polystichum denticulatum* Pr. (Polypodiaceae) (*). A specimen of *H. lyciformis* was collected on leaves of a small (about 1 meter high) tree fern (Cyatheaceae). The insects were found imobile, been easily visible because of their coloration, contrasting with the light green color of the leaves. The fern leaves were young ones, without reproductive structures. With the exception of a *Polystichum* whose leaves showed some small brown spots, the leaves did not show any indication of insect activities, from what I conclude that they were not been eaten or damaged. J. H. Guimarães (personal information) collected adult specimens of *H. lyciformis* in Nova Friburgo, State of Rio

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(*) This species is placed by some authors in the genus *Ruhmora* [*Ruhmora denticulata* (Pr.) Copel].

de Janeiro, on young leaves of small shrublike ferns. H. Reichardt (personal information) also collected some specimens of this species on tree ferns, in the National Park of Itatiaia, State of Rio de Janeiro.

There seems to be no specificity: two species of *Homalocerus* (*H. lyciformis* and *H. plaumanni*) were found on the same species of fern (*Polystichum denticulatum*); the same species of *Homalocerus* (*H. lyciformis*) may occur on ferns belonging to different families of Filicinae, as for example Cyatheaceae (tree ferns) and Polypodiaceae (*Polystichum*).

It is still unknown whether species of *Homalocerus* actually develop in ferns or if they only frequent them as adults. I observed that copulation takes place on the leaves; I have not, however, observed oviposition. I have also looked for immature stages (larvae and pupae) in the crown of the new leaves, in the developing leaves, in the interior of the trunk and in the subterraneous rhizome of ferns where I have collected adults of *Homalocerus,* but I did not find vestiges of any activity of the insects.

Figs. 124 and 125 show the months of collection of the two species of *Homalocerus* better represented in the studied collections (*H. lyciformis,* fig. 8 and *H. xixim,* fig. 10). These species seem to be more frequent from November to January; the peak of occurrence (observed in *H. lyciformis*) is from September to April. It is very probable that the life span of the adult is short.

EXTERNAL MORPHOLOGY

Adults

Antennae straight, non-geniculate, 11-segmented; apical segments never forming distinct club; antennal insertions lateral, about middle of beak or subbasal; scrobes shallow, foveolate or oblique. Eyes lateral, hemispherical, prominent. Gular sutures short, clearly separate. Mouthparts hidden in the apex of beak; mandibles strong; maxillary palpi more or less rigid; maxillary galea and lacinia distinct (at least in South American genera); labial palpi attached to ventral surface of prementum; labrum indistinct. Sides of prothorax rounded, not margined. Elytra usually elongate; on inner side, near external margin, with supra-costal flange. Membranous wings with 5 anal veins. Abdomen with 5 visible, freely articulated sternites, all more or less equally long. Legs: anterior coxae large, prominent and contiguous; median and posterior coxae subcontiguous; femora and tibiae usually with a row of granules on dorsal margin, these granules sometimes fused to form a carina; tarsi pseudo-tetramerous; tarsal claws free, simple. Male genitalia: aedeagus with tubular median lobe (Belinae) or non-tubular with membranous dorsal plate (Pachyurinae); tegmen with entire apex, sharp; with or without setae. Female genitalia: coxites and styli present (*Homalocerus, Dicordylus, Atractuchus* and *Callirhynchinus*).

Larvae

In his key to the families of Curculionoidea, Crowson (1955:156) characterized the larva of Belidae as follows: "mandibles without mola; legs very rarely distinct; epipharyngeal rods absent; maxillary palpiger distinct, well developed; thoracic spiracle intersegmental". A more detailed description (*Belus sp.*) is found in van Emden (1938).

Unfortunately there is no description of larvae of any of the South American genera (the only reference is that of the larva of *Dicordylus marmoratus* discovered by Kuschel, 1959).

INTERNAL ANATOMY OF *HOMALOCERUS LYCIFORMIS*

Specimens of *H. lyciformis* were fixed in Bouin and were used for studies of the nervous, digestive and reproductive systems. There are very few papers on the comparative internal anatomy of Curculionoidea and thus these studies are very difficult. As reference for comparisons and conclusions I based my studies on Phelps (1956), Aslam (1961) and Morimoto (1962); for the general morphology of insects I based myself especially on Chapman (1969).

Central nervous system (fig. 22).

Cerebral and subesoephagian ganglia linked by thick connectives; prothoracic ganglium isolated; 3 well separated abdominal ganglia, of which the distal one is larger than the others.

Aslam (1961) studied the central nervous system of Curculionoidea (without including, however, any Belidae) and concluded that the more primitive type only has two isolated abdominal ganglia. Fusion of these ganglia, sometimes even with the thoracic ganglia, is considered as the derived situation.

Digestive system (figs. 20 and 21).

Anterior gut: the narrow pharynx opens into a tubular oesophagus, which is not much distended and does not form a distinct crop. There is no sclerotized proventriculus (common in other Curculionoidea). *Mid gut:* anterior portion expanded and posterior portion tubular, forming an inverted U, passing under the anterior portion. With short and sparse caeca. *Hind gut:* forming a loop and with well marked constrictions at the beginning of rectum. Six cryptonephric Malpighian tubules (fig. 21), which emerge around the distal portion of the intestine and attach themselves to the intestine near the constriction between collum and rectum.

The absence of a sclerotized proventriculus agrees with Crowson (1955: 155); according to Aslam (1961) and Morimoto (1962) this is a primitive character. In Curculionoidea the number of Malpighian tubules varies from 4 to 6, 6 being considered the more primitive number; they are usually of the cryptonephric type.

Reproductive system

Male reproductive system (figs. 18 and 19). Formed by a pair of bilobed testes, placed on the sides of the digestive tube; testicular lobes free, with some follicles (about 9). Vas deferens with posterior portion shorter than anterior one; the latter with distal dilation, the seminal vesicle small, opaque and not lobed. Accessory glands present: one pair (mesadenia) tubular, coiled, opening in the seminal vesicle and another pair (ectadenia) of larger diameter than the preceding pair opening close to the ejaculatory duct. The two vasa deferentia fused distally to form the ejaculatory duct, but receiving the ducts of the pair of ectadenial accessory glands before fusing.

Fig. 19 shows a diagram of the male reproductive system, with a dorsal view of the genitalia.

The seminal vesicle needs more careful studies. According to Phelps (1956), the expanded distal portion of the vas deferens represents the seminal vesicle. Aslam (1961) does not share this opinion. He considers as such (seminal vesicle) the dilated portion of the vas deferens where the accessory glands open. According to Aslam, accessory glands may be paired or not. There would also be a few cases in which, besides the true seminal vesicle, there is a dilation of the vas deferens. In *Homalocerus* the accessory gland opens posteriorly. Therefore, it remains doubtful whether the dilation of the vas deferens represents a true seminal vesicle. Judging from its position or form, it seems logical to suppose that it works as such.

Female reproductive system (figs. 16 and 17). Formed by a pair of ovaries, each with 4 ovarioles. Each ovariole with terminal filament, which is tied to the filaments of the other 3 ovarioles, forming a ligament; this ligament is united to the ligament of the ovary to form the median ligament. The ovarioles open in the calyx of the lateral oviduct; these fuse and originate a common and short oviduct, which soon widens to form the vagina. The bursa copulatrix is placed in the antero-dorsal portion of the vagina; still on the dorsal face there is a sacciform structure, with short duct, which opens medially, close to the duct of the bursa, which probably is the spermatheca. There are no accessory glands.

It should be noted that most Curculionoidea (Aslam, 1961 and Morimoto, 1962) have a spermatheca with 3 clearly distinct components: the heavily sclerotized capsule, the gland and the duct, which can open near the bursa copulatrix or in the common oviduct. *Homalocerus* apparently lacks the sclerotized capsule and the gland of the spermatheca; according to Chapman (1969: 284), however, in the absence of the gland associated to the spermatheca, its own epithelium may be glandular and produce the secretions necessary for nutrition of the spermatozoa. Between the duct of the spermatheca and the bursa there is a small, salient structure, with a sclerotized, vermiform structure inside. It is impossible to state the nature or function of this strucure; it could be related to the bursa or the spermatheca.

I also dissected the reproductive system of a single female of *Homalocerus plaumanni* and found that it is extremely similar to that of *H. lyciformis*. It seems, however, that the duct of the spermatheca is a little longer and the spermatheca itself also slightly more elongate.

The male and female reproductive systems show variations in some structures, according to the degree of development and maturity of the specimen. In males there is variation especially in the testicular follicles; in females there is variation in size of ovarioles, calyx and bursa copulatrix.

Conclusions

The following characteristics seem to support the primitiveness of Belidae in relation to other Curculinoidea, as well as their segregation as a distinct family:

a) absence of sclerotized proventriculus;

b) nervous system with 3 abdominal ganglia, all well separated from each other;

c) ovaries with 4 ovarioles; spermatheca not sclerotized and without accessory glands;

d) seminal vesicle without lobes.

TAXONOMY

Kuschel (1959: 252) proposed the division of the family Belidae into two tribes, Belini and Pachyurini. As the modern tendency of considering Belidae as a distinct family is well supported (Crowson, 1955: 161) and is still better fundamented in this paper, and the differences between the two groups are consistent (particulary those related to the structure of the aedeagus and the mandibles), I do not see any logical reason for not considering them as subfamilies.

Key to subfamilies (according to Kuschel, 1959)

1. Dorsal face of mandibles more or less uniformly convex to the distal margin, so that, when observed from above, the apical tooth is placed more distally than the median tooth. Posterior femora short, not reaching posterior margin of abdominal sternite II. Membranous wings with A_1 always entire. Males: median lobe tubular; median struts with single basal branch; internal sac with long flagellum. Type: *Belus* Schoenherr .... Belinae Lacordaire, 1863

Dorsal face of mandibles only convex to the median tooth, apical tooth retracted and placed ventrally, so that, when mandibles are examined from above, the apical tooth is invisible. Posterior femora long, reaching beyond the posterior margin of the second abdominal sternite. Membranous wings with A_1 entire or abbreviate. Males: median lobe not tubular, its dorsal face membranous; median struts with two branches at base; internal sac without flagellum, but with a long, tubular sclerite, which is sinuous at apex. Type: *Pachyura* Hope.......................... Pachyurinae Kuschel, 1959

Both subfamilies are represented in South America, Australia, Tasmania and New Zealand. In South America, Belinae are represented by two genera, *Homalocerus* and *Trichophthalmus;* the Pachyurinae by three, *Callirhynchinus, Dicordylus* and *Atractuchus.*

Key to South American genera

1. Antennal insertion sub-basal (figs. 32-48) 2
Antennal insertion sub-medial (figs. 27-31) 3

2(1). Eyes pubescent between ommatidia (Chile) ....
.... *Trichophthalmus* Kuschel, 1955
Eyes without setae between ommatidia (Argentina, Paraguay and Brazil)
.... *Homalocerus* Schoenherr, 1839

3(1). Integument metallic. Epistoma with two sharp dentiform processes (fig. 31). Metasternum very swollen. Femora unarmed (Chile) .... *Callirhynchinus* Kuschel, 1955

Integument not metallic. Epistoma bisinuate, without sharp processes (figs. 28 and 30). Metasternum normal. Femora toothed 4

4(3). Elytra narrowed to apex from the humeral callosity; each elytron ending into one spine (♂) or two (♀). Integument smooth, only punctate (Chile) .... *Atractuchus,* gen. n.

Elytra sub-parallel in basal two thirds; apices obliquely truncate (♂ and ♀). Integument granulate (Chile and Brazil) .... *Dicordylus* Lacordaire, 1863

PACHYURINAE, STAT. N.

Pachyurini Kuschel, 1959: 252.

Dicordylus Lacordaire, 1863

Dicordylus Lacordaire, 1863: 522; Pascoe, 1871: 175; 1874: 87 (note); Fairmaire, 1872: 47; Bovie, 1909: 11; Dalla Torre & Voss, 1935: 1 (Cat.); Blackwelder, 1947: 727 (Cat.); Bondar, 1947: 273; Kuschel, 1955: 275; 1959: 253, 255; Lima, 1956: 124.

Redescription

Head elongate, sub-cylindrical; eyes large, hemispherical, slightly oval and transverse. Beak about one and half times longer than head, arcuate and dilated towards apex. Mouthparts (figs. 64-66, 70 and 77); maxillary palpi four-segmented; labial palpi three-segmented. Antennal insertion sub-median; scape obconic, about twice as long as segment II; III longer and thinner than each of the following segments; IV-XI obconic, shorter and thickened towards apex; last segment abruptly sharpened at apex. *Pronotum* cylindrical, slightly constricted apically; widest near middle; integument granulate, with pubescence sparse or forming longitudinal bands. *Scutellum* elongate, triangular, sides curved; very salient and inclined, forming an abrupt angle of almost 90° with elytra. *Elytra* elongate, sub-parallel in basal two thirds; base bisinuate, much wider than pronotum; humeri not very salient; apex obliquely truncate; each elytron with a gibbosity slightly behind scutellum; integument granulate and pubescense variable, forming a rounded spot near middle of disc; with or without sparse tufts of erect setae; elytral margin salient. *Membranous wings* (fig. 26) with incomplete A_1. *Prosternum* very small. *Mesosternum* small, with narrow mesosternal process. *Metasternum* transverse; posterior coxal cavities slightly more separated than median ones. *Abdomen* (figs. 103-105). *Legs* (figs. 92-96). Femora clavate; with one or two teeth on inner face (the second, inner tooth, sometimes reduced and little visible); median and posterior ones granulate on upper surface; tibiae mucronate; anterior and middle ones straight; posterior tibiae straight in females or curved with an internal, sub-apical lamella in males; front tibiae with a smooth carina on external margin; middle and posterior ones with fused granules. *Male genitalia* (figs. 57 and 58); median lobe with downwards curved apex, hook-shaped.

Sexual dimorphism. Posterior tibiae (♂) slightly curved with lamelliform, sub-apical process; (♀) tibiae straight, without sub-apical lamella. Type-species. *Dicordylus binotatus* (Philippi, 1859).

Key to species of *Dicordylus*

1. Pronotum with three distinct longitudinal bands of light-colored pubescence. Elytra without tufts of dark, erect setae (fig. 4) (Chile) .... *marmoratus* (Philippi, 1859)

Pronotum without distinct bands of pubescence. Elytra with sparse tufts of dark and erect setae 2

2(1). Integument black. Decumbent setae of elytral spot oriented backwards (figs. 1 and 2) (Chile) .... *binotatus* (Philippi, 1859)

Integument reddish-brown. Setae of elytral spot inclined 45° in relation to longitudinal axis of body (fig. 3) (Brazil: Minas Gerais and Santa Catarina) .... *serranus*, sp. n.

Dicordylus binotatus (Philippi, 1859)

Rhinotia binotata Philippi, 1859: 1085; Branden, 1883: 121.

Dicordylus binotatus; Pascoe, 1874: 87 (note); Bovie, 1909: 12; Dalla Torre & Voss, 1935: 1 (Cat.); Blackwelder, 1947: 727 (Cat.); Kuschel, 1959: 256.

Kuschel (1959) considered *D. binotatus* as formed by two sub-species, one occurring in the Chilean provinces of Valparaiso and Santiago and the other, southern subspecies, occurring from Linares to Bío-Bío; he suggested but did not formalize the names for these subspecies. Examination of the types confirmed the denomination of the northern and southern subspecies, as suggested by Kuschel.

The two subspecies can be distinguished as follows:

Elytral spot large, rounded (fig. 1); pubescence with numerous white and yellowish setae (Valparaiso and Santiago) .... *binotatus binotatus* (Philippi, 1859)

Elytral spot smaller, narrow and transverse (fig. 2); pubescence with few white setae, the yellowish ones almost absent; elytral punctures coarser. (Linares to Bío-Bío) .... *binotatus balteatus* (Fairmaire & Germain, 1860)

Dicordylus binotatus binotatus (Philippi, 1859)

(Figs. 1, 27, 65, 77, 78, 103 and 129)

Redescription

General aspect. Integument black. Decumbent pubescence white and yellowish-brown; elytra spot rounded, its setae oriented backwards, parallel to suture.

Head (fig. 27). *Pronotum* slightly wider than long; strongly widened in anterior third, close to apical constriction; granulation well developed. *Elytra* convex, slightly flattened on disc. *Posterior legs:* femora almost reaching abdominal sternite III; with two spines on inferior face; tibiae (♂) almost straight, with well developed subapical lamella. *Integument,* dorsally black; antennae, apex of beak and elytral emargination, reddish-brown. Decumbent pubescence formed by yellowish-white and yellowish-brown setae, intermixed and sparse at the base of beak, pronotum and elytra; near the middle of elytral disc the yellowish-white setae form a rounded spot, with backwards oriented setae. Between the decumbent setae, fine, erect and dark pubescence. On elytra, tufts of dark setae, irregularly spaced. *Scutellum* with black setae. *Inferior face* with black integument, more intensely red on base of pronotum and base of legs. Pubescence identical to the dorsal one, sparse; on tibiae the white setae are denser, forming a ring of variable width; in the abdomen (fig. 103) the yellowish-brown setae are placed along posterior margin of sternites, and the white ones form small, irregular spots on each sternite.

Measurements	♂	♀
Total length	8.7 - 12.1	10.4 - 15.5
Length of beak	1.6 - 2.1	1.8 - 2.5
Length of pronotum	1.6 - 2.3	1.8 - 2.6
Length of elytra	6.3 - 9.0	8.0 - 11.9
Humeral width	2.9 - 4.0	3.6 - 5.4

Material examined. CHILE. *Cautin:* Cunco (1 ♂, CASC); *Santiago:* El Canelo, X.1950, (1 ♀, ZMHA); no locality, XI.1951, (1 ♀, MZSP). No locality: (4 ♂, 2 ♀, MNHN); (1 ♀, MCZC); (1 ♀, MZCN).

Geographic distribution (fig. 129).

Discussion. The elytral spot varies from rounded to quadrangular. The ventral pubescence is frequently very long. The white ring of setae of tibiae never reaches base or apex of tibiae.

Dicordylus binotatus balteatus (Fairmaire & Germain, 1860), stat. nov.

(Figs. 2, 92, 93 and 129)

Homalocerus balteatus Fairmaire & Germain, 1860: 6 (holotype ♀, Chile. MNHN, examined); Pascoe, 1874: 87 (note).

Dicordylus ithyceroides Lacordaire, 1863: 523, pl. 72, fig. 3; Fairmaire, 1872: 48; Pascoe, 1874: 87 (note); Philippi, 1887: 143.

Dicordylus luctuosus Pascoe, 1871: 176; 1874: 87 (note); Fairmaire, 1872: 48.
Dicordylus balteatus; Fairmaire, 1872: 48.

Measurements	♂	♀
Total length	11.5 - 12.1	12.1 - 13.1
Length of beak	2.1 - 2.2	2.2 - 2.5
Length of pronotum	2.1 - 2.3	2.3 - 2.6
Length of elytra	8.6 - 9.1	9.2 - 9.8
Humeral width	3.9 - 4.1	4.0 - 4.8

Material examined. CHILE. *Ñuble:* Cordillera Chillan (1 ♂, AMNH). No locality: (1 ♂, BMNH), compared with the type of *Dicordylus luctuosus* by R. T. Thompson; (1 ♀, type of *Homalocerus balteatus,* MNHN).

Geographic distribution (fig. 129).

Discussion. This subspecies differs from the typical form only in details of coloration of pubescence and punctures. White setae are fewer, the yellowish-brown ones almost lacking, giving it a darker aspect. The elytral spot is formed by backwards oriented white setae; it is smaller and transverse. Rostral and elytral punctures are better developed.

Notes on types. *Homalocerus balteatus* Fairmaire & Germain. The specimen, a female, bears the "type" label, from the collection of Léon Fairmaire; it represents the southern subspecies.

Dicordylus luctuosus Pascoe. I have not examined the type-specimen. Through the kindness of Dr. R. T. Thompson of the British Museum (Natural History), I have received a specimen compared with the type, with the following notes: "A small male; the type is a large female and shows minor differences, but has the elytral macula narrow and white, as in the specimen sent (not broad and yellowish, as in *binotatus* Phil.)". I can, therefore, safely conclude that *luctuosus* Pascoe also represents the southern subspecies.

I did not examine the type of *D. ithyceroides* Lacordaire, but from its description and illustration in the "Genera des Coléoptères" (pl. 72, fig. 3) it is also clear that it represents the southern subspecies.

As I did not have much material of this species, it is not possible to analyze too carefully the subspecies problem. However, from the characteristics cited by Kuschel (already used in the key above) it is possible to recognize specimens from the different regions. It is my opinion that the subspecies should be accepted until more material is available for further studies.

Discussion on the geographic distribution. *D. binotatus binotatus* occurs in the provinces of Valparaiso and Santiago, according to Kuschel (1959), an area without conifers; he suggests that subspecies develops in *Ephedra* (Gnetinae); a gymnosperm common in the localities where *binotatus binotatus* has been collected.

The southern subspecies is found from Linares to Bío-Bío and its distribution coincides well with Hueck's "*Libocedrus* and *Araucaria* Forest" (1972: 372, fig. 205).

Dicordylus serranus, sp. n.

(Figs. 3, 26, 28, 61, 66, 70, 79, 96 and 105)

Types. BRAZIL. *Minas Gerais:* Santa Bárbara, Serra do Caraça, 1380 m, XI.1961, Kloss, Lenko, Martins & Silva col. (holotype ♀, MZSP). *Santa Catarina:* Mafra, 800 m, II.1965, (paratype ♀, DZUP).

Description

General aspect. Integument reddish-brown. Decumbent pubescence white and yellowish-brown; elytral spot dense, its setae inclined in relation to suture.

Head (fig. 28). Apical half of beak (♀) smooth and shiny, only slightly punctate. *Pronotum* slightly longer than wide, a little widened behind apical constriction. *Elytra* little convex, flattened on disk. *Posterior femora* (fig. 96) strongly clavate, short (they reach only slightly beyond abdominal sternite II), with two spines on inferior face. *Integument* reddish-brown; pronotal granulation and apical segments of antennae darkened. *Decumbent pubescence* white and yellowish-brown, sparse on basal half of beak, on head and more or less dense on sides of pronotum; on elytra two rounded and compact spots, near the middle of disc; setae forming an angle of about 45° in relation to the longitudinal axis of body; in apical fourth of elytra an irregular spot formed by more or less dense setae. *Erect pubescence* fine and sparse, placed between the decumbent setae. On elytra tufts of black, erect, irregularly spaced setae. *Inferior face* with sparse, whitish pubescence. *Abdomen* (fig. 105). *Female genitalia* (fig. 61). Male unknown.

Measurements	Holotype	Paratype
Total length	10.0	10.2
Length of beak	1.5	1.6
Length of pronotum	2.0	2.1
Length of elytra	7.5	7.7
Humeral width	3.2	3.2

Geographic distribution (fig. 127). Up to now *Dicordylus* was considered as typically Chilean and the discovery of this species modifies considerably the zoogeography of the group (see discussion of the distribution on page 41). This Brazilian species (from the center of the State of Minas Gerais and east of the State of Santa Catarina) could be related to the distribution of *Araucaria* (see Hueck 1972, figs. 121 and 128, on the distribution of the "Paraná Pine"), as other Chilean species are related to conifers such as *Fitzroya* and *Podocarpus.*

Discussion. This new species is related to *D. binotatus,* with similar distribution of the pubescence and erect tufts on elytra. It is distinguished by the shorter beak, the longer and narrower pronotum, the shorter legs with more robust and clavate femora and also by the reddish-brown integument.

D. serranus differs from *D. marmoratus* by the weakly convex elytra, the distribution of pubescence and presence of erect tufts on elytra.

Unfortunately the male of *D. serranus* is unknown; as has been seen for the other two species of the genus, the male genitalia furnish excellent diagnostic characters.

Dicordylus marmoratus (Philippi, 1859)

(Figs. 4, 29, 58, 64, 80, 94, 95, 104 and 128)

Rhinotia marmorata Philippi, 1859: 1087; Branden, 1883: 121.

Homalocerus albidovarius Fairmaire & Germain, 1860: 6; Redtenbacher, 1867: 160.

Dicordylus heilipoides Lacordaire, 1863: 524; Fairmaire, 1872: 48; Pascoe, 1874: 87 (note); Philippi, 1887: 142.

Dicordylus albidovarius; Fairmaire, 1872: 48; Pascoe, 1874: 87 (note).

Dicordylus marmoratus; Pascoe, 1874: 87 (note); Bovie, 1909: 12, fig. 14; Dalla Torre & Voss, 1935: 2 (Cat.); Blackwelder, 1947: 827 (Cat.); Kuschel, 1959: 258.

Redescription

General aspect. Integument reddish-brown to dark-brown. Decumbent pubescence yellowish-white; pronotum with three longitudinal bands; elytral spot irregular.

Head (fig. 29). Apical half of beak (♂ and ♀) smooth and shining, only slightly punctate. *Pronotum* cylindrical, longer than wide, widest at base; slightly widened behind apical constriction; granulation not very salient. *Elytra* very convex. *Posterior legs* (figs. 94 and 95) with feebly incrassate femora; with single ventral tooth (the external tooth); tibiae (♂) curved slightly beyond the middle. *Integument* reddish-brown to dark-brown. White or yellowish-white pubescence forming two dorsal bands starting in the middle of beak and continued along the sides of head and pronotum. Pronotum with a third, median, narrow band; elytra with small spots, sometimes forming lines and fused; near the middle of elytral disc with an irregular spot of variable shape, with areas without light colored setae in the middle. *Ventral face* with dense, whitish pubescence. *Legs* reddish, with less dense white pubescence. *Abdomen* (fig. 104).

Measurements	♂	♀
Total length	8.7 - 11.7	9.6 - 12.7
Length of beak	1.4 - 1.7	1.5 - 1.9
Length of pronotum	1.6 - 2.1	1.7 - 2.2
Length of elytra	6.4 - 8.7	6.9 - 9.7
Humeral width	2.8 - 3.7	3.0 - 4.0

Material examined. CHILE. *Ñuble*. Cordillera Chillan (♂, MACN; 1 ♀, AMNH). *Bío-Bío*: Cordillera Pemehue (2 ♂, AMNH; 1 ♀, MACN). Central

Chile (1 ♂, 1 ♀, CASC). Sierra Nahuelbuta (1 ♂, CASC). No locality: (1 ♂, 1 ♀, MCZC); 4 ♂, 5 ♀, and 1 ♀, type of *Dycordylus albidovarius,* MNHN).

Geographic distribution (fig. 128). This species is distributed from Curicó to Llanquihue. There seems to be no geographical variation.

Kuschel (1959) mentions larvae of this species collected in branches of "alerce" (*Fitzroya cupressoides*), in Llanquihue, Volcán Calbuco. It should be noted that, according to Hueck (1972, fig. 203), the "alerce" forests exist between latitudes 39° and 44°; to the north or to the south of these limits, this conifer occurs isolatedly. Another gymnosperm which could serve as host-species for *D. marmoratus* is *Libocedrus chilensis,* with more ample distribution, occurring from 34°30' to 44°.

Discussion. One specimen from Sierra de Nahuelbuta has the ring-shaped elytral spot incompletely closed.

This species is easily distinguished from *D. binotatus,* the other Chilean species of the genus, by the brown or reddish-brown integument, the absence of tufts of erect setae on elytra, by the more convex elytra, and by the pronotum with three longitudinal bands of light colored pubescence.

Atractuchus, gen. n. (*)

Dicordylus Lacordaire, 1863 (*pars*).

Description

Head (fig. 30) elongate, subcylindrical; eyes oval and slightly longitudinal. Beak as long as head, straight, slightly depressed and dilated towards apex. Mouthparts as in figs. 67, 71 and 76; maxillary palpi four-segmented; labial palpi three-segmented. Antennae inserted sub-medially; last segment gradually acuminate. *Pronotum* conic; wider at base and without apical constriction. *Scutellum* elongate, triangular and little salient; inclination of about 45°. *Elytra* elongate, gradually narrowed to apex, beginning shortly behind humeri; strongly compressed (navicular); without gibbosities; elytral apex ending into one (♂) or two (♀) spines; elytral margin salient; in females with a slight notch near abdominal sternite IV. *Membranous wings* (fig. 25) with complete A_1. *Ventrally* similar to *Dicordylus. Abdomen* elongate (fig. 106). *Legs* very elongate (fig. 97-100). Femora granulate along external margin and with a small tooth on ventral face; front and middle femora slender; posterior ones thickened. Tibiae without spines ventrally; front and middle ones straight; posterior one (♂) curved, without subapical internal lamella. *Male genitalia*: apex of median lobe sagittate (fig. 59).

Sexual dimorphism of the apex of elytra (males with one spine, females with two, figs. 101 and 102), and posterior legs (femora of males very thickened and tibiae very curved, figs. 97-100).

(*) Etymology. The masculine generic name is derived from *atraktos*, Greek for arrow and *uchus,* Latin for to carry, in view to the sagittate apex of the male genitalia.

Type-species. *Rinothia annulifera* Philippi, 1859.

Discussion. I can only explain that no author has ventured to describe a new genus for this species, in spite of very evident characters, because of the supposed endemism of the genus *Dicordylus,* which would be restricted to Chile. However, *D. binotatus* and *D. marmoratus,* from Chile, are more closely related to *D. serranus* from Brazil, than to the third Chilean species, up to now included in *Dicordylus,* and for which I propose this new genus.

The body shape is very different in *Atractuchus* and *Dicordylus* (figs. 1-5 and 27-30). In the new genus the head is more elongate, the beak more straight, short and widened; the eyes are not as prominent, and are longitudinal; consequently the head takes a more horizontal position, while in *Dicordylus* it is turned downwards. In *Atractuchus* the integument is smooth, only punctate, and there are no erect setae, while in *Dicordylus* it is granulous and bears erect setae sparse among the decumbent ones. In *Atractuchus* the elytra are strongly compressed and narrowed backwards. beginning at humeri, while in *Dicordylus* the elytral margins are more or less parallel in the basal two thirds. The scutellum of *Atractuchus* is less prominent and more elongate than in *Dicordylus.* In *Atractuchus* the apex of the aedeagus is sagittate, while in *Dicordylus* it is strongly curved and hook-shaped (figs. 57-59).

In *Dicordylus* there is sexual dimorphism of the presence (in males) of a lamelliform process in the subapical and internal part of hind tibiae, while in *Atractuchus* this structure is absent. In males of the latter the tibiae are more curved and the femora very swollen. Besides these dimorphic characters there is also the dimorphism of the elytral apices, simple and obliquelly truncate in *Dicordylus;* in females of *Atractuchus* there is a notch in the elytral margin, a character absent in *Dicordylus.*

Atractuchus annulifer (Philippi, 1859), comb. n.

Rhinotia annulifera Philippi, 1859: 1086; Branden, 1883: 27.

Dicordylus annulifer; Pascoe, 1874: 87 (note); Bovie, 1909: 12, fig. 15; Dalla Torre & Voss, 1935: 1 (Cat.); Blackwelder, 1947: 727 (Cat.); Kuschel, 1959: 259.

Kuschel (1959) distinguished two subspecies of *Atractuchus annulifer* (see discussion on pag. 19) which can be separated by the following key:

Males. Posterior femora very swollen, without a small, ventral denticle. Posterior tibiae forming a semicircle; external mucrus well developed and curved (fig. 97). Chile (Linares to Bío-Bío) .... *annulifer argus* (Fairmaire & Germain, 1860)

Males. Posterior femora very swollen and with a small tooth on ventral face. Tibiae less curved, not forming semicircle; external mucrus less developed (fig. 99). Chile (Bío-Bío to Aisén) and Argentina (Neuquén) .... *annulifer annulifer* (Philippi, 1859)

Atractuchus annulifer annulifer (Philippi, 1859), comb. n.

(Figs. 5, 25, 59-60, 67-71, 76, 81, 93, 100-102, 106 and 130)

Redescription

General aspect. Integument reddish-brown, smooth and shiny; punctures fine. Decumbent pubescence present; elytra without setae or tufts of erect setae.

Head with two bands of reddish-brown pubescence. *Pronotum* with two lateral bands, in continuation of those of head, as well as a third, median and narrow band. *Elytral pubescence* variable, forming arabesques (especially basally); each elytron with a ring-shaped spot of yellowish-brown pubescence about the middle. Integument darkened ventrally. *Legs* reddish-brown, with darkened granules. *Whitish pubescence* forming a lateral band starting on head, continued on prothorax, epimera and sides of abdominal sternites until apex. *Abdomen* (fig. 106): sternites II-IV with pubescence in groups, to form two triangular spots, the bases of which are contiguous; on sternites I and V they are irregularly condensed. *Hind legs* (figs. 99 and 100). Male: posterior femora swollen, with a denticle on ventral face; posterior tibiae curved, curvature starting slightly beyond middle; tibial mucrus evident, small. Female: posterior femora slender; tibiae straight.

Variation in coloration. In some specimens the lateral band is interrupted on abdomen; there may be an intermediate band on prothorax, between the pronotal band and the lateral one, or only some sparse setae, forming a line next to the base of pronotum.

Measurements	♂	♀
Total length	9.5 - 10.0	10.2 - 12.3
Length of beak	1.2 - 1.3	1.3 - 1.6
Length of pronotum	1.4 - 1.5	1.6 - 2.0
Length of elytra	7.1 - 7.4	7.6 - 9.5
Humeral width	2.7 - 2.9	3.0 - 3.7

Material examined. CHILE. *Bío-Bío*: Cordillera de Pemehue (1 ♂, 2 ♀, AMNH). *Arauco*: Sierra de Nahuelbuta (1 ♂, 2 ♀, CASC). *Llanquihue*: Los Muermos (1 ♀, CASC). No locality: (1 ♂, MNHN).

Argentina. *Neuquén*: Pucará (1 ♂, 1 ♀, DZUP); idem, Lago Lacar (5 ♂, 4 ♀, LEFA).

Geographic distribution (fig. 130).

Atractuchus annulifer argus (Fairmaire & Germain, 1860), comb. n.

(Figs. 30, 97-98 and 130)

Homalocerus argus Fairmaire & Germain, 1860: 6 (holotype ♀, Chile, MNHN, examined); Pascoe, 1874: 87 (note).

Dicordylus pupillatus Pascoe, 1871: 175 (pl. 6, fig. 1); 1874: 87 (note);

Fairmaire, 1872: 48; Philippi, 1887: 142.
Dicordylus argus; Fairmaire, 1872: 48.

Males. *Hind legs* (fig. 97), with very swollen femora, without denticles. Tibiae extremely curved; external mucrus well developed and curved. Color pattern identical to that of typical form (see discussion below).

Measurements	♂	♀
Total length	9.5 - 12.4	11.8 - 13.4
Length of beak	1.2 - 1.5	1.5 - 1.6
Length of pronotum	1.3 - 1.5	1.7 - 1.9
Length of elytra	7.0 - 9.2	8.8 - 10.2
Humeral width	2.6 - 3.5	3.4 - 3.8

Material examined. CHILE. *Bío-Bío*: Cordillera Chillan (1 ♂, 1 ♀, MACN). No locality: (1 ♂, BMNH), compared with type of *D. pupillatus;* (holotype ♀ of *H. argus,* MNHN); (1 ♂, 2 ♀, USNM; 9 ♂, 2 ♀, MNHN; 1 ♂, MCZC).

Geographic distribution (fig. 130).

Statistical analyses of geographical variation (figs. 117-123).

Kuschel (1959) distinguished a northern and a southern subspecies of *A. annulifer,* characterized by the posterior femora of males (figs. 97 and 99); they also differ in the number of granules on the dorsal face of hind femora: "raza boreal [*argus*], que posee en ambos sexos, no más de 10 gránulos en los femures posteriores...; raza austral (forma típica) [*annulifer*] que posee un número mínimo de 11 gránulos en los femures posteriores' (Kuschel, *l.c.*: 259).

I have counted the granules of the hind legs of males and females, in order to test Kuschel's observations statistically. Figs. 120 and 122 show that the number of granules is not the same on the left and the right leg, variation having been noted in the same individual. For analyses of variance I have used data from the right hind femora (fig. 120).

Analyzing a series of 7 males and 8 females of the southern form (table 1) I have verified that statistically the differences between sexes is not significant. It is not necessary to test the difference between means of southern males and females, since the confidence interval of one sample includes the means observed in another sample (fig. 121 ♂ south, and ♀ south), and the two samples are not significantly different (Simpson & *al.,* 1960: 353).

This was followed by application of Student's *t* test of differences between means, for northern and southern males, and the difference was significant (table 2).

Other characters analyzed:

Left hind femur. Regression of maximum width on length (figs. 117 and 118; table 3). In fig. 117 we observe the strong sexual dimorphism, the lines being very divergent. The regression (fig. 118) was statistically the same for northern and southern forms, only that the northern form has larger femora than the southern form.

Head. Regression of maximum width of head [just behind eyes] (MWH) on length of head plus beak (LHB) in males (fig. 119, table 4). The lines are parallel and not coincident. In relation to lengths of head and beak, the head of the southern form is wider than that of the northern form.

Elytral length. Southern area specimens apparently are smaller than northern area specimens. To verify this possibility I have analyzed the elytral length in both forms (fig. 123; table 5). Fig. 123 shows that the northern form has longer elytra and that in females the elytra are longer than in males, in the respective distributional areas, north and south.

Discussion. These analyses of geographical variation are preliminary, because of the small size of the sample and especially because of the lack of samples from critical localities. Two forms can be distinguished, a northern and a southern. The geographical distribution of the two forms (fig. 130) coincides with two biogeographic subregions of Chile (fig. 131, adapted from O'Brien, 1971).

I did not find intermediate characters in the study of posterior legs of males; they are either clearly representative of the northern or of the southern pattern. In relation to MWH x LHB, the forms are also clearly separate. The absence of intermediate forms could represent insufficiency of the studied material, or that the forms are already separated at the specific level. The male genitalia of the two forms, however, are very similar. I could not verify if there is clinal variation of characters.

From the data I have, there are two parapatric populations, with no evidence of intergradation of characters. Due to the small number of individuals and localities analyzed it is difficult to present a final conclusion on the status of the two forms. I prefer to follow Mayr (1969: 197): "It is preferable for various reasons to treat allopatric populations of doubtful rank as subspecies". In future studies, based on more representative material, it may be well possible to conclude that they are two distinct species.

Summarizing, we have the following conclusions:

1. Sexual dimorphism is very evident in both forms; males have swollen posterior femora and more curved tibiae;
2. The northern form occurs in the Santiagan Subregion, while the southern form occurs in the Valdivian Subregion;
3. Northern individuals are, in average, larger than southern specimens;
4. Northern form: posterior legs of male with very curved tibiae and mucrus (apical spur) well developed; posterior femora without ventral denticle, with a variable number (6 to 13) of granules on dorsal face. Southern form: males with less curved tibiae, and less developed mucrus; posterior femora with denticle on ventral face, and number of granules varying from 10 to 13. In average the number of granules is larger in the southern form, but since it is very variable (especially in the northern form), it is not an exclusive character for determination, as already mentioned by Kuschel (1959);
5. Head and beak of the northern form more elongate than in the southern form.

Nomenclatural discussion. According to Kuschel (1959: 259), the "raza austral" is the typical form, that is *A. annulifer annulifer;* he could not, however, solve the problem of the name of the northern form, because he did not study the types deposited in Paris and London.

The holotype of *Homalocerus argus* Fairmaire & Germain, 1960, is a female; there is no reference to locality. Because of this it is more difficult to determine to which form it belongs. By the number of granules of hind femora (left one with 9, right one with 8), it would belong to the northern population. I have shown, however, that this character is not absolute for the separation of the forms; however, figs. 120 and 122 show that there is not a single female of the southern form with less than 10 granules on hind femora. Therefore, the probability of the holotype of *argus* representing the southern form is almost nil. As there is no other means to solve this problem it seems best to consider the holotype of *H. argus* as belonging to the northern form.

The specimen of *D. pupillatus* Pascoe, 1861, from the British Museum (Natural History), compared with the type by R. T. Thompson, is a male and its hind legs are characteristic of the northern form.

Following the law of priority the valid name for the northern subspecies is that of Fairmaire & Germain, *argus*.

Callirhynchinus Kuschel, 1959

Callirhynchinus Kuschel, 1955: 275; 1959: 253, 255.

Redescription

Head wider than long; eyes not too prominent, transverse. Beak as long as head; epistoma with two dentiform, sharp processes (fig. 31); maxillary palpi four-segmented (Kuschel, 1959: 247). *Antennae* inserted in basal third of beak. *Pronotum* transverse, conic; apex truncate and base bisinuate, widest at base. *Scutellum* at same level of elytra; wider than long, heart-shaped. *Elytra* elongate-oval; sides expanded behind humeri, vertical only on epipleura and oblique from basal fourth to apex; base of elytra slightly wider than pronotum; each elytron with two longitudinal, not very prominent, carinae; apex ending in a sharp point close to the sutural angle. *Membranous wings* with complete A_1 (Kuschel, 1959: 248). *Femora* and *tibiae* slender (anterior femora slightly thicker), without granules on external face; femora not toothed ventrally. Tibiae straight, anterior one with a row of spines on inner margin. *Metasternum* very swollen near median coxae. Integument strongly metallic. Punctures coarse and deep.

Type-species. *Homalocerus exquisitus* Fairmaire & Germain, 1861.

Discussion. A monobasic genus established by Kuschel (1955) for a single species described in *Homalocerus* by Fairmaire & Germain (1861) and transferred to *Dicordylus* by Fairmaire (1872).

Differences between *Callirhynchinus* and the other two genera of South American Pachyurinae are great. *Callirhynchinus* is distinguished by the more basal antennal insertion, not thickened, not toothed and not granulate slender femora, by anterior tibiae ventrally with a row of spines, by the very tumid metasternum; and finally by the characteristic depressed and metallic body.

According to Kuschel (1959: 255), this genus has closer affinities with the Australian *Pachyura* than to *Dicordylus*.

Callirhynchinus exquisitus (Fairmaire & Germain, 1861)

(Figs. 6, 31, 82 and 127)

Homalocerus exquisitus Fairmaire & Germain, 1861: 6.

Dicordylus amoenus Pascoe, 1871: 176; 1874: 87 (note); Fairmaire, 1872: 48; Philippi, 1887: 142.

Dicordylus exquisitus; Fairmaire, 1872: 48; Bovie, 1909: 12; Dalla Torre & Voss, 1935: 2 (Cat.); Blackwelder, 1947: 727 (Cat.)

Callirhynchinus exquisitus; Kuschel, 1955: 275; 1959: 255.

Redescription

General aspect. Integument strongly metallic, violaceus, ochre pubescence decumbent, forming two bands on head, three on pronotum, and small organized spots on elytra. Legs reddish with darkened tarsi.

Head (fig. 31). Beak black, smooth and punctate, shiny; metallic sheen only at base. *Antennae* (fig. 82) with testaceous scape; segments II-IV testaceous, with darker apices and segments IV-XI darkened. *Pronotum* with slightly median longitudinal depression, covered by a band of pubescence; there are two other lateral bands which do not reach either margin. *Scutellum* pubescent. *Elytra* slightly depressed between the first carina and humeri. Elytral pubescence organized in three rows of spots. *Ventrally* with white pubescence, forming small spots; this pubescence denser on sides of prosternum and metaepimeron; metaepisternum with bluish metallic sheen.

Measurements	♀ (BMNH)
Total length	7.5
Length of beak	1.0
Length of pronotum	1.3
Length of elytra	5.8
Humeral width	2.4

Material examined. CHILE. *Bío-Bío*: Chillan (1 ex., MNHN). No locality (1 ♀, BMNH).

Geographic distribution (fig. 127). The exact locality of this species was unknown. According to Kuschel (1959: 255) the few extant specimens would have been collected in the Chilean province of Ñuble or Bío-Bío. The specimen received from the "Muséum National d'Histoire Naturelle" (probably determined by Fairmaire) is labeled "Chillan", a mountain chain in the province of Bío-Bío, which confirms Kuschel's supposition.

Discussion. This species is extremely rare, and very conspicuous and well characterized by the metallic sheen, which distinguishes it immediately from all other South American Belidae.

Kuschel (1959: 255) cites as characteristics for the female the anterior and median tibiae with mucrus. The two specimens seen have these characters and would be females. In the BMNH specimen this was confirmed because the genitalia is extroverted, it being possible to observe coxites and styli.

BELINAE, stat. n.

Belides Lacordaire, 1863: 522.
Belini; Kuschel, 1959: 252.

Homalocerus Schoenherr, 1839

Homalocerus Schoenherr, 1839: 358; Boheman, 1839: 359; 1845: 366; Blanchard, 1845: 97, 115; 1851: 306; Fairmaire, 1860: 6; 1861: 8; 1872: 47; Lacordaire, 1863: 526; Philippi, 1866: 356; Pascoe, 1866: 418; Bovie, 1909: 11; Dalla Torre & Voss, 1935: 2-3 (Cat.); Voss, 1939: 199; Hustache, 1940: 697; Blackwelder, 1947: 727 (Cat.); Bondar, 1947: 273-276 (key to species); Guérin, 1953: 197; Lima, 1956: 124; Kuschel, 1959: 243, 246.

Redescription

Head transverse, slightly wider than long; eyes rounded, hemispherical and very prominent; superior face flat and slightly strangulated behind eyes; frons declivous; integument granulate. Curvature and length of beak variable (two to six times length of head), cylindrical; width more or less uniform, sometimes widened at base and apex; base with a sulcus of variable length and depth; rostral scrobe foveiform; epistoma bisinuate with a median notch (fig. 34). Mouthparts as in figs. 69, 72 and 75: mandibles robust; maxillae with short palpi, distinctly three-segmented; labium very small, palpi reduced to a single segment. Antennae inserted almost at base of beak; scape very short; segment II about half as long as scape; following segments progressively shorter; last segment slightly larger than preceding one, or elongate and with characteristic shape. Integument testaceous or black, with short, fine and dense pubescence, with velvety aspect; some elongate setae, especially on apical half of each segment. *Pronotum* cylindrical: sides rounded and subparallel in basal half; apex constricted or not; base bisinuate; disc convex or flattened; median longitudinal sulcus of variable length and width. Integument granulate; decumbent pubescence forming spots or bands, with intraspecific variation. *Scutellum* wider than long; with a median longitudinal impression; posterior margin rounded. *Elytra* elongate; sides slightly expanded in apical half or third, or subparallel; base slightly wider than pronotum; base of each elytron smoothly rounded or sharp and salient on top of pronotum; elytral surface finely and densely granulate, granulation more or less organized in rows; punctures imperceptible because of the granulation; apex rounded, obliquely truncate or forming a sharp spine at sutural angle. Elytral pubescence formed by decumbent, dense setae, which form longitudinal or transversal bands. *Membranous* wings (fig. 24) with complete A_1. *Metasternum* approximately quadrangular; coxae elongate, little prominent. *Abdomen* with sub-parallel sides. *Legs.* Anterior pair longer than median and posterior ones. Femora short, not toothed ventrally; external margin with a row of granules which are fused at apex; little evident in anterior ones, but present. Tibiae slender, slightly compressed and widened towards apex; apex truncate, with strong mucrus, armed at base with two small, sharp teeth, which are turned forwards; anterior ones with dorsal smooth and shining carina; median and posterior ones with crenulate carina, formed by coalescence of granules; internal margins more or less sinuate, with a series of perpendicular teeth; pubescence more or less dense, making observation of teeth difficult. *Male genitalia* (figs. 51-56) with tubular aedeagus.

Type-species. Rhinotia lyciformis Germar, 1833, by original designation.

Discussion. This genus is morphologically very uniform, in contrast to *Dicordylus,* where specific differences are more evident. Intraspecific variation of color pattern is also intense.

Bondar (1947), not knowing the types, and not taking this variation into consideration, based his key almost exclusively on color and distribution of pubescence, which led to misidentifications.

The study of the male genitalia (figs. 51-56) showed some considerable differences in the median lobe, especially in relation to the length of the median struts and the body itself. The differences, however, do not give secure diagnostic characters, as in *Dicordylus.* The tegmen usually does not show differences. The existence of setae at the apex of the tegmen, as well as the number of setae, seem to vary within the same species. I have observed the rupture and loss of the anterior portion (where the setae are fixed) which may have occurred during copulation, since this structure is apparently fragile.

Examination of the mouthparts of some species, especially the mandibles and maxillae, showed great morphological uniformity, apparently without specific characters. The mouthparts are very small, hidden inside the apex of beak, and in smaller species they are difficult to dissect.

The antennae (figs. 84-91) are characteristic for some species, for example *H. antennalis* and *H. flavicornis;* in others species as *H. nigripennis* and *H. acuminatus* they are similar. The length of intermediate segments is very variable in some species, especially *H. xixim* and *H. lyciformis;* because of this I will not give too much weight to the relative length of segments, except for the last segment which is characteristic for some species. The position of the antennal insertion is more basal than in the other three known genera of Belinae.

Sexual dimorphism. The sex is easily determined in most species of *Homalocerus* by secondary sexual characters. Males have a shorter beak, with deeper and denser punctures, and its base is more compressed. In females the beak is longer and more slender, bears more shallow, fine and sparse punctures (in some species it is even smooth and shiny). In average, females are larger than males. Femora of males are slightly thicker.

Key to species of *Homalocerus*

1.	Elytra black, without spots or bands	2
	Elytra with colored pubescence, which forms different patterns	3

2(1). Pronotum with three spots of orange colored pubescence. Beak short, shorter than pronotum (♂). Antennae testaceous. (Fig. 11) .... *flavicornis,* sp. n.

Pronotum with two marginal bands of yellow pubescence. Beak very long, in males about 1.5 times, in females 2 times as long as pronotum. Antennae black. (Fig. 7) .... *longirostris,* sp. n.

3(1). Elytra black, with two lateral, longitudinal bands of yellowish-white pubescence 4

Elytral pubescence varying from yellowish-white to yellow, sometimes forming a transverse or oblique band in median third, or, on the other extreme, covering the two basal thirds 5

4(3). Apex of elytra with sharp spine at sutural angle (fig. 108). Pronotum with two lateral spots of yellowish-white setae, surrounded by red setae; central spot present or not; median dorsal sulcus shallow. (Fig. 13) .... *nigripennis* Boheman, 1839

Elytral apex rounded or obliquely truncate (fig. 111). Pronotum with two lateral spots of red pubescence and some sparse, yellowish-white setae; without central spot; median sulcus deep in basal half. (Fig. 12) .... *plaumanni* Voss, 1937

5(3). Last antennal segment very long, about as long as three preceding ones together (fig. 89). Elytral integument testaceous in basal three-fourths, with yellowish pubescence; in apical fourth black with equally black setae. (Fig. 9) ...... *antennalis* Hustache, 1940

Last antennal segment shorter than the three preceding ones together. Elytral integument black or dark brown 6

6(5). Elytra almost parallel-sided. Apex ending in a sharp spine at sutural angle (Fig. 14) .... *acuminatus* Boheman, 1845

Elytra expanded from half or posterior third; apex rounded or obliquely truncate 7

7(6). Elytral apex rounded. Beak (♂ and ♀) shorter than pronotal length (in some females slightly longer). (Fig. 10) *xixim* Bondar, 1947

Elytral apex obliquely truncate, sometimes forming a spine before sutural angle. Beak (♂ and ♀) longer than pronotum (in ♀ at least 1.25 times longer). (Fig. 8) .... *lyciformis* (Germar, 1833)

Homalocerus lyciformis (Germar, 1833)

Rhinothia lyciformis Germar, 1833: 244 (Holotype, BRAZIL, not examined).
Homalocerus lyciformis; Schoenherr, 1839: 358; Boheman, 1839: 359; Labram & Imhoff, 1843: 6; Lacordaire, 1863: 526; Heyne & Taschenberg,

1893-1908: 229, pl. 31, fig. 20; Bovie, 1909: 11, fig. 13; Dalla Torre & Voss, 1935: 3 (Cat.); Blackwelder, 1947: 727 (Cat.); Bondar, 1947: 274; Guérin, 1953: 197, fig. 292; Lima, 1956: 124, fig. 107; Kuschel, 1959: 246.

Redescription

General aspect. Sides of pronotum rounded, pronotum strongly constricted at apex; median impression well marked; two marginal bands of yellow pubescence. Elytra black, with yellow setae forming an oblique band near middle third of each elytron, or covering the basal two-thirds; apex obliquely truncate. Beak longer than pronotum.

Head with two lateral bands of yellow setae next to eyes; ventral face with sparse setae. *Beak.* ♂ (fig. 34), longer than pronotum, arcuate and strongly compressed; widest at base and apex; with coarse and irregular punctures; punctures confluent, not forming striolae. ♀ (fig. 35), longer than that of male, approximately 1.25 to 1.4 times as long as pronotum; cylindrical, regularly arcuate, punctures well apart and shallow; smooth and shiny. Ventral yellow pubescence present or not. *Antennae* (fig. 91) black; segment XI slightly longer than preceding segment. *Pronotum* wider than long; sides strongly rounded, abruptly parallel at apex; median sulcus deep along all its extension, or only on basal third; pubescence variable (see discussion below), but at least with two marginal, yellow bands. *Scutellum* black, with or without yellow setae; slightly concave. *Elytra* approximately 3 times as long as wide at humeri and 4.5 times as long as pronotum; margins expanded from basal third or half; basal region projected over pronotum; apex obliquely truncate, forming a large spine placed far away from the sutural angle; integument black; yellow pubescence variable, from an oblique and transverse band near median third of each elytron, to completely covering the basal two-thirds (see discussion); epipleurae dark; elytral margin varying from reddish-brown to black. *Integument of ventral parts* black; with yellow pubescence on prosternum and front legs (coxae and ventral face of femora), mesoepimera, metaepimera and mesoepisterna; mesosternum and metasternum with greyish setae; abdomen with sparse, grey or dark brown setae. Middle and posterior femora and tibiae with greyish setae. Male genitalia (figs. 51 and 52). Female genitalia (fig. 63).

Measurements	♂	♀
Total length	7.8 - 19.6	10.0 - 19.1
Length of beak	1.4 - 3.4	2.2 - 4.1
Length of pronotum	1.3 - 3.2	1.5 - 3.0
Length of elytra	6.0 - 15.2	7.9 - 15.1
Humeral width	1.8 - 5.1	2.4 - 5.2

Material examined. BRAZIL. *Bahia:* Ilhéus (1 ♀, AMNH); no locality (1 ♂, MNHN). *Mato Grosso*: Diamantino (Rancho Grande) (1 ♂, MZSP). Espírito Santo: no locality (1 ♂, AMNH). Rio de Janeiro: Serra de Macaé (3 ♂, 1 ♀, MZSP); Nova Friburgo (Mury), (8 ♂, 6 ♀, MZSP); Parque Nacional do Itatiaia, (3 ♂, MZSP); *idem* (Maromba, 1100m), (5 ♂, 4 ♀, MNRJ); *idem,* 700 m, (1 ♂, LEFA); idem (Véu de Noiva, 1100m), (2 ♂, 2 ♀, MZSP); Parque das Agulhas Negras (1950-2200m), (1 ♀, MZSP); no locality (2 ♂, BMNH). *Minas Gerais*: Passa Quatro, (1 ♂, FMNH; 2 ♀, MNRJ); Serra da Mantiqueira (Barreira de Piquete, 1500m), (1 ♂, LEFA); Virgínia (Serra de Minas Gerais, 1500m), (1 ♀, MNRJ). *São Paulo*: São José do Barreiro (Serra da Bocaina, 1650m), (4 ♂, 1 ♀, DZUP); Salesópolis (Estação Biológica de Boracéia), (3 ♂, MZSP); idem, on "samambaiaçu" (1 ♂, MZSP); *idem,* on *Polystichum denticulatum* (5 ♂, 3 ♀, MZSP); São Paulo (Horto Florestal), (1 ♂, VAPC); *idem* (Parelheiros), (1 ♂, VAPC); *idem* (Pico do Jaraguá), (1 ♀, MNRJ); Paranapiacaba (1 ♂, MZSP); São Roque (1 ♀, MZSP); Iporanga (1 ♂, 1 ♀, MZSP). *Paraná*: Ponta Grossa (1 ♂, 3 ♀, AMNH; 1 ♂, 1 ♀, MNRJ); Foz do Iguaçu, (1 ♀, DZUP). *Santa Catarina*: Rio Negrinho, (2 ♂, 2 ♀, MNRJ); Rio Vermelho, (7 ♂, 2 ♀, AMNH); Rio Natal, (2 ♀, AMNH); Mafra (2 ♀, MNHN); Santa Cruz do Timbó (formerly Caúna), (3 ♀, AMNH); São Bento, (1 ♂, MNRJ); Lanca, (1 ♂, AMNH); Pinhal, (1 ♂, DZUP); *idem* (700m), (1 ♀, DZUP); Blumenau (1 ♂, 1 ♀, MNRJ); Corupá (formerly Hansa Humboldt), (3 ♂, 1 ♀, AMNH; 1 ♂, DZUP; 2 ♂, 2 ♀, MNHN); *idem* (60m), (1 ♂, DZUP). Nova Teutônia, (19 ♂, 12 ♀, MZSP; 5 ♂, AMNH; 2 ♂, DZUP; 1 ♀, ZMHA); no locality (1 ♂, MZSP, 1 ♂, AMNH). *Rio Grande do Sul*: Santo Augusto, (1 ♂, 1 ♀, DZUP); no locality (1 ♂, MNHN, 2 ♂, MCZC). *No locality*: (2 ♂, 2 ♀, FMNH); (2 ♂, 4 ♀, MCZC); (10 ♂, 11 ♀, MNHN); (1 ♀, ZMHZ).

ARGENTINA. *Santiago del Estero*: Chaco de Santiago, Rio Salado (1 ♂, MNHN).

Geographic distribution (fig. 132). *Homalocerus lyciformis* is the best geographically represented species. Kuschel (1959) reported it from Paraguay, without precise locality. The northernmost record is Ilhéus, State of Bahia, and the southernmost is Rio Salado, Santiago del Estero, Argentina. See discussion about distribution on page 41.

Discussion. This is the commonest and best known species of the genus, having been illustrated several times. Boheman (1839) noted already the great variation in size and color pattern, describing three different varieties, without naming them.

Variation in size. H. lyciformis is the largest species of the genus. It can, however, vary very much, even in the same locality, as can be seen in fig. 126 and table 6. It is also possible to note that in average, females are larger than males.

Variation in color pattern (fig. 113, table 8). The color pattern is variable on elytra and pronotum, independently of sex. Fig. 113 shows the variation of coloration in this species (the patterns I have determined are not rigid; there seems to be a cline). On the pronotum the yellow setae may form only two marginal bands, or also form a third, median and isolated band; in some cases there is also a coalescence of bands in the basal part; in this case the whole pronotum is almost covered with yellow pubescence. Yellow setae may be present or absent on scutellum. On the elytra the yellow pubescence can form a narrow transversal band, with oblique margins, or cover the whole basal two thirds; all intermediate stages of coloration are present. In a single specimen from Ilhéus, State of Bahia, the pubescence is restricted, on each elytron, to a sutural and a marginal band (fig. 113E).

Geographical variation of color pattern (table 8). In all specimens south of Iporanga, State of São Paulo, I found patterns A, B and rarely C; there are almost never yellow setae on the disc of pronotum and the elytral band is narrow. Specimens from Salesópolis (Estação Biológica de Boracéia), State of São Paulo, fall into patterns B and C. The greatest variation was found in the State of Rio de Janeiro. In Nova Friburgo and Itatiaia, for example, all patterns have been recorded, except pattern E (a single specimen from Ilhéus, State of Bahia, shows this pattern). It should also be noted that specimens collected in Nova Friburgo, State of Rio de Janeiro (J. H. Guimarães, personal information), on the same fern, showed great differences in size and coloration pattern.

Morphological variation. Specimens from Boracéia, one specimem from Serra da Bocaina and some from Itatiaia, show some morphological variations which merit discussion. Pronotum with feebly rounded lateral margins, subparallel in basal half, median sulcus not very clear or completely absent in anterior half, basal impression very evident; beak of male very slender and punctures less coarse, but punctures still confluent; beak of females less arcuate, not very shiny, antennal segment XI almost twice as long as preceding segment; metepisterna with bands of yellow setae; abdominal pubescence whitish.

Other specimens from Itatiaia show characters intermediate between the two extremes, permitting the conclusion that these variations are intraspecific. The male genitalia are extremely similar, all with truncate apex of median lobe.

H. lyciformis is characterized by the strong sexual dimorphism of beak. By coloration only, small specimens (less than 12.5mm) may be confused with *H. xixim;* they are, however, easily identifiable by the beak and the elytral apex.

Homalocerus longirostris, sp. n.

(Figs. 7, 36, 37, 90 and 135)

Types. BRAZIL. São Paulo, S. José do Barreiro, Serra da Bocaina, 1650m, XI.1968, Alvarenga & Seabra col. (holotype ♂, DZUP); *idem,* 1600m, XI. 1967 (paratype ♀, MZSP). Santa Catarina: Rio Vermelho, XII.1945, A. Maller col. (paratype ♂, AMNH); no locality, A. Maller col. (paratype ♀, BMNH).

Description

General aspect. Beak very long and slender; in the male almost 1.5 times as long as pronotum, in the females twice as long; pronotum parallel-sided on basal half; elytra truncate at apex. Dorsally the yellow pubescence is restricted to head and pronotum; elytra black, opaque, with two narrow, velvety black longitudinal bands near the elytral suture.

Head. Dorsal face with two lateral bands of yellow, dense setae, which extend from the base of beak to near pronotum; ventral face with less dense yellow setae. Beak. ♂ (fig. 36), almost 1.5 times as long as pronotum; curved, slender, cylindrical and slightly compressed in basal third; with elongate punctures, which form strioles, except apical part which is smooth; integument black, with apex and base reddish-brown. ♀ (fig. 37), twice as long as pronotum; regularly cylindrical, less depressed basally than in male; punctures weaker. *Antennae* (fig. 90). *Pronotum* small, about one-fifth length of elytra; parallel-sided on basal half, constricted at apex; disc flattened, median sulcus shallow, slightly indicated; base of pronotum slightly depressed in the middle; with three bands of yellow setae: two lateral ones and a median narrow one, which does not reach apex or base of pronotum. *Scutellum* black, with short, dark-brown setae. Integument of *elytra* very dark-brown to black, except basally, where it is reddish-brown; granulation of integument fine and regular, giving an opaque shine to elytra when observed without microscope; on each side of suture a depressed area, black pubescent; setae decumbent, dense and velvety; sutural region elevated; beginning in the basal fifth; elytral apex truncate. *Integument* of pro- and mesosternum reddish-brown; metasternum and abdomen black; mesepimera and metepisterna densely covered with yellow setae. Femora and tibiae black, their apices reddish-brown. Abdomen with whitish, sparse setae.

Measurements	holotype ♂ (DZUP)	paratype ♂ (AMNH)	paratype ♀ (MZSP)	paratype ♀ (BMNH)
Total length	6.9	7.4	7.9	-
Length of beak	1.5	1.5	2.6	2.6
Length of pronotum	1.1	1.1	1.3	1.2
Length of elytra	5.3	5.7	6.2	-
Humeral width	1.7	1.8	2.0	-

Geographic distribution (fig. 135).

Discussion. This species is characterized by the exceedingly long beak of the female. The color pattern is constant in the four known specimens, being very characteristic and not confusable with other species. The great development of beak, antennal structure, elytral apex and color pattern approach *H. longirostris* of *H. lyciformis*. The female paratype (BMNH) lacks the left elytron, as well as part of the right one.

Homalocerus antennalis Hustache, 1940

(Figs. 9, 38, 39, 53, 83 and 135)

Homalocerus antennalis Hustache, 1940: 697 (holotype, BRAZIL, Bahia, Água Preta, 20.IX.1936, Bondar col.; in Hustache collection; not found); Blackwelder, 1947: 827 (Cat.); Bondar, 1947: 275, 276.

Redescription

General aspect. Head and pronotum with two marginal yellow bands; elytra testaceous on basal three-fourths, with yellow and short pubescence; apical fourth and scutellum black. Segment XI of antennae elongate, almost as long as the three preceding ones together.

Head. Dorsal face with four spots of yellow setae: two small ones in front and two elongate ones on sides and behind eyes; integument black, rugose. Ventral face with yellow, sparse setae. *Beak* ♂ (fig. 38), slightly shorter than pronotum; cylindrical, little arched, slightly thickened at base; fine punctuation formed by longitudinal, confluent punctures, which form shiny strioles; with a fine, smooth and not very high dorsal carina; integument black, dark reddish-brown at apex and ventrally; ventral face with some sparse, yellow setae. ♀ (fig. 39), slightly more curved, regularly cylindrical; punctures less well impressed, forming thinner strioles. *Antennae* (fig. 89) reddish-brown to black; segment XI very elongate, almost as long as the three preceding segments together; sharpened in apical half. *Pronotum* about one-fifth length of elytra; moderately convex, with strong apical constriction; widest behind the middle; median basal depression very pronounced and short; integument reddish-brown, with darkened granules; setae yellow, dense, forming two lateral bands which go from apex to base; some dark setae, of same color, on margin and basal depression; disc with some dark, sparse setae. *Scutellum* longer than wide; apex rounded; black, rugose, with black setae. *Elytra* with basal region salient and sharp, projected over pronotum; apex obliquely truncate; integument testaceous in basal three-fourths, granulate, covered with yellow short and sparse setae; apical fourth black, granulate with dark-brown setae, sparse; discal region, near suture, slightly depressed on basal two-thirds; elytral epipleurae darkened, with dark-brown setae. *Ventral integrument* reddish- brown to black; prosternum, anterior and median coxae densely pubescent; metasternum, abdomen and femora with shorter and finer, greyish yellow, sparse setae. *Male genitalia* (fig. 53).

Measurements	♂	♀
Total length	11.4 - 13.0	14.0
Length of beak	1.6 - 1.8	2.1
Length of pronotum	1.8 - 2.0	2.2
Length of elytra	8.9 - 10.2	11.1
Humeral width	2.7 - 3.0	3.4

Material examined. BRAZIL. *Santa Catarina:* Joinville, 10 m, (1 ♂, 1 ♀, DZUP); no locality (1 ♂, BMNH; 1 ♂, MCZC).

Geographic distribution (fig. 135). *H. antennalis* was only known from the type, collected at Água Preta (now Uruçuca), State of Bahia. Specimens from Santa Catarina increase very much the distribution of the species, leaving a large gap between the extremes of distribution.

Discussion. In size and color this species can be confused with some specimens of *H. lyciformis* (for example fig. 113G). However, *H. antennalis* is characterized by the very elongate and peculiarly shaped antennal segment XI.

The type, originally deposited in the Hustache Collection, at present in the MNHN, has not been located there.

Homalocerus xixim Bondar, 1947

(Figs. 10, 25, 40, 41, 54, 88, 124 and 133)

Homalocerus xixim Bondar, 1947: 277 (lectotype ♂, BRAZIL, *Paraná:* Ponta Grossa; AMNH, examined).

Homalocerus zikani Bondar, 1947: 276 (holotype ♂, BRAZIL, Rio de Janeiro; AMNH, examined). *Syn. n.*

Redescription

General aspect. Sides of pronotum subparallel on basal two-thirds, or slightly rounded; with two or three longitudinal bands of yellow setae. Elytra black or reddish-brown; yellow or white-yellowish setae covering basal two-thirds, or restricted to a transverse band on median third; apex rounded. Beak short.

Head. With two bands of yellow setae next to eyes; ventral face with sparse setae. *Beak.* ♂ (fig. 40), shorter than pronotum; arcuate, cylindrical and slightly compressed; longitudinal punctures almost confluent. ♀ (fig. 41), slightly longer than that of male, and narrower; regularly cylindrical, smooth and shiny; punctures more sparse and shallow. *Antennae* (fig. 88) black; segment XI slightly longer than preceding segment. *Pronotum* cylindrical, variable in shape and convexity: from slightly convex, parallel on basal two-thirds and narrowing to apex (lectotype ♂), to very strongly convex surface and rounded lateral margins; basal third with median sulcus; pubescence variable: restricted to margins, forming two longitudinal bands, or also with a third median band (lectotype ♂). *Scutellum* black; with dark or yellow, sparse setae. *Elytra* slightly over three times humeral width, and 4.5 to 5 times as long as pronotum; slightly expanded behind basal third or half; basal region slightly salient, rounded; apex rounded; apical region finely granulate; integument black or reddish-brown, covered with dense, yellow setae, distributed on basal two-thirds (lectotype ♂) or only on median third, forming a transverse band, sometimes interrupted on suture; epipleurae with dark setae. *Ventral face.* Integument black, with white, short and sparse pubescence; mesepimera, metepimera and metepisterna with yellow setae. Femora and tibiae black; apices may be reddish-brown; integument of abdominal sternites II, III and IV with or without yellow posterior margin. *Femora* slightly thickened. *Male genitalia* (fig. 54).

Measurements	♂	♀
Total length	7.1 - 11.8	6.8 - 12.5
Length of beak	1.0 - 1.8	1.0 - 1.9
Length of pronotum	1.2 - 2.1	1.1 - 2.0
Length of elytra	5.5 - 9.0	5.1 - 9.8
Humeral width	1.7 - 3.1	1.5 - 3.1

Material examined. BRAZIL. *Mato Grosso:* Diamantino (Rancho Grande), (4♂, 3♀, MZSP). *Espírito Santo:* Alegre (Faz. Jerusalém) (1♂, MNRJ). *Rio de Janeiro:* Serra de Macaé, (1♂, MZSP); Parque de Itatiaia, 700 m, (1♀, LEFA); no locality (3♂, BMNH); no locality (holotype ♂ of *H. zikani*, AMNH). *Minas Gerais:* Camanducaia (Vila Monte Verde), (1♀, MZSP).

São Paulo: Cássia dos Coqueiros, (1 ♂, MZSP); S. José do Barreiro (Serra da Bocaina), (5 ♂, 3 ♀, DZUP); Campos do Jordão (2 ♂, MZSP); Salesópolis (Estação Biológica de Boracéia), (♂, MZSP). *Paraná:* Ponta Grossa, "em xixim espinhento" (lectotype ♂, paralectotype ♀, *H. xixim,* AMNH); *idem,* (4 ♂, 1 ♀, DZUP); Morretes (Vista Lacerda), (1 ♂, DZUP). *Santa Catarina:* Mafra (3 ♂, MNHN); Rio Vermelho, (1 ♂, 1 ♀, AMNH); Rio Natal, (1 ♀, AMNH); Corupá (formerly Hansa Humboldt), (2 ♂, 1 ♀, AMNH); *idem,* (1 ♂, DZUP); Nova Teutônia, (9 ♂, 9 ♀, MZSP; 1 ♂, 1 ♀, DZUP). *Rio Grande do* Sul: São Francisco de Paula, (1 ♂, MZSP). *No locality:* (1 ♀, MNHN); (1 ♂, 1 ♀, MCZC); 1 ♂, BMNH).

ARGENTINA. *Misiones:* Loreto, (1 ♂, MZSP).

Geographic distribution (fig. 133).

Discussion. Variation in color (fig. 114, table 9). This species is very variable in color, especially in the distribution of the yellow pubescence. On the pronotum there may be a median colored band (lectotype, fig. 114 A), which may or may not reach the apex of pronotum; on the elytra the yellow pubescence may cover completely the basal two-thirds (except for a small, circum-scutellar area; lectotype, fig. 114 A) or may be restricted to a median transverse band, which may be interrupted near the suture (fig. 114 G); the setae may vary from white to yellow. A single specimen from Cássia dos Coqueiros, State of São Paulo, has completely black elytra, without colored pubescence and without indications of lost pubescence (fig. 114 F).

Notes on the types of *H. xixim.* Vaurie (1953) designated a lectotype (♂) and a paralectotype (♀) from the two cotypes of Bondar. These specimens have the yellow elytral pubescence covering the basal two-thirds.

H. zikani was described by Bondar in the same paper, upon a single specimen, from the State of Rio de Janeiro, without exact locality. *H. zikani* is apparently only a chromatic variant of xixim, with whitish, instead of yellow, setae forming a band which is interrupted on suture. In a series of five male specimens from Serra da Bocaina, State of São Paulo, I found two colored similarly to the type of *zikani,* two with intermediate color pattern, light yellow, and finally one typical *xixim.* The integument of abdominal sternites II, III and IV, with yellow posterior margin, a character cited in the original description of *zikani,* is also found in some specimens of *H. xixim,* as well as in other species of the genus (*H. lyciformis, H. antennalis, H. nigripennis* and *H. acuminatus*). Bondar also cited differences in head measurements: in *xixim* the head is wider than long, while in *zikani* it is longer than wide; in the type-specimen of *zikani,* however, the head is not as much retracted in the prothorax as in the type specimens of *xixim.* In some specimens of *xixim* the head is very salient, similar to that of the type of *zikani,* thus invalidating this difference. The male genitalia of specimens similar to the types of both species are identical.

H. xixim has a color pattern similar to that of *H. lyciformis;* in average, however, *xixim* is smaller. Form and sculpture of beak are very different (see figs. 34-35 and 40-41), being much shorter in *xixim.* Comparing the median lobe of male genitalia (figs. 51 and 54), it can be noted that in *xixim* the basal apophyses are better developed than in *lyciformis.* Even though there is slight variation in the median lobe, the relationship between length of median struts and length of the body is approximately 1:1.

Totally black specimens of *H. xixim* (fig. 114 F) could be confused with *H. longirostris,* which has black elytra and pronotum with two marginal yellow bands. In the latter, however, the beak is very elongate, longer than pronotum.

Some specimens of *H. xixim* have been identified as *H. acuminatus;* the two species are only similar in color pattern, being very different morphologically.

Homalocerus flavicornis, sp. n.

(Figs. 11, 42, 87 and 135)

Type. BRAZIL. *Rio de Janeiro:* Rio de Janeiro, coll. Fry (holotype ♂, BMNH).

Description

General aspect. Dorsally black, with three areas of orange pubescence on pronotum; ventrally dark reddish-brown. Elytra black, rounded at apex. Antennae testaceous.

Head. Frons with a short carina slightly behind base of beak; dorsally with dark brown and a few yellowish setae; frontal setae more elongate and curved towards the median carina; ventrally and laterally with white setae. *Beak.* ♂ (fig. 42), approximately four-fifths length of pronotum; reddish-brown; curved; punctures forming strioles, more evidently so near base, smooth at apex; rostral carina very conspicuous; ventrally with white pubescence similar to that of head. *Antennae* (fig. 87), with a few long, dark brown setae; segment XI as long as the two preceding ones together. *Pronotum* with rounded sides; apical constriction very slight; disc convex; median sulcus shallow, deeper and slightly widened basally. Integument black, with dark brown sparse setae and three large spots of orange pubescence: two lateral and irregular ones, and the median, lozenged one; with a few sparse, white setae among orange setae. *Scutellum* black; pubescence similar to that of elytra. *Elytra* three times as long as wide at humeri; integument very dark brown, almost black, with sparse, more elongate, brown pubescence at apex; apex rounded. *Ventral face. Integument* reddish-brown, darkened on metasternum, abdomen, femora and tibiae; with sparse and elongate, white pubescence, slightly denser on prosternum, mesosternum, front and middle coxae; mesepimera and metepisterna reddish-brown, with fine and sparse brown pubescence

Measurements	holotype ♂
Total length	8.9
Length of beak	1.4
Length of pronotum	1.6
Length of elytra	6.8
Humeral width	2.2

Geographic distribution (fig. 135).

Discussion. Unfortunately this species in only known from the single specimen collected by Fry in Rio de Janeiro, State of Rio de Janeiro. It is probably rare, since Rio de Janeiro must be one of the best collected areas of Brazil, as far as insects are concerned. The characteres cited under general aspect are sufficient for the identification of *H. flavicornis*. The shape of beak, elytral apex and color pattern seem to place it near *H. plaumanni*.

Homalocerus plaumanni Voss, 1937

(Figs. 12, 43, 44, 56, 86, 110-112 and 134)

Homalocerus plaumanni Voss, 1937: 199 (holotype ♂, BRAZIL, *Santa Catarina:* Nova Teutônia, ZMHA, examined); Blackwelder, 1947 (Cat.); Bondar, 1947: 275.

Redescription

General aspect. Elytra black, with two narrow lateral bands of yellowish-white pubescence; apex rounded. Pronotum with very distinct longitudinal impression, which divides it into two halves; black, with two lateral spots of carmine pubescence and a few sparse yellowish-white setae.

Head. Integument black, rugose; pubescence yellowish-white, forming two small spots in front and two behind eyes; sparse ventrally. Frons with a short, shiny carina. *Beak.* ♂ (fig. 43), black, shiny, slightly shorter than pronotum, curved, cylindrical, slightly thicker at base than at apex; sculpture formed by elongate, longitudinal and isolated punctures; dorsal face with median band, narrow, smooth and shiny; ventrally with sparse yellowish-white setae. ♀ (fig. 44), slightly more slender, punctures less well impressed. *Antennae* (fig. 86), segment XI as long as two preceding ones together, very much narrowed on apical half. *Pronotum* transverse (fig. 110), sides rounded, constricted at apex, widest behind middle, with very clearly impressed median, longitudinal sulcus, which divides it into two halves; at base the sulcus is deeper and the apex shallower. Black, with two lateral spots of carmine setae, as well as a few short, yellowish-white, sparse setae; integument with strong punctures and rugose; basal and lateral areas tumified, with smooth and shiny areas between punctures. *Scutellum* black, with greyish or dark-brown setae. *Elytra* three times as long as wide at humeri; with rounded apex (fig. 111); integument black, rugose, greyish pubescence, very fine; each elytron with a lateral, longitudinal and narrow band of decumbent yellowish-white pubescence; sutural region elevated. *Integument* dark reddish-brown on prosternum; meso- and metasternum black; coxae reddish-brown; front and middle ones, as well as prosternum, with fine, whitish pubescence. *Hind leg* (fig. 112); legs varying from dark reddish-brown to black. *Abdomen* black; with fine, short and sparse, withish pubescence, slightly denser and more elongate on sides. *Male genitalia* (fig. 56). *Female genitalia* (fig. 62).

Measurements	♂	♀
Total length	9.4 - 12.4	7.9 - 16.6
Length of beak	1.4 - 1.9	1.5 - 2.4
Length of pronotum	1.5 - 2.1	1.5 - 2.7
Length of elytra	7.4 - 9.7	6.0 - 12.2
Humeral width	2.2 - 3.2	2.0 - 4.1

Material examined. BRAZIL. *Rio de Janeiro:* Rio de Janeiro (Corcovado), (4 ♀, MZSP); *idem* (Floresta da Tijuca), (1 ♂, DZUP). *São Paulo:* Salesópolis (Estação Biológica de Boracéia), (1 ♀, MZSP). *Paraná:* Ponta Grossa, (1 ♀, DZUP). *Santa Catarina*: Santa Cruz do Timbó (formerly Caúna), (1 ♂, AMNH); Chapecó, (1 ♂, DZUP); Joinville, (1 ♂, DZUP); Mafra, (1 ♀, MNHN; 1 ♂, MNRJ); Nova Teutônia, (holotype ♂, ZMHA; 2 ♂, MZSP); no locality (2 ♂, AMNH). *No locality:* (1 ♀, MCZC); (2 ♂, MNRJ).

Geographic distribution (fig. 134).

Discussion. In color pattern this species is similar to *H. nigripennis,* showing the same constancy of elytral pattern. The two species are easily distinguished by the structure of pronotum, hind legs and elytral apex (see figs. 107-112). Among 20 specimens examined I have not found any with the central spot on pronotum, which is common in *nigripennis;* the yellow setae never form a compact spot, being always intermixed in the carmine spot.

In one specimen from Rio de Janeiro, the elytral apex is sharp, instead of rounded, but does not form a spine at the sutural angle; even in this specimen the elytral apex is structurally very different from that of *H. nigripennis* and *H. acuminatus.*

Homalocerus nigripennis Boheman, 1839

(Figs. 13, 45, 46, 55, 85, 107-109, 115 and 134)

Homalocerus nigripennis Boheman, 1839: 359. (holotype ♀, BRAZIL, no locality; HDEO, examined); Lacordaire, 1862: 526; Dohrn, 1866: 356; Bovie, 1909: 11; Dalla Torre & Voss, 1935: 4 (cat.); Blackwelder, 1947: 727 (Cat.); Bondar, 1947: 274, 275.

Homalocerus punctum Pascoe, 1886: 418 (holotype, BRAZIL, Paraná; BMNH, not examined); Bovie, 1909: 11; Dalla Torre & Voss, 1935: 4 (Cat.); Blackwelder, 1947: 727 (Cat.); Bondar, 1947: 276. *Syn. n.*

Redescription

General aspect. Pronotum with rounded sides, black, with two lateral spots of yellowish-white setae, surrounded by carmine setae, which may also form a third spot on disc. Elytra black, with two lateral bands of yellowish-white pubescence.

Head. With two spots of reddish pubescence on frons and two behind eyes; ventral face and sides with yellowish, sparse setae. *Beak.* ♂ (fig. 45), black, ventrally and apically reddish-brown; almost three-fourths as long as pronotum; curved, cylindrical; dorsally with a smooth and shiny carina; glabrous or with yellowish-white setae, which sometimes are denser ventrally. ♀ (fig. 46), similar to that of male, only punctures are less well impressed. *Antennae* (fig. 85); segment XI only slightly longer than preceding one. *Pronotum* (fig. 107) cylindrical, regularly rounded, slightly constricted at apex (in some specimens constriction not perceptible); disc convex, dorsal median sulcus shallow and basal depression not well impressed; rugosity of integument more or less regular, with opaque aspect; reddish-brown to black, with darker granules; pubescence forming variable patterns (see discussion below), usually with two lateral spots of yellowish-white setae, surrounded by carmine setae, and a median spot, also carmine. *Scutellum* black; setae greyish or dark-brown. *Elytra* more than three times as long as wide at humeri; sides almost parallel, crenulate apically and ending into a small, but sharp spine at sutural angle (fig. 108); integument black, rugose, granules more or less oriented in rows; pubescence greyish, fine and sparse, more elongate and erect backwards; each elytron with a narrow, lateral and longitudinal band of decumbent, yellowish-white pubescence, starting slightly behind humeri, which is widened to its middle and narrow near apical margin (figs. 13, 115 A). *Ventral face.* Integument of pro-, meso- and metasternum reddish-brown; prosternum, front and middle coxae, with whitish pubescence; meso- and metepimera with whitish, dense pubescence. *Abdomen* black; with more or less dense, short whitish pubescence; frequently with glabrous areas in the middle of segments. *Legs* with the same pubescence as ventral face; hind legs (fig. 109). *Male genitalia* (fig. 55).

Measurements	(♂ and ♀)
Total length	5.9 - 10.0
Length of beak	0.8 - 1.4
Length of pronotum	0.9 - 1.8
Length of elytra	4.6 - 7.8
Humeral width	1.4 - 2.4

Material examined. BRAZIL. *Bahia:* Maracás, (1 ♂, MZSP). *Rio de Janeiro:* Rio de Janeiro, (1 ♂, BMNH; 1 ex., MCZC); *idem* (Corcovado), (8 exs., MZSP; 1 ♂, MZSP; 2 exs. DZUP). *São Paulo:* Embu-Guaçu (Cipó), (1 ex., VAPC). *Paraná:* Ponta Grossa (Pedreira), (1 ♂, DZUP). *Santa Catarina:* Corupá, (1 ♀, AMNH; 1 ♀, DZUP); Nova Teutônia, (2 exs., MZSP); Rio Natal, (1 ♂, AMNH). *No locality:* (holotype, HDEO).

Geographic distribution (fig. 134). Kuschel (1959) also records *H. nigripennis* for Argentina, Misiones, without giving exact locality.

Discussion. The type of *H. nigripennis* Boheman, as well as the specimen compared with the type of *H. punctum* Pascoe (by R. T. Thompson, BMNH), do not differ morphologically, except in details of coloration. Therefore, I consider *H. punctum* Pascoe, 1866 a junior synonym of *H. nigripennis* Boheman, 1839. It is interesting to note that Pascoe compared his species with *H. lateralis* (*nom. nudum*), but did not cite *H. nigripennis* Boheman.

The type of *H. nigripennis* Boheman is deposited in the Hope Department of Entomology, Oxford (in Hope Collection), labelled "type col. 1397", "Brasilia". The specimen shows a few setae on disc of pronotum; judging from the beak it should be a female.

The type of *H. punctum* Pascoe is deposited in the British Museum (Natural History). Mr. Thompson (*in litt.*) furnished some information concerning this specimen: it bears the typical oval mauve-colored label of Pascoe's type, and manuscript labels by Pascoe including the word "type"; its locality is "Paraná"; the specimen bears the median pronotal spot, isolated from the lateral ones, with carmine and yellowish pubescence.

Fig. 115 shows color variation of this species. In the 20 specimens examined, the elytral pattern is constant (fig. 115 A). There is variation in the distribution of the colored pubescence of pronotum, where the median spot may be present or not.

Even though this species may be confused with *H. plaumanni,* at least in color, it can easily be distinguished by pronotal structure, hind legs and elytral apex. Morphologically, *H. nigripennis* is very similar to *H. acuminatus,* differing especially in the color pattern (fig. 115 and 116); this is the last species to which *H. nigripennis* is related.

Homalocerus acuminatus Boheman, 1845

(Figs. 14, 47, 48, 84, 116 and 135)

Homalocerus acuminatus Boheman, 1845: 366 (holotype ♀, no locality, Chevrolat coll.; NRSS, examined); Bovie, 1909: 11; Dalla Torre & Voss, 1935: 3 (Cat.); Blackwelder, 1947: 727 (Cat.); Bondar, 1947: 276.

Redescription

General aspect. Elytra nearly parallel-sided; apex with a sharp spine at sutural angle. Black, with yellow pubescence forming one median and two lateral bands on pronotum, and an irregular area on elytral disc; scutellum with dense, yellow pubescence.

Head. Eyes surrounded by yellow pubescence, except sometimes for a small interruption which isolates two small triangular spots on frons (holotype); ventrally the pubescence is lighter and more sparse. *Beak.* ♂ (fig. 47), shiny black, with apex reddish-brown, slightly shorter than pronotum, cylindrical, very little dilated towards apex; with elongate, longitudinal punctures, isolated from each other, not forming strioles. ♀ (fig. 48), slightly longer and more slender than that of male, with shallower and more separated punctures. *Antennae* (fig. 84); segment XI slightly longer than preceding segment. *Pronotum* cylindrical; sides rounded, constricted at apex; disc convex, with shallow, narrow, median dorsal sulcus; black and rugose; granules partially hidden by yellow pubescence; the latter forming three longitudinal bands: a median and two lateral ones, the former partially covering the sulcus. *Scutellum* densely covered with yellow setae. *Elytra* more than three times as long as wide at humeri, very little expanded backwards; sides nearly parallel; crenulate near apex, ending into a small and sharp spine at sutural angle; integument black, rugose; each elytron with an oblique and irregular band of yellow pubescence, more or less dense; yellowish-white pubescence fine and sparse; apical setae longer and darker. *Ventral face.* Pro-, meso- and metasternum reddish-brown, with yellow, sparse pubescence on prosternum and front coxae, and more dense on meso- and metepimera. *Abdomen* black, reddish-brown on sides, with not very dense, greyish pubescence. *Legs* with same pubescence as abdomen; femora short and robust, especially posterior ones, about two and half times longer than wide; reddish-brown, darkened towards apex, with black granules on dorsal face; tibiae of same color as apex of femora; tarsi dark brown.

Measurements	♂	Holotype ♀
Total length	7.1	10.0
Length of beak	1.1	1.4
Length of pronotum	1.2	1.7
Length of elytra	6.0	7.4
Humeral width	1.7	2.3

Material examined. BRAZIL. *Rio de Janeiro:* Rio de Janeiro (3 exs., BMNH). *No locality* (holotype ♀, NRSS).

Geographic distribution (fig. 135).

Discussion. Although I have only examined the type and three specimens from the same locality (Rio de Janeiro), I have noted that there is color variation, especially of the yellowish pubescence (fig. 116). This pubescence can surround the eyes completely or not; the median pronotal band can extend from base to apex, or be restricted to the basal half of pronotum; on elytra the density of pubescence is variable, sometimes forming a continous and dense band which covers approximately the basal two-thirds (fig. 116D). The yellow pubescence of the scutellum, however, is not variable and always dense.

This species is very similar to *H. nigripennis,* of which it is most probably close, differing very much as to color pattern (see taxonomic discussion in *H. nigripennis,* page 36).

Trichophthalmus Kuschel, 1955

Trichophthalmus Kuschel, 1955: 275; 1959: 254.

Redescription

Head only slightly wider than long; eyes with interommatidial setae. *Beak* arcuate, slightly longer than pronotum. Antennal insertion near basal fifth (♂) or near base of beak (♀); scrobes foveiform; base of beak without U-shaped sulcus, but with slight and shallow depression. Mouthparts (figs. 68, 73 and 74 - see discussion below). Epistoma with median notch (fig. 33). *Pronotum* cylindrical, slightly longer than wide; sides at base slightly rounded, narrowed towards apex. Surface of *elytra* more or less plane; sides nearly parallel; base bisinuous; apex with a strong spine formed outside the sutural angle. *Ventral face* similar to that of *Homalocerus. Integument* granulose.

Type-species. *Homalocerus miltomerus* Blanchard, 1851.

Discussion. Kuschel described this monobasic genus for a species originally included by Blanchard in *Homalocerus.* The main character which led Kuschel to establish the new genus *Trichophthalmus* are the interommatidial setae. Morphologically it is very similar to *Homalocerus,* including in male genitalia, membranous wings (with complete vein A_1, fig. 23) and mouthparts: mandibles (fig. 73) with three well visible teeth; maxillae (fig. 68) with three-segmented palpi; labium (fig. 74) with single segmented palpi. Other characters of *Trichoph-*

thalmus are: less basal antennal insertion (at least in male); elytral apex with better developed spine, the spine not exactly at sutural angle and structurally different from that which occurs in *Homalocerus;* elytral color pattern formed by uniformely distributed pubescence, which does not form the longitudinal or transversal bands common in *Homalocerus;* finally, *Trichophthalmus* is restricted to the Chilean Subregion.

Sexual dimorphism: male femora clearly thicker than those of females. Female beak more elongate, regularly cylindrical and with more shallow and sparse punctures; base of beak less thickened; antennal insertion closer to base of beak.

Trichophthalmus miltomerus (Blanchard, 1851)

(Figs. 15, 23, 32, 33, 49, 50, 68, 73, 74, 83 and 127)

Homalocerus miltomerus Blanchard, 1851: 306, pl. 22, fig. 3; Philippi, 1866: 356; Bovie, 1909; 11; Dalla Torre & Voss, 1935: 3; Blackwelder, 1947: 727; Bondar, 1947: 274-275.

Trichophthalmus miltomerus; Kuschel, 1955: 275; 1959: 154.

Redescription

General aspect. Elytra nearly parallel-sided; apex with a sharp spine near sutural angle. Color pattern variable.

Head slightly wider than long, with slight constriction behind eyes; eyes salient, with interommatidial setae; with more or less dense pubescence near eyes. *Beak* slightly longer than pronotum; regularly arcuate; in male (Fig. 32) slightly compressed, thickened at base and with longitudinal, almost confluent punctures; in female (fig. 33) cylindrical, with less thickened base and more sparse and shallow punctures. *Antennae* (fig. 83), in male inserted on basal fifth of beak; in female slightly closer to base; scape as long as beak width at base; segment XI almost twice as long as preceding segment. *Pronotum* cylindrical, slightly longer than wide; sides slightly rounded at base and narrowed towards front; apex subtubular; surface little convex; median sulcus shallow, deeper on basal half. *Elytra* nearly parallel-sided; base bisinuous, not very salient over pronotum; apex with robust and sharp spine, not very close to sutural angle. *Integument* rugose. Coloration variable (see discussion below). Male genitalia (figs. 49 and 50).

Measurements	♂	♀
Total length	7.1 - 9.6	6.5 - 9.8
Length of beak	1.4 - 1.7	1.3 - 1.8
Length of pronotum	1.1 - 1.4	1.0 - 1.7
Length of elytra	5.4 - 7.4	5.0 - 7.7
Humeral width	1.6 - 2.3	1.5 - 2.4

Material examined. CHILE. *Valparaiso:* Reñaca "on Chilean fern *Blechnum chilense*", (8 ♂, 3 ♀, CASC; 1 ♂, 1 ♀, USNM; 2 ♂, AMNH; 1 ♂, DZUP). Cautin, 22 km E of Temuco (1 ♂, 1 ♀, CASC).

Geographic distribution (fig. 127). This species is distributed from Valparaiso to Wellington Island (Puerto Eden) the southernmost locality of Belidae distribution.

Discussion. This species is very variable in color of integument and pubescence. The integument of legs and beak varies from reddish-brown to black; the pubescence covering the insect, especially the dorsal face of elytra and pronotum, varies in density and color, from white to yellowish-brown; on pronotum it may be dense near the median sulcus and form a longitudinal band. The ventral face is covered whith white pubescence, of variable density.

In a series of 13 males and 4 females collected by Reed in Reñaca, I noted that the variation may occur in the same locality. Besides this, in 100% of examined males, the elytral pubescence is whitish, and in 100% of females it is yellowish-brown and denser. It is necessary to see more specimens, especially females, to check whether this variation is actually sex-linked.

The two specimens from Temuco are differently colored. The male is completely black, with white and sparse pubescence on elytra, forming two small spots: one at base of pronotum and one on scutellum. The female has yellowish-brown setae, which form a median band on pronotum.

According to Kuschel (1959), specimens from the northern part of distribution (from Valdivia north) have reddish femora and tibiae; southern specimens (from Osorno south) show a tendency to dark femora and tibiae; the yellowish and more dense pubescence would be more frequent in the northern part of the distribution and not found in the south.

COLOR PATTERN IN *HOMALOCERUS*

There are two color patterns in *Homalocerus*. The first is similar to that of Lycidae; the second to some Lampyridae. Lacordaire (1863: 526) already called attention to these similarities.

In species with "lycoid pattern" there is great variation in distribution of the color pubescence on pronotum and elytra (for example *H. lyciformis*, fig. 113; *H. xixim*, fig. 114; *H. acuminatus*, fig. 116); however, species with "lampyroid pattern" (*H. nigripennis*, fig. 115; *H. plaumanni*) have constant color pattern on elytra, variation being restricted to the pronotum.

One could hypothesize that the reason for constancy or variability of elytral color pattern is related to mimicry. Obviously it is not possible to affirm the existence of mimicry without experiments (and if it occurs, of what type). However, by analogy with other groups of Coleoptera this possibility exists (Gahan, 1913, Linsley *et al.*, 1961). In mimetic series of insects, Malacodermata act as models. Lycidae and Lampyridae are included in this group, usually showing very conspicuous and aposematic coloration. Many produce toxic or repulsive substances, which keep away possible predators (Wickler, 1968; Lloyd, 1973).

I collected *H. lyciformis* and *H. plaumanni* (Estação Biológica de Boracéia, Salesópolis, State of São Paulo) together with some species of beetles (Lycidae, Lampyridae, Cantharidae, Oedemeridae and Cerambycidae) with color pattern similar to that of the two species of Belidae. Lampyridae of the genus *Aetra*, very similar in coloration to *H. plaumanni*, are particularly common, being collected in large numbers; when handled, they emit a milky fluid by both sides of the metathorax; this fluid (haemolymph), according to Williams (1917), would act as a protective agent.

Many Lycidae and Cantharidae show intense variation in the black and yellow coloration on pronotum and elytra. This would make the larger band of variation for the possible mimics.

Several genera of Lampyridae, however, have a conspicuous and constant elytral color pattern, formed by a lateral, narrow, light band on each elytron. If they act as models in a mimic series, the possible mimics should not present great variation in the elytral color pattern. Those which show evident variation, probably have greater possibilities of being eliminated by natural selection. It should also be noted that many Lampyridae show considerable variation in pronotal color, a fact which is repeated in the probable mimics.

Summarizing, species of *Homalocerus* seem to mimic lycids and lampyrids and their color pattern seems to be determined by the variation which can occur in the model.

Athough these ideas may be highly speculative at this point, they seem plausible, based on the observed data. Future experiments may better clarify this matter.

GEOGRAPHICAL DISTRIBUTION

General notes

The present geographical distribution of Belidae is restricted to the Southern Hemisphere, comprising Australia, New Zealand, Tasmania, New Guinea and southern South America (see table 7). There are no fossil records for the family. The greatest diversification and the greatest number of species are found in Australia. The two subfamilies, Pachyurinae and Belinae, are represented in all areas cited above (except New Guinea, with only three species of *Belus*), which makes one suppose that both are very old groups, and that the family was very early diversified into at least two distinct lineages. According to Kuschel (1959), the ancestral stocks of the present day genera should have been originated in the Middle or Upper Cretaceous.

I can add·little to what has already been written on this pattern of distribution. Two hypotheses have been suggested.

The first accepts origin in the northern hemisphere (Darlington, 1965), with migration to Australia and South America, and later extinction in the northern hemisphere. The family would have had a more extense distribution, perhaps worldwide (Crowson, 1955: 161), accompanying the almost universal distribution of the genera of lower vascular plants, very much favored by the uniformity of mesozoic climate. Present day groups would be relicts, survivors of the great modifications which occurred since the Jurassic-Cretaceous and which have adapted to the new conditions. Some species, however, preserved primitive habits.

The second hypothesis considers the group as Paleantarctic (Jeannel, 1942: 218; Kuschel, 1959: 230; 1969), with the center of evolution in Antarctica, or utilizing this continent as a dispersal route. Geophysical data show that Australia was still connected to Antarctica in the Cretaceous (Dietz & Holden, 1970) and even in the Eocene (Jardine & McKenzie, 1972). During the Cretaceous and the beginning of the Tertiary, South America was much closer to Antarctica than it is today. Thus this hypothesis is not to be discarded. The family would not be represented in Africa, since separation of the continent of Gondwana into Africa and South America would have started at the end of the Jurassic and beginning of the Cretaceous (Dietz & Holden, 1970) or according to Maxwell *et al.* (1970) at the beginning of the Cretaceous.

There are no evidences for or against any of the two hypotheses. As seen above, there are no fossil secords for the family, which would be of great importance for these studies. Besides, the Australian species still need revision, and before this is done, it is impossible to adequately relate the genera of the two regions.

The South American Belidae

Fig. 127 shows the geographical distribution of the South American genera of Belidae. This distribution was superimposed to the map of vegetal formations of South America, based on Hueck (1972, fig. 2); forests are represented by spotted areas, while light areas represent open or poorly vegetated areas.

It can be observed that the distribution of Belidae is clearly disjunct, and that Pachyurinae and Belinae are represented in both areas. The distribution of *Homalocerus* shows great coincidence with the Atlantic forest. *Dicordylus,* which up to now was restricted to Chile, is now recorded for Brazil (States of Santa Catarina and Minas Gerais). *Trichophthalmus, Callirhynchinus* and *Atractuchus* are endemic to the Chilean Subregion (Chile and extreme western Argentina).

The "Chilean" species occur between latitudes 33ºS and 49ºS and their distribution seems to be related with forests of the southern part of South America. These forests are uninterruptedly distributed from 37ºS to about 57ºS (Hueck, 1972). However, slightly above the northern limit (37ºS) there are pockets of vegetation similar to the Valdivian forest, and according to O'Brien (1961) would represent relicts of the Valdivian forest. As this region is arid, these relictual forests depend on occasional rains and especially on the fogs coming in from the sea, which would provide them with the necessary humidity.

The concordance of the distribution of *Homalocerus* with the Atlantic forest may be related with the distribution of Pterydophytes. In the discussion of the distribution of ferns in tropical America, Tryon (1972: 123, fig. 1) recognizes three areas of concentration of species in South America: an Andean center (from the Andes of Venezuela to Southern Bolivia and northern Chile); a second in the Guianas and a third in Brazil, coinciding with the Atlantic forest, approximately from the State of Espírito Santo and Minas Gerais to northern Rio Grande do Sul. Two of the cited localities of *Homalocerus* do not fall into this area. Rio Salado (Chaco de Santiago, Santiago del Estero, Argentina) and Diamantino (Mato Grosso, Brazil). These localities are close to large rivers, respectively the Salado and the Paraguay. These records could be explained by gallery forests, perhaps related to the Atlantic forest in floristic composition (see for example, Smith, 1962: 223 and Martins, 1972: 1352, fig.

685). It would also be necessary to consider the Paraguayan record of *H. lyciformis,* unfortunately without exact data (Kuschel, 1959). The connection between Diamantino and the Atlantic forest could perhaps occur through Paraguay and Bolivia.

Dicordylus, a genus previously known only from the Chilean Subregion (Jeannel, 1942; Kuschel, 1959), is now recorded from Brazil. This pattern of disjunct distribution is discussed by Smith (1962: 266, fig. 35) for various genera of plants (including *Araucaria*), which occur on the Andes and southern Brazil. The disjunction is attributed to climate and topography, which originate a dry, well delimited band, separating the forested regions of northern and eastern South America from the forests of the southern Andes. Before the Miocene, however, these forests would have been continuous (Berry, 1938) because of the relatively low relief of the Andes, allowing faunistic interchange. The uplift of the Andean geosynclinal interrupted the continuity of forests by two factors: the warming from the Amazonian Region, acting from north to south, and the aridity of Patagonia, acting from the south to the north (Smith, 1962).

As *Dicordylus* seems to be related to gymnosperms (especially conifers) it seems logical to suppose that the Chilean and Brazilian species are isolated since the Miocene-Pliocene.

PHYLOGENETIC TENDENCIES OF THE SOUTH AMERICAN GENERA OF BELIDAE

The South American genera of Belidae are placed in both subfamilies, Belinae (*Homalocerus* and *Trichophthalmus*) and Pachyurinae (*Callirhynchinus, Dicordylus* and *Atractuchus*). There are no elements to infer how the ancestral stocks of the two subfamilies appeared in South America before the Tertiary.

Callirhynchinus does not show clear relations with the other South American genera of Pachyurinae (fig. 137); *Dicordylus* and *Atractuchus* are very close to each other (see discussion on the two genera on page 17).

Trichophthalmus and *Homalocerus* are very closely related genera and are certainly derived from a common ancestral stock. This ancestral stock would have had a much wider distribution (due to the continuity between the forests on the west coast of Chile and the Brazilian Atlantic forest) and was separated into two stocks when the forests of southern South America were separated. To the north the stock originated *Homalocerus,* to the south *Trichophthalmus.*

The species of *Homalocerus* are very similar. This great uniformity should indicate a weak evolutionary plasticity in the group. The suggested phylogeny (fig. 136) is based especially on the development of the beak and the elytral shape. The more evolved species would be those with more elongate beak and with more accentuated sexual dimorphism.

ACKNOWLEDGMENTS

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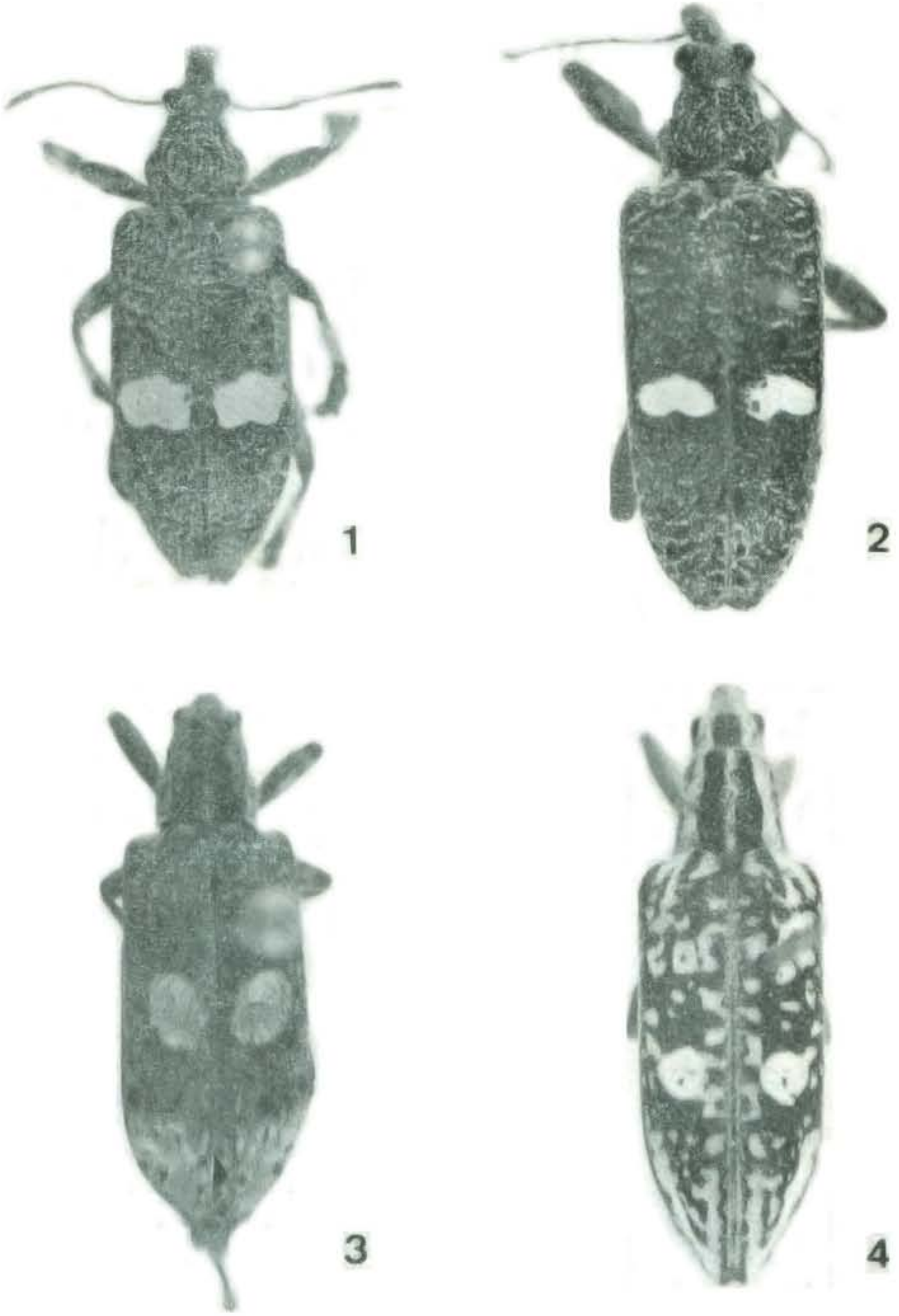

Fig. 1. *Dicordylus b. binotatus* (Philippi), ♀. Fig. 2. *D. binotatus balteatus* (Fairm. & Germ.), ♂. Fig. 3. *D. serranus*, sp. n., holotype ♀. Fig. 4. *D. marmoratus* (Philippi), ♂. Figures not in the same scale.


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Fig. 5. *Atractuchus a. annulifer* (Philippi), ♀. Fig. 6. *Callirhynchinus exquisitus* (Fairm. & Germ.), ♀. Fig. 7. *Homalocerus longirostris*, sp. n., paratype ♀ (MZSP). Fig. 8. *H. lyciformis* (Germar), ♂. Figures not in the same scale.

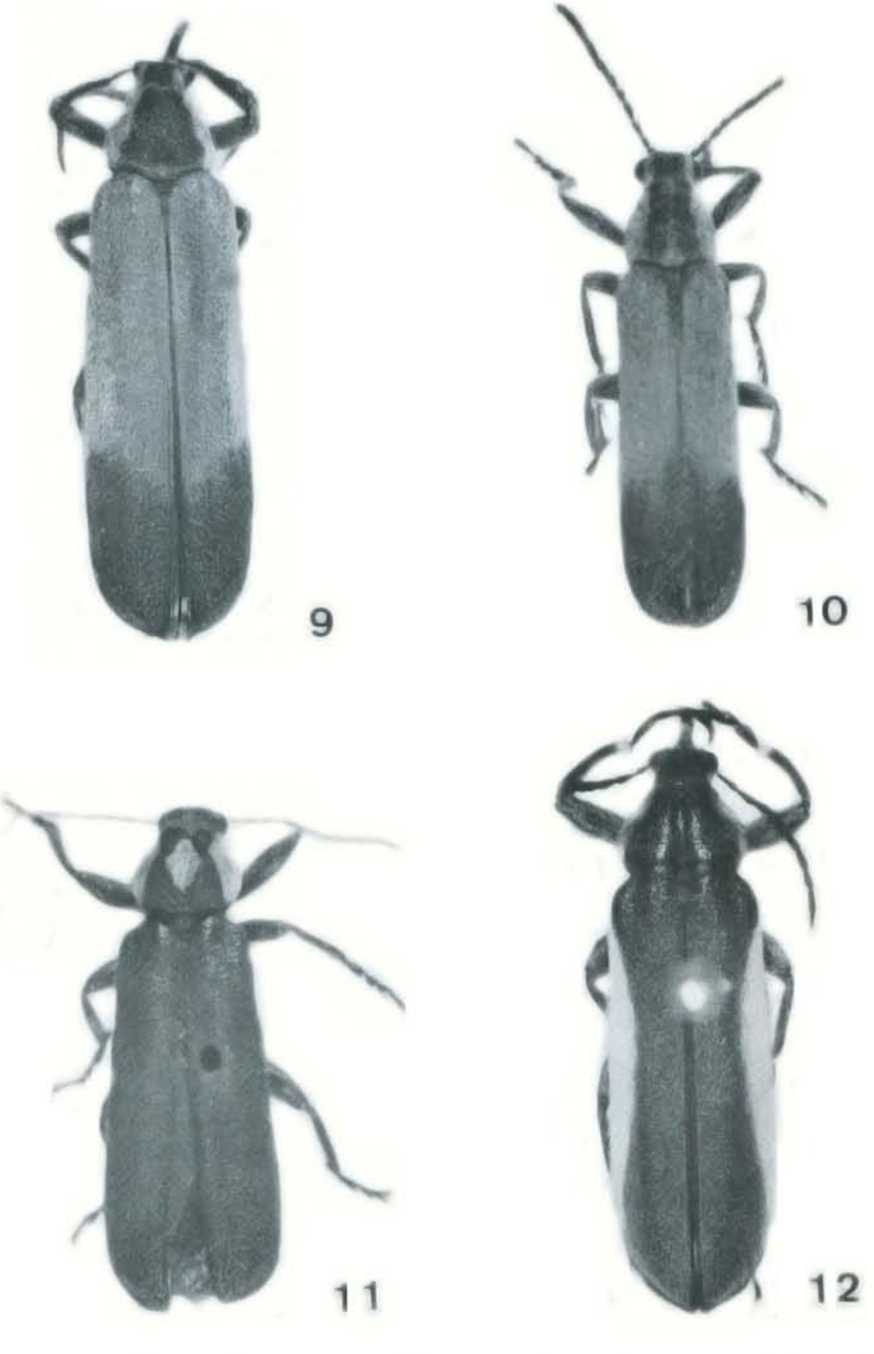

Fig. 9. *H. antennalis* Hustache, ♀. Fig. 10. *H. xixim* Bondar, ♂. Fig. 11. *H. flavicornis*, sp. n., holotype ♂. Fig. 12. *H. plaumanni* Voss, ♂. Figures not in the same scale.

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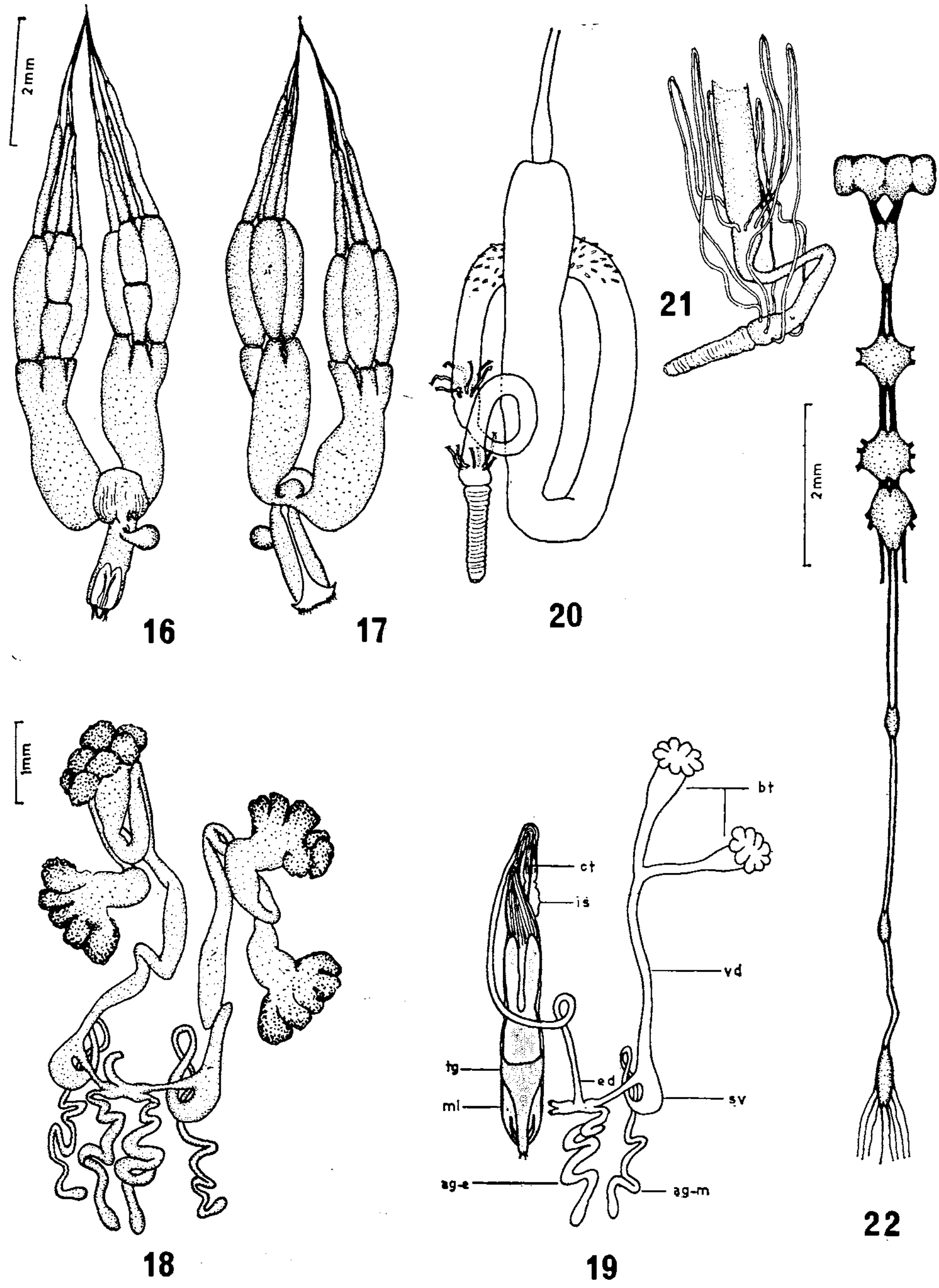
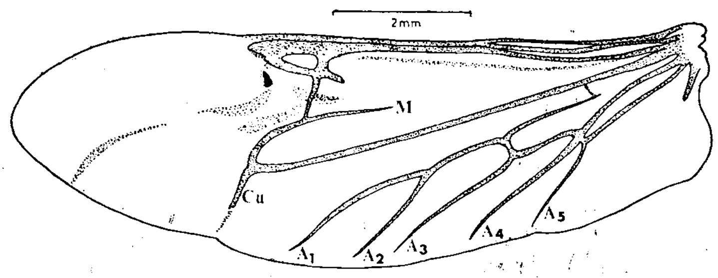
Fig. 13. *H. nigripennis* Boheman, ♀. Fig. 14. *H. acuminatus* Boheman, ♂. Fig. 15. *Trichophthalmus miltomerus* (Blanchard), ♀. Figures not in the same scale.



Figs. 16-22. Internal anatomy of *Homalocerus lyciformis*. Fig. 16. Female reproductive system (dorsal aspect). Fig. 17. *Idem* (ventral aspect). Fig. 18. Male reproductive system (dorsal aspect). Fig. 19. *Idem*, diagramatic, male genitalia in dorsal aspect (ag-e — accessory gland (ectadenia); ag-m — accessory gland (mesadenia); bt — bilobed testis; ct — chitinous tube; ed- ejaculatory duct; is — internal sac; ml — median lobe; sv — seminal vesicle; vd — vas deferens; tg — tegmen. Fig. 20. Digestive system (dorsal aspect). Fig. 21. *Idem*, cryptonephric Malpighian tubules in detail. Fig. 22. Central nervous system.



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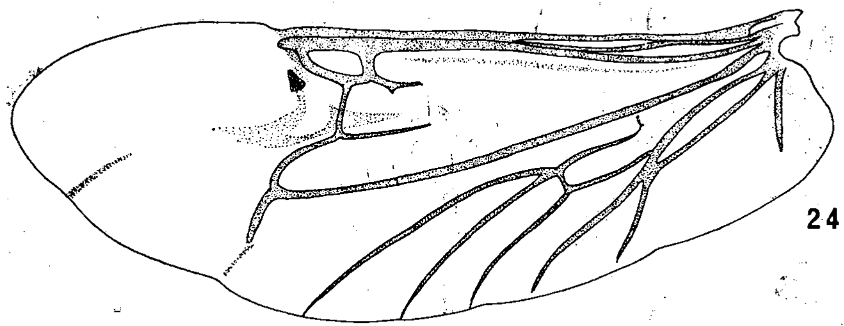

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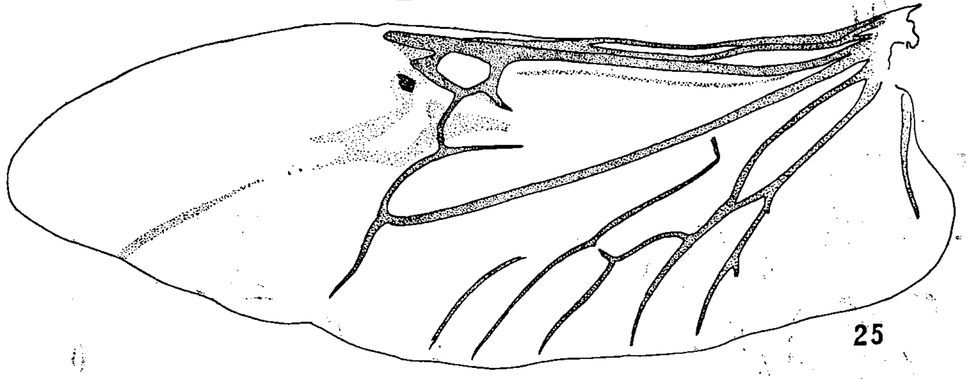

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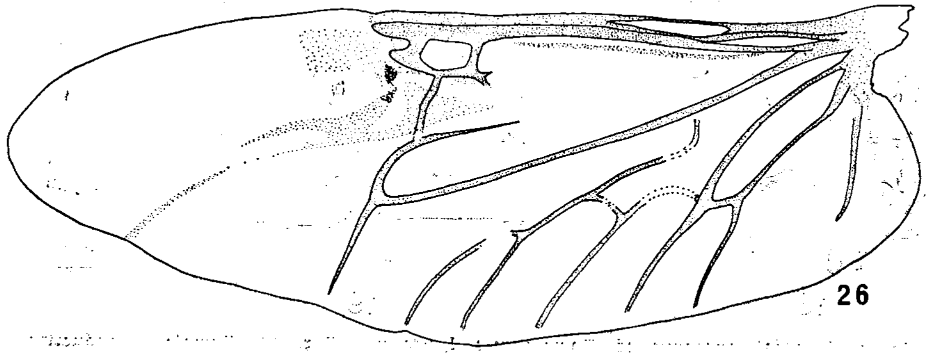

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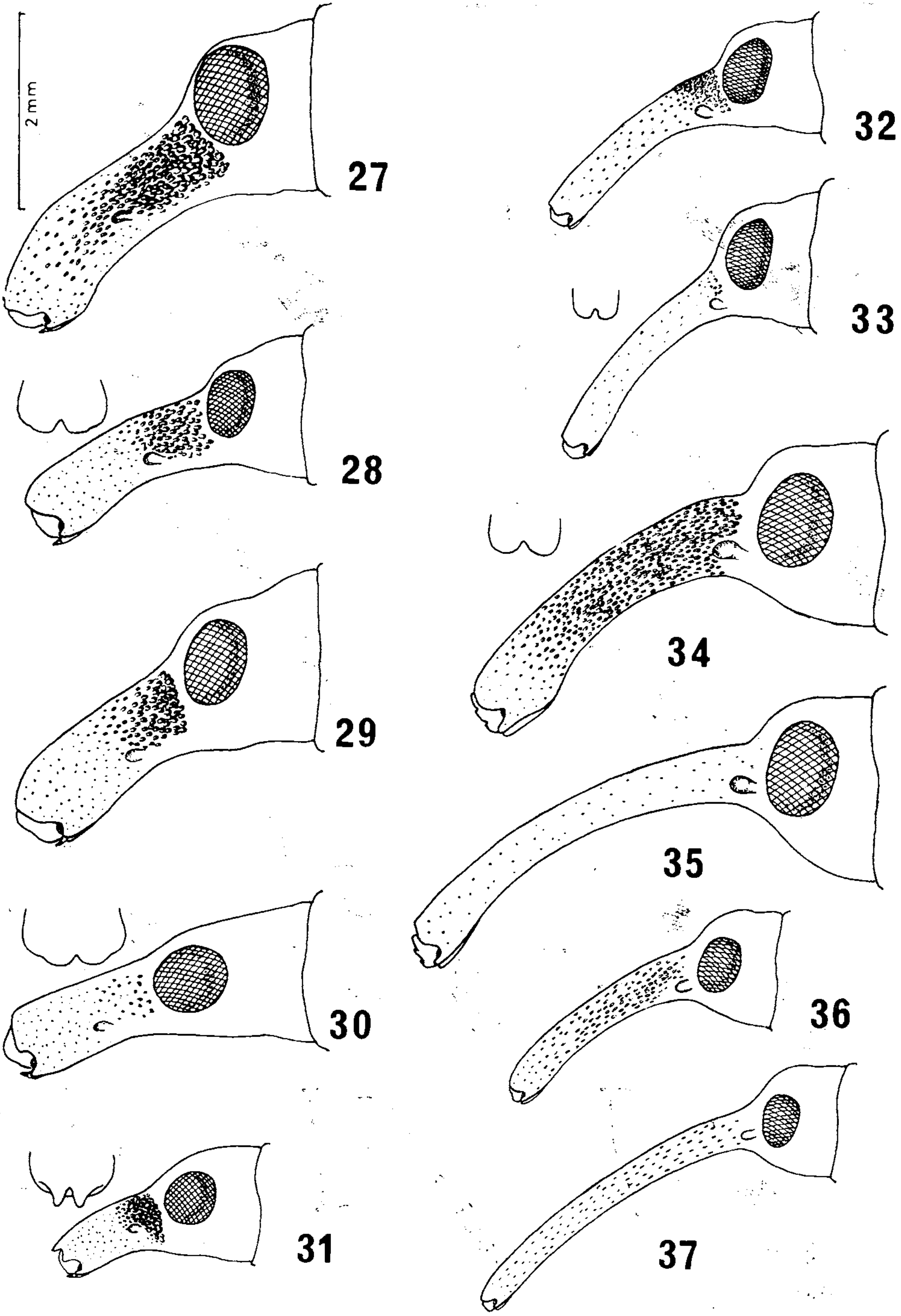
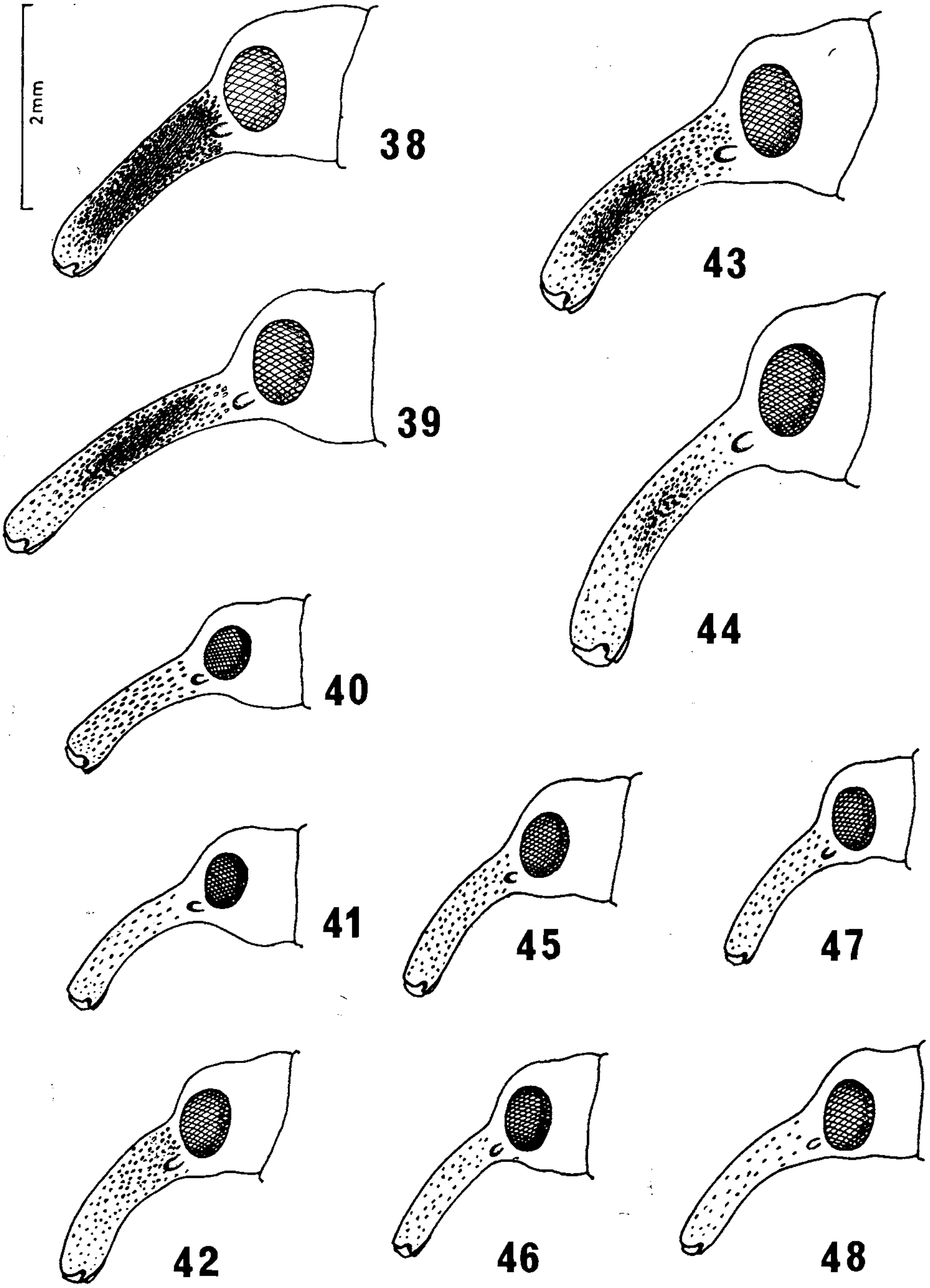
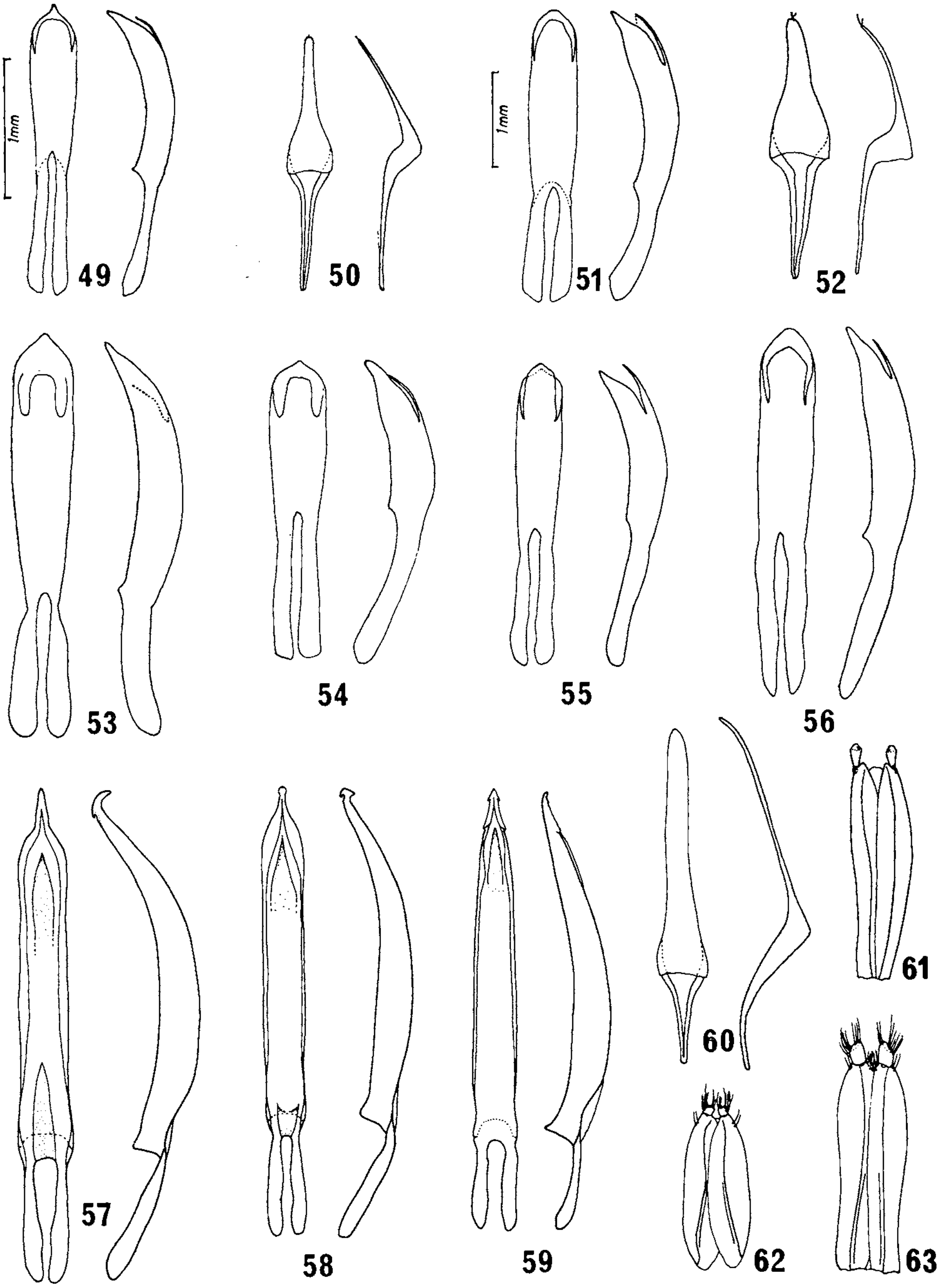
Figs. 23-26. Membranous wings. Fig. 23. *Trichophthalmus miltomerus*. Fig. 24. *Homalocerus xixim*. Fig. 25. *Atractuchus a. annulifer*. Fig. 26. *Dicordylus serranus*, holotype ♀. Veins: A — Anal; Cu — Cubitus; M — Media.



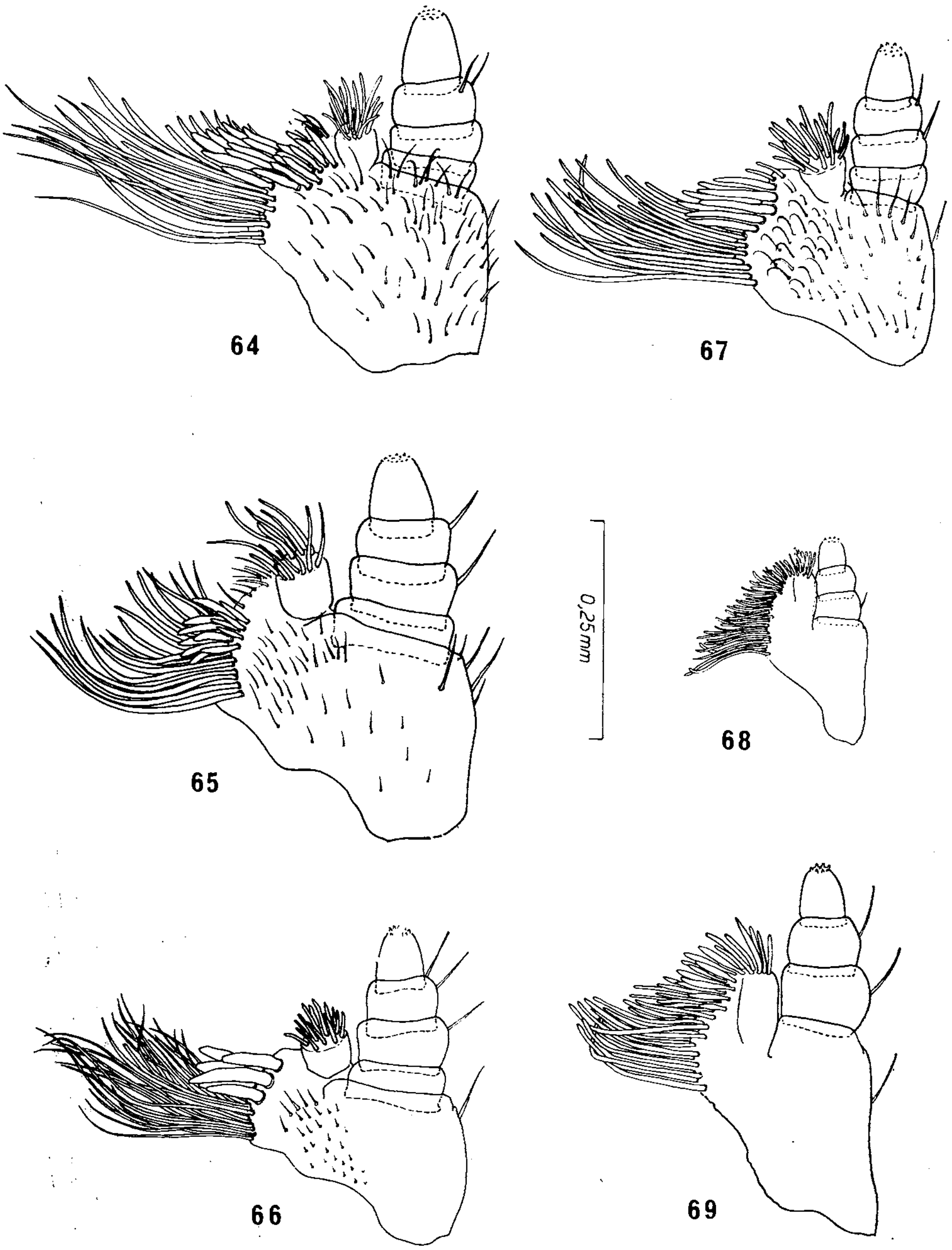
Figs. 27-37. Head (lateral aspect). Fig. 27. *Dicordylus b. binotatus*, ♂. Fig. 28. *D. serranus*, holotype ♀ (epistoma in detail). Fig. 29. *D. marmoratus*, ♂. Fig. 30. *Atractuchus annulifer argus*, ♂, (epistoma in detail). Fig. 31. *Callirhynchinus exquisitus*, ♀. Fig. 32. *Trichophthalmus miltomerus*, ♂. Fig. 33. *Idem*, ♀ (epistoma in detail). Fig. 34. *Homalocerus lyciformis*, ♂ (epistoma in detail). Fig. 35. *Idem*, ♀. Fig. 36. *H. longirostris*, holotype ♂. Fig. 37. *Idem*, paratype ♀ (MZSP).



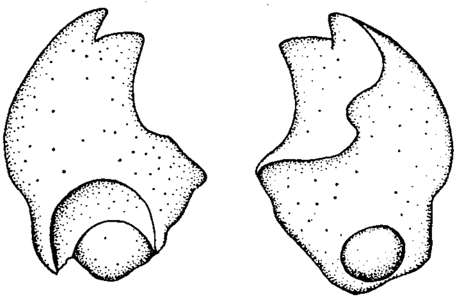
Figs. 38-48. Head (lateral aspect). Fig. 38. *Homalocerus antennalis*, ♂. Fig. 39. *Idem*, ♀. Fig. 40. *H. xixim*, lectotype ♂. Fig. 41. *Idem*, paralectotype ♀. Fig. 42. *H. flavicornis*, holotype ♂. Fig. 43. *H. plaumanni*, ♂. Fig. 44. *Idem*, ♀. Fig. 45. *H. nigripennis*, ♂. Fig. 46. *Idem*, ♀. Fig. 47. *H. acuminatus*, ♂. Fig. 48. *Idem*, ♀.



Figs. 49-60. Male genitalia (aedeagus and tegmen in dorsal and lateral aspects). Fig. 49. *Trichophthalmus miltomerus*, aedeagus. Fig. 50. *Idem*, tegmen. Fig. 51. *Homalocerus lyciformis*, aedeagus. Fig. 52. *Idem*, tegmen. Fig. 53. *H. antennalis*, aedeagus. Fig. 54. *H. xixim*, aedeagus. Fig. 55. *H. nigripennis*, aedeagus. Fig. 56. *H. plaumanni*, aedeagus. Fig. 57. *Dicordylus binotatus balteatus*, aedeagus. Fig. 58. *D. marmoratus*, aedeagus. Fig. 59. *Atractuchus a. annulifer*, aedeagus. Fig. 60. *Idem*, tegmen. Figs. 61-63. Female genitalia (dorsal aspect). Fig. 61. *D. serranus*, paratype ♀. Fig. 62. *H. plaumanni*. Fig. 63. *H. lyciformis*.



Figs. 64-69. Left maxilla (ventral aspect). Fig. 64. *Dicordylus marmoratus*. Fig. 65. *D. b. binotatus*. Fig. 66. *D. serranus*, holotype ♀. Fig. 67. *Atractuchus a. annulifer*. Fig. 68. *Trichophthalmus miltomerus*. Fig. 69. *Homalocerus lyciformis*.



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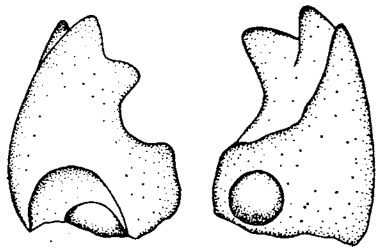

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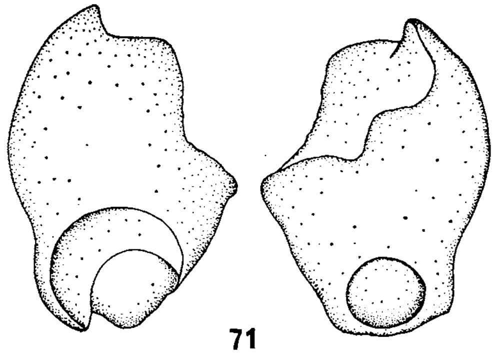

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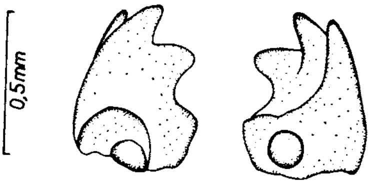

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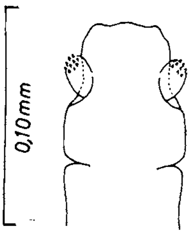

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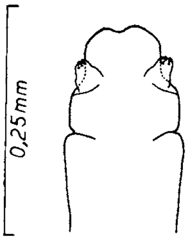

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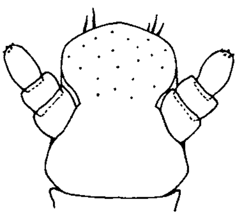

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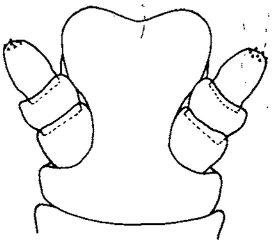

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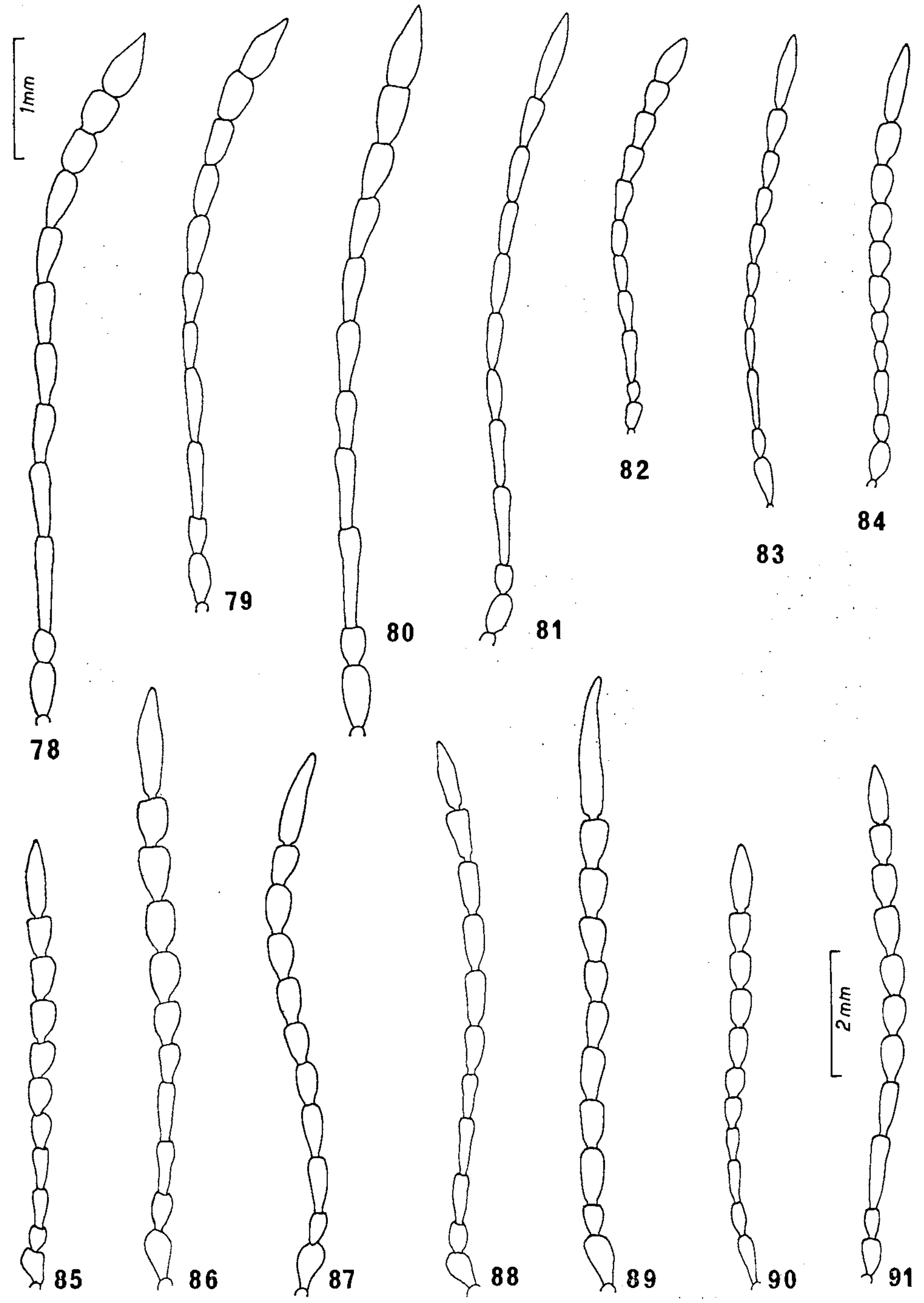
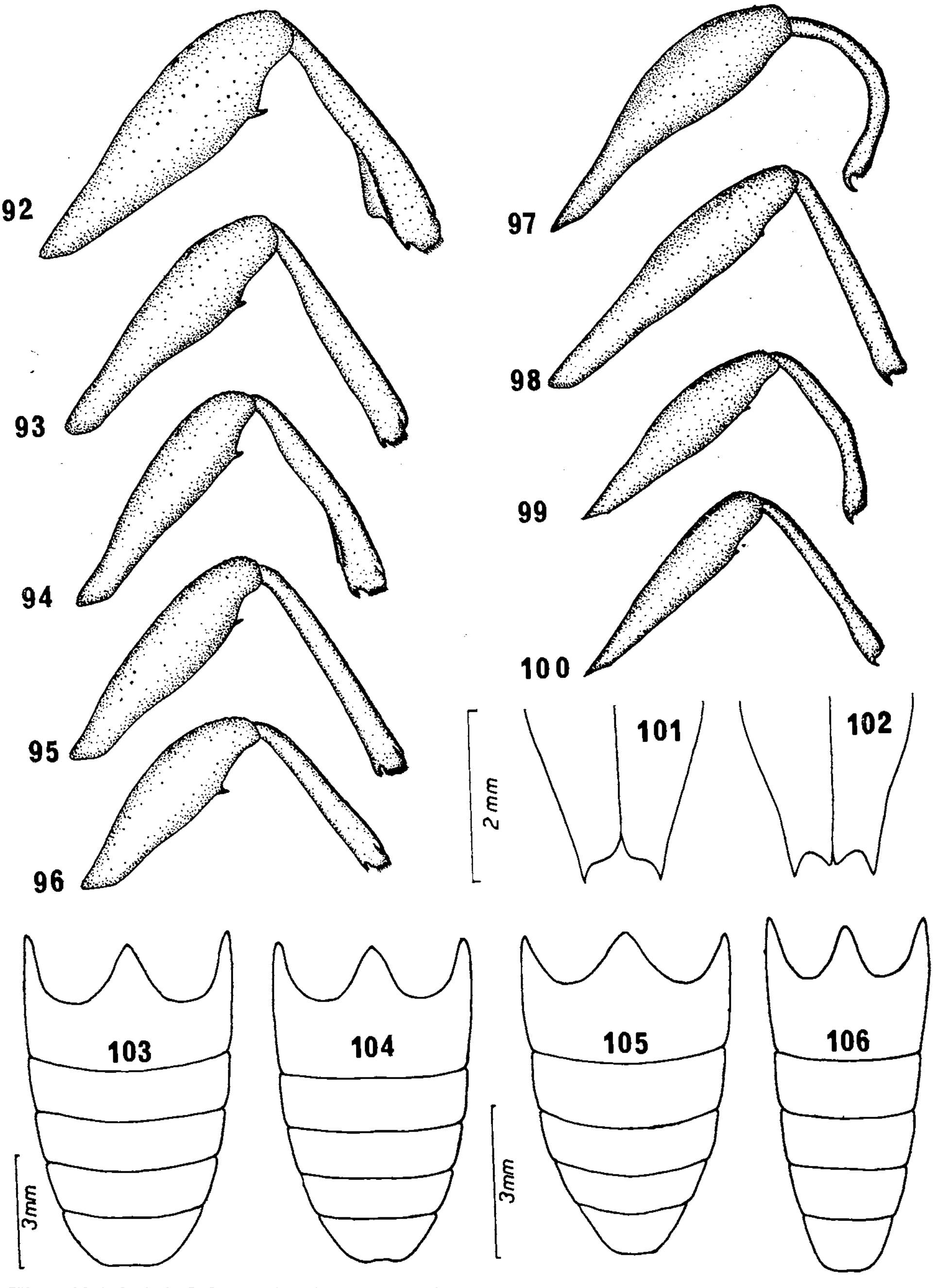
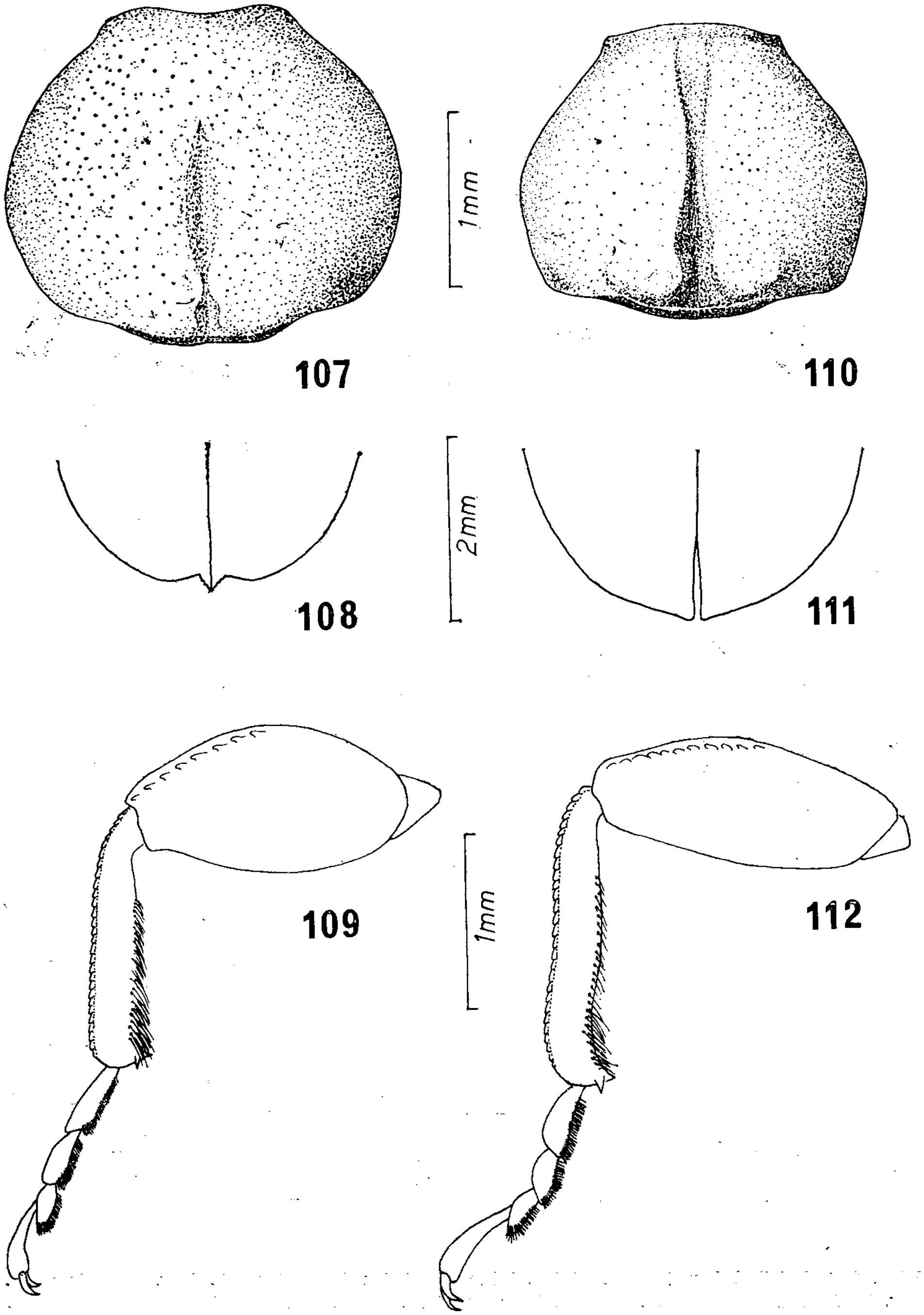
Figs. 70-73. Left mandible (dorsal and ventral aspects). Fig. 70. *Dicordylus serranus*, holotype ♀. Fig. 71. *Atractuchus a. annulifer*. Fig. 72. *Homalocerus lyciformis*. Fig. 73. *Trichophthalmus miltomerus*. Figs. 74-77. Labium (ventral aspect). Fig. 74. *T. miltomerus*. Fig. 75. *H. lyciformis*. Fig. 76. *A. a. annulifer*. Fig. 77. *D. b. binotatus*.



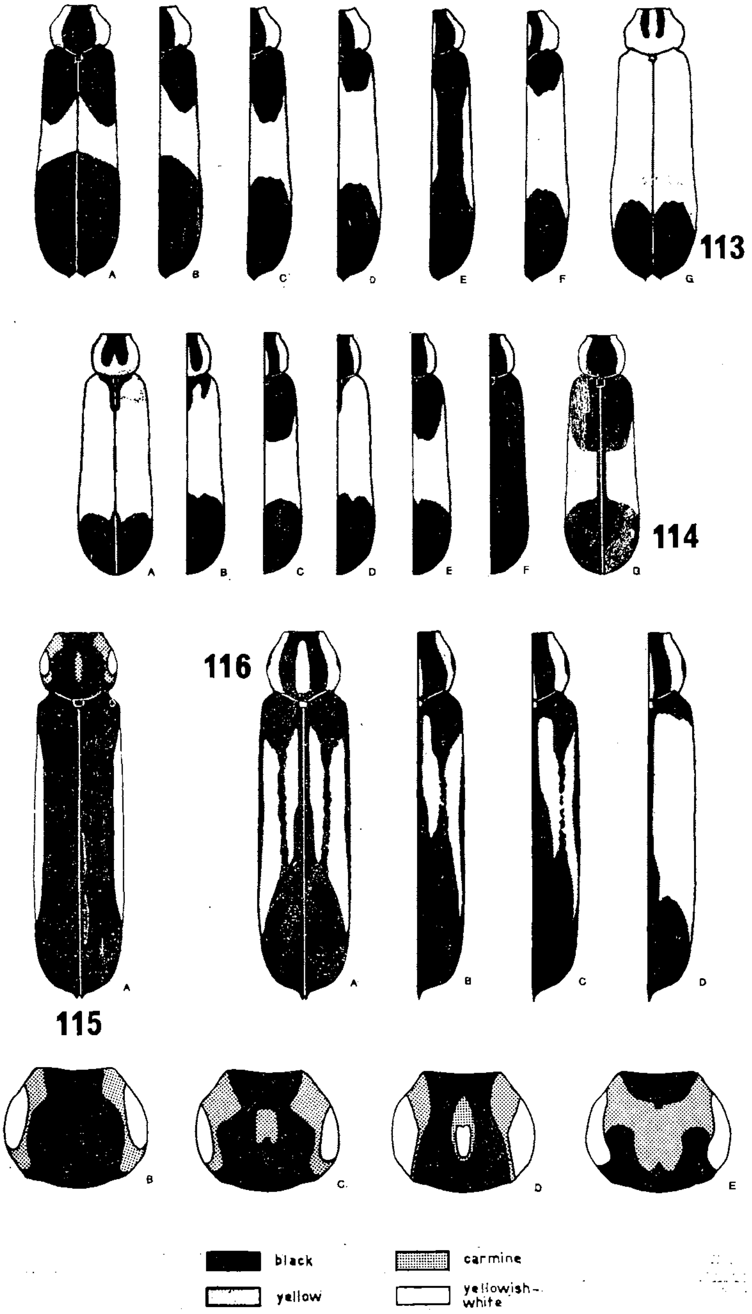
Figs. 78-91. Antenna (pubescence not represented). Fig. 78. *Dicordylus b. binotatus*. Fig. 79. *D. serranus*, paratype ♀. Fig. 80. *D. marmoratus*. Fig. 81. *Atractuchus a. annulifer*. Fig. 82. *Callirhynchinus exquisitus*. Fig. 83. *Trichophthalmus miltomerus*. Fig. 84. *Homalocerus acuminatus*. Fig. 85. *H. nigripennis*. Fig. 86. *H. plaumanni*. Fig. 87. *H. flavicornis*, holotype ♂. Fig. 88. *H. xixim*. Fig. 89. *H. antennalis*. Fig. 90. *H. longirostris*, paratype ♀ (MZSP). Fig. 91. *H. lyciformis*. (Figs. 78-90, same scale as fig. 78).



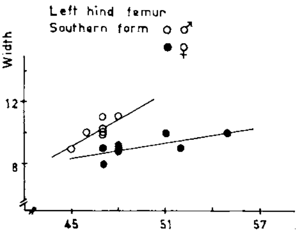
Figs. 92-100. Hind leg. Fig. 92. *Dicordylus binotatus balteatus*, ♂. Fig. 93. *Idem*, ♀. Fig. 94. *D. marmoratus*, ♂. Fig. 95. *Idem*, ♀. Fig. 96. *D. serranus*, holotype ♀. Fig. 97. *Atractuchus annulifer argus*, ♂. Fig. 98. *Idem*, ♀. Fig. 99. *A. a. annulifer*, ♂. Fig. 100. *Idem*, ♀. Elytral apex. Fig. 101. *A. a. annulifer*, ♂. Fig. 102. *Idem*, ♀. Figs. 103-106. Abdomen. Fig. 103. *D. b. binotatus*, ♂. Fig. 104. *D. marmoratus*, ♂. Fig. 105. *D. serranus*, paratype ♀. Fig. 106. *A. a. annulifer*, ♂. (Figs. 92-102, same scale as fig. 101).



Figs. 107-109. *Homalocerus nigripennis*, ♂. Fig. 107. Pronotum. Fig. 108. Elytral apex. Fig. 109. Hind leg. Figs. 110-112. *Homalocerus plaumanni*, ♂. Fig. 110. Pronotum. Fig. 111. Elytral apex. Fig. 112. Hind leg.



Figs. 113-116. Variation in coloration. Fig. 113. *Homalocerus lyciformis*. Fig. 114. *H. xixim*. Fig. 115. *H. nigripennis*. Fig. 116. *H. acuminatus*.



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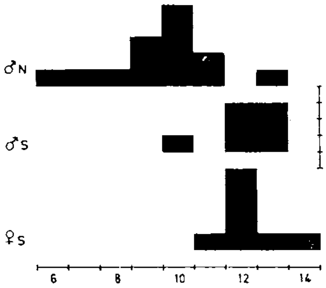

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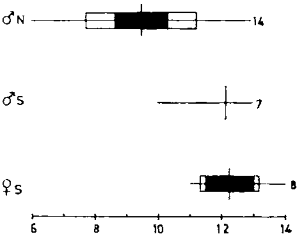
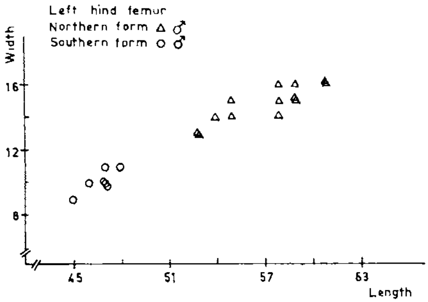


Number of granules of right hind femur

121



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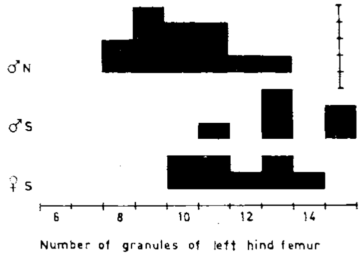

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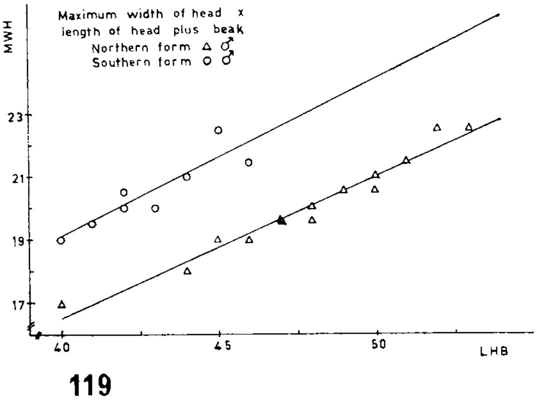

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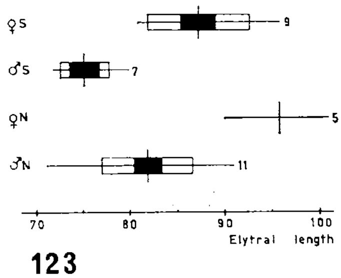

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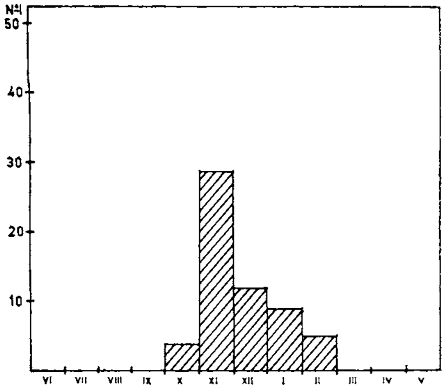
Figs. 117-123. Geographic variation in *Atractuchus annulifer* (measurements in micrometric units: figs. 117-119, 1 m.u. = 0.0625 mm; fig. 123, 1 m.u. = 0.1 mm). Figs. 120 and 122, one unit of vertical scale equals a single granule. Figs. 121 and 123, horizontal lines show observed ranges; rectangles mark standard deviation with solid black indicating 95% confidence intervals for the means; mean values are indicated by vertical lines and the number of records is shown on the right. Fig. 117. Left hind femur: regression of maximum width on length, on males and females from the southern area of distribution; Fig. 118. *idem*, males from the northern and southern areas of distribution. Fig. 119. Head: regression of maximum width of head (just behind eyes) -MWH- on length of head plus beak -LHB-, in males from the northern and southern areas of distribution. Fig. 120. Histogram of number of granules of right hind femur in males from northern area, and males and females from the southern area of distribution. Fig. 121. Diagram of variation in number of granules of right hind femur. Fig. 122. Histogram of number of granules of left hind femur, in males from northern area, and males and females from the southern area of distribution. Fig. 123. Diagram of elytral length variation, in samples from northern and southern areas of distribution.



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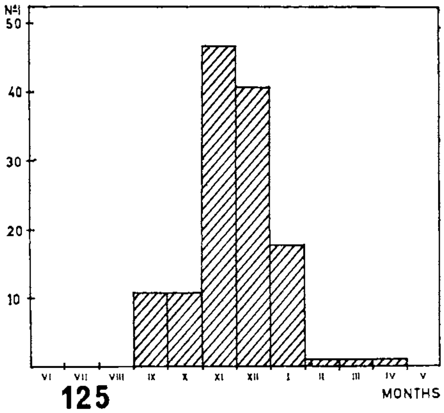

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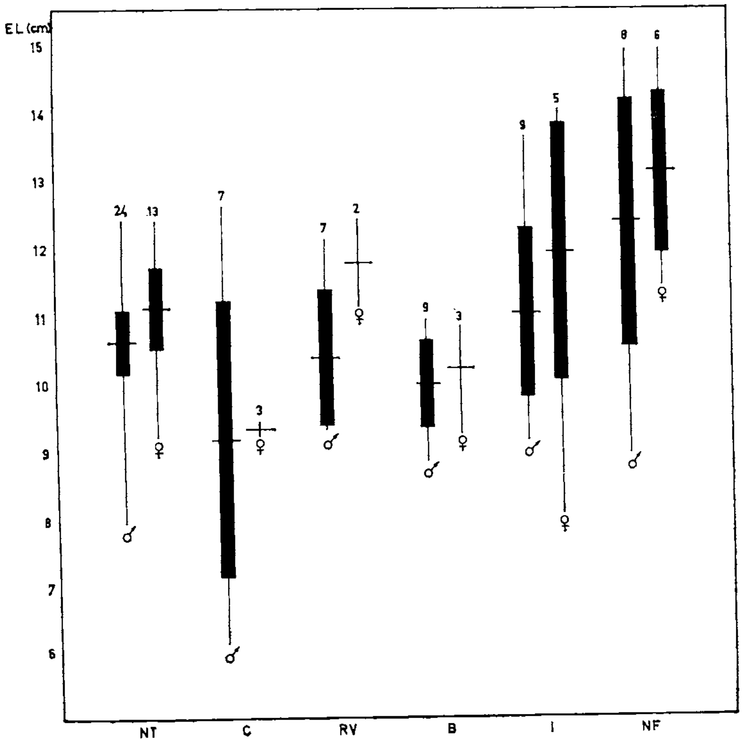

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Fig. 124. Histogram showing the months of collection of *Homalocerus xixim* (N.º I — number of individuals). Fig. 125. Histogram showing the months of collection of *Homalocerus lyciformis*. Fig. 126. Diagram of elytral length variation in *H. lyciformis* (vertical line represents the observed range, horizontal line the mean, black rectangle the 95% confidence interval for the mean, number on the top the number of specimens in the sample). Localities arranged from south to north: NT — Nova Teutônia, SC; RV — Rio Vermelho, SC; C — Corupá, SC; B — Estação Biológica de Boracéia, Salesópolis, SP; I — Itatiaia, RJ; NF — Nova Friburgo.

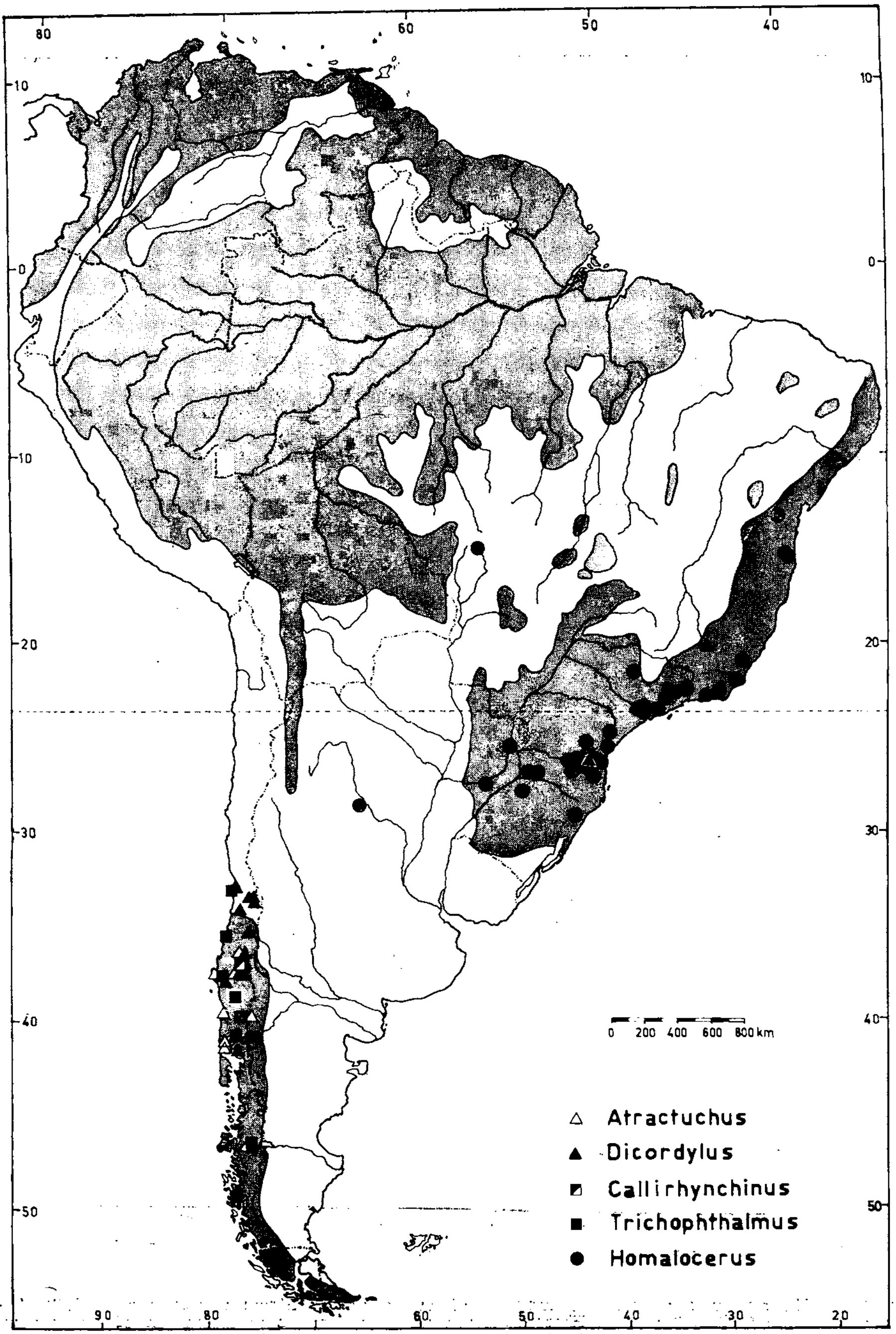

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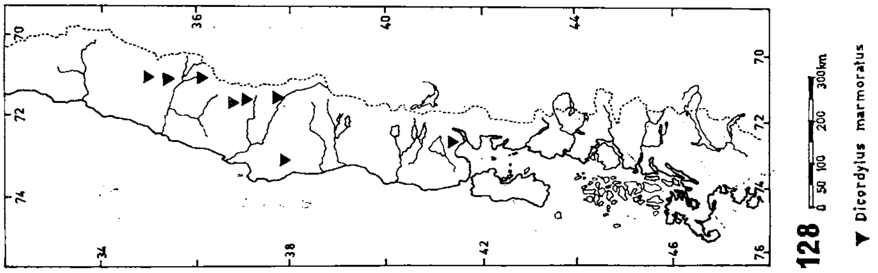
Fig. 127. Geographic distribution of the genera of South American Belidae. Shaded areas represent forest regions; light areas represent open formations or poorly vegetated areas (Map based on Hueck, 1972, fig. 2).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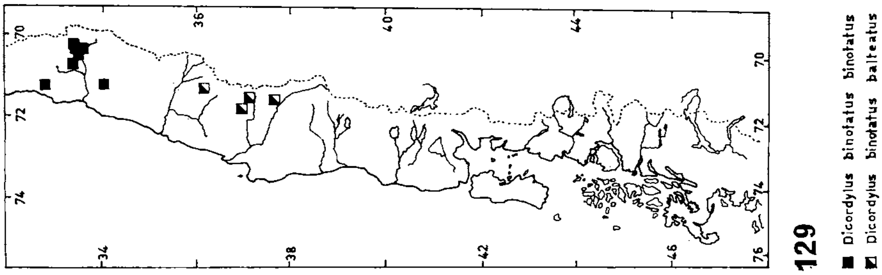
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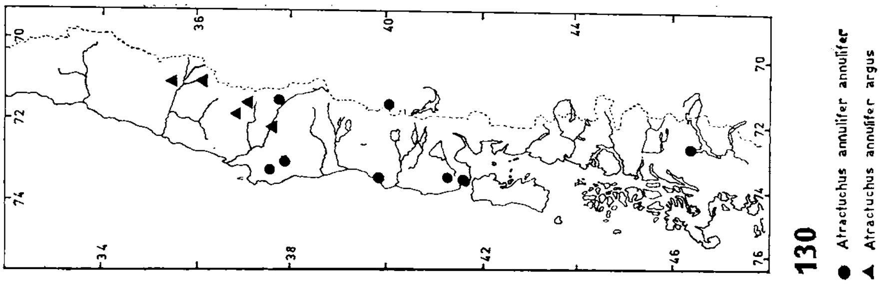
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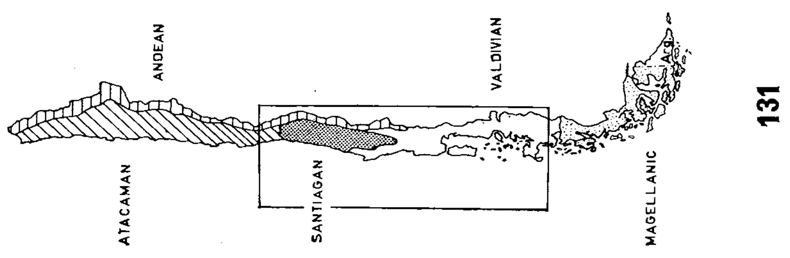
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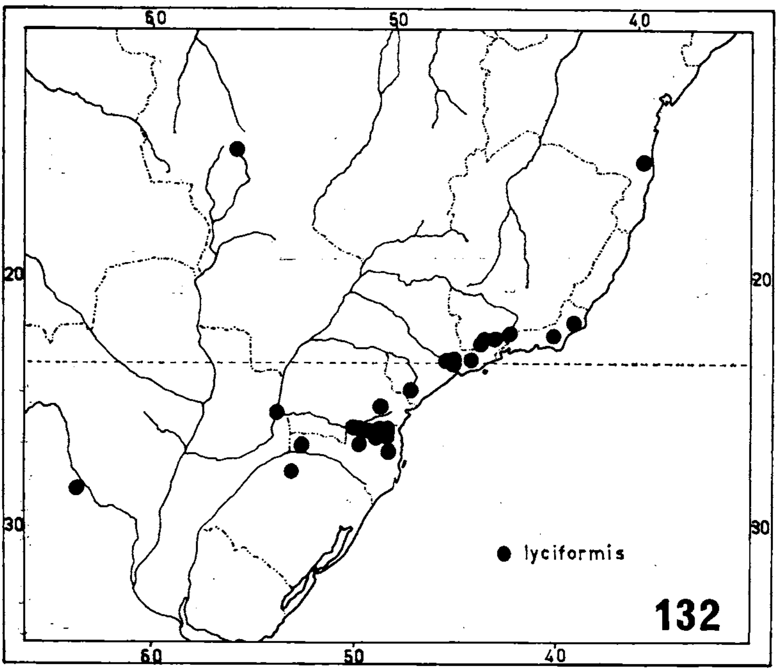
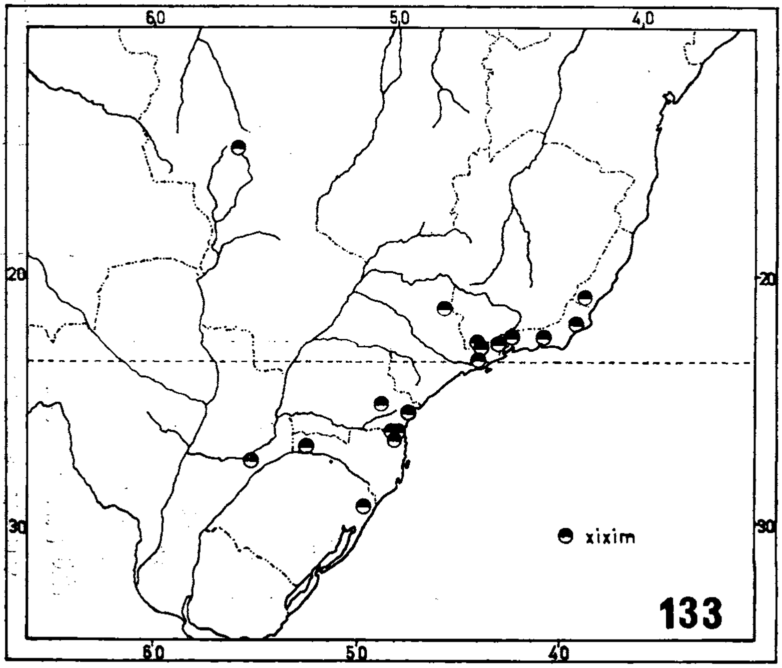
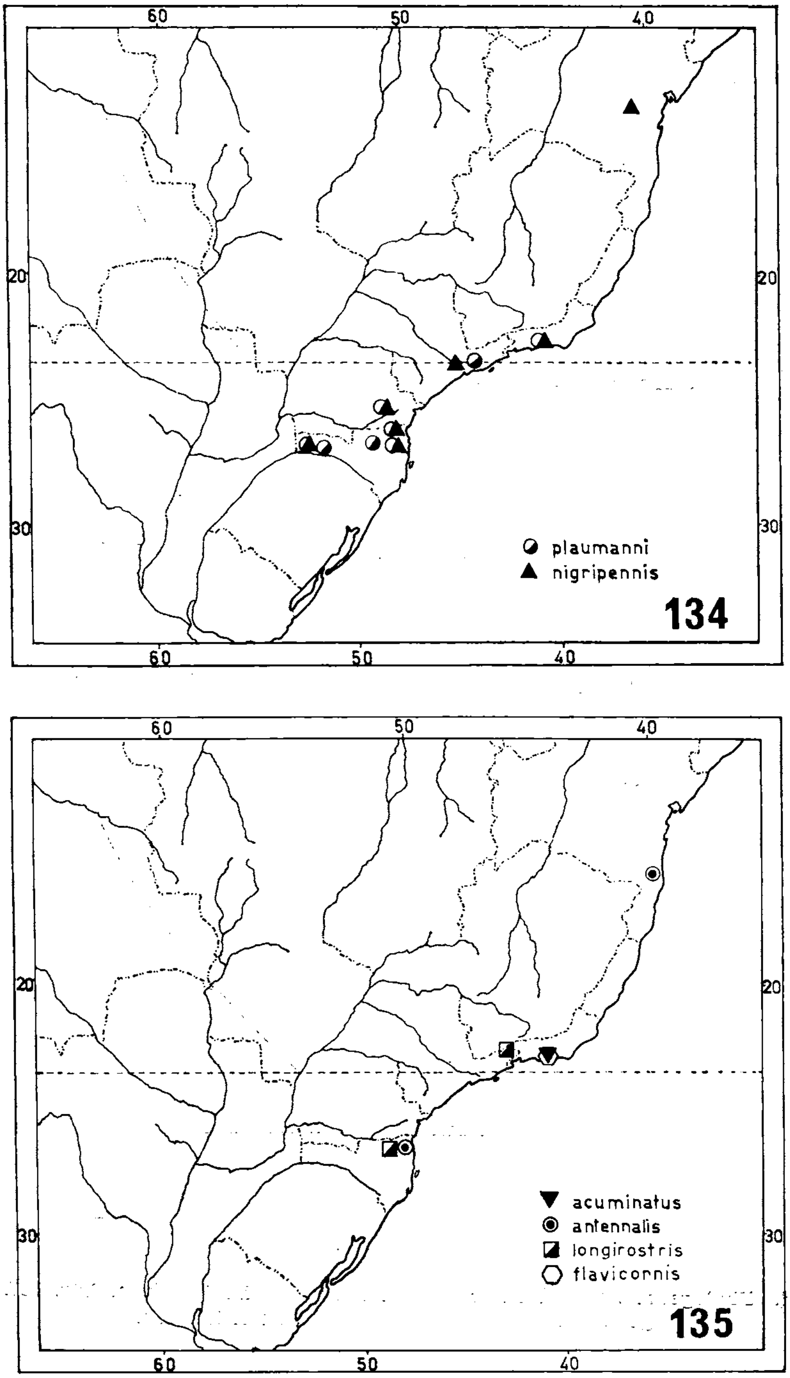
Geographic distribution. Fig. 128. *Dicordylus marmoratus*. Fig. 129. *D. binotatus*. Fig. 130. *Atractuchus annulifer*. Fig. 131. Biogeographic regions in Chile, according to O'Brien (1971).

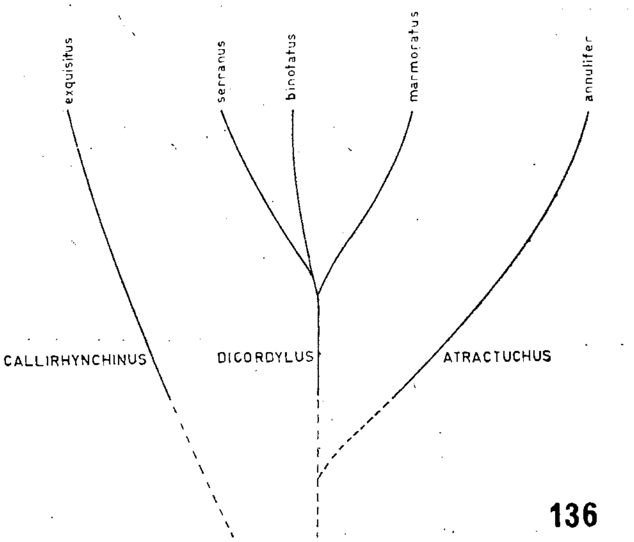




Figs. 132-133. Geographic distribution of species of the genus *Homalocerus*.



Figs. 134-135. Geographic distribution of species of the genus *Homalocerus.*



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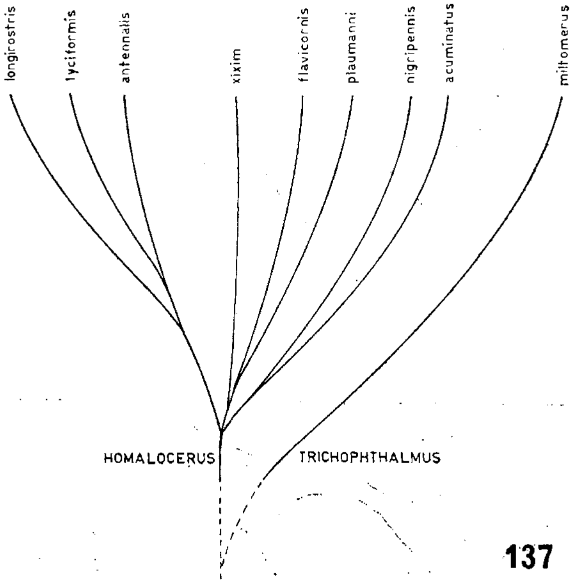

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Fig. 136. Phylogenetic trends in the South American Pachyurinae. Fig. 137. Phylogenetic trends in the South American Belinae.

Geographic variation in *Atractuchus annulifer*
Analysis of the data shown in figs. 117-123

TABLE 1. Number of granules of right hind femur.

Sample	Sex	N	R	M	s	I
northern	♂	14	6-13	9.50	1.74	8.66-10.34
southern	♂	7	10-13	12.14		
southern	♀	8	11-14	12.25	.89	11.47-13.03

TABLE 2. Number of granules of right hind femur: Student's t test.

Sample	Sex	N	M	Sxx	
northern	♂	14	9.50	39.50	$t = 3{,}61$
southern	♂	7	12.14	6.86	$t_5(19) = 2.093$

TABLE 3. Left hind femur. Regression of maximum width on length (measurements in micrometric units: 1 m.u. = 0.0625 mm).

Sample	Sex	N	Rx	b	a	F	r^2
northern	♂	14	53-61	.3684±.140	-6.27±8.04	68.4	.85
southern	♂	7	45-48	.6070±.178	-18.32±8.34	11.6	.70
southern	♀	8	47-55	.1637±.061	3.05±1.02	7.0	.54

TABLE 4. Head. Regression of maximum width of head (just behind eyes) on length of head plus beak, in males (measurements in micrometric units: 1 m.u. = 0.0625 mm).

Sample	Sex	N	Rx	b	a	F	r^2
northern	♂	14	40-53	.4456±.089	-1.33±4.29	248.2	.95
southern	♂	8	40-46	.5023±.099	-1.04±4.27	25.5	.81

TABLE 5. Elytral length (measurements in micrometric units: 1 m.u. = 0.1 mm).

Sample	Sex	N	R	M	s	I
northern	♂	11	71-91	81.91	4.90	80.44-83.38
northern	♀	5	90-101	85.80		
southern	♂	7	72-80	75.28	2.62	73.79-76.77
southern	♀	9	81-96	87.33	5.67	85.51-89.15

N - number of specimens in the sample
Rx - range of the independent variable
b - regression coefficient ± its standard deviation
a - regression constant ± its standard deviation
F - variance ratio

r^2 - coefficient of determination
R - observed range
M - mean
s - standard deviation
I - 95 % confidence interval

TABLE 6. *Homalocerus lyciformis*: elytral length

LOCALITY	SEX	N	R	M	s	I
Nova Teutonia, SC	♂	24	7.9-12.4	10.62	1.15	10.17-11.07
	♀	13	9.2-12.4	11.09	.99	10.48-11.70
Corupá, SC	♂	7	6.1-12.6	9.14	2.23	7.09-11.19
	♀	3	9.2- 9.4	9.3	-	-
Rio Vermelho	♂	7	9.3-12.1	10.34	1.27	9.31-11.37
	♀	2	11.1-12.4	11.75	-	-
Salesópolis, SP	♂	9	8.8-10.9	9.95	.72	9.31-10.59
	♀	3	9.2-10.8	10.23	-	-
Itatiaia, RJ	♂	9	9.1-13.6	11.01	1.66	9.74-12.28
	♀	5	8.0-14.0	11.90	2.37	10.01-13.79
Nova Friburgo, RJ	♂	8	8.9-14.8	12.34	2.20	10.5 -14.18
	♀	6	11.4-14.8	13.10	1.31	11.92-14.28

TABLE 7. Geographical distribution of the genera of Belidae

SUBFAMILY	Genera	Number of species	Australia	Tasmania	New Zealand	New Guinea	Chile	Argentina	Brazil	Paraguay
BELINAE	*Belus*	*100	x	x		x				
	Rhinotia	8	x	x	x					
	Homalocerus	8						x	x	x
	Trichophthalmus	1					x	x		
PACHYURINAE	*Pachyura*	* 16	x	x	x					
	Cyrothyphus	1	x	x						
	Agnesiotis	1	x							
	Lebus	1	x							
	Pachyurinus	1			x					
	Agathinus	1			x					
	Dicordylus	3					x		x	
	Atractuchus	1					x	x		
	Callirhynchinus	1					x			

* approximate number

TABLE 8. *Homalocerus lyciformis:* variation in coloration.
Localities arranged from north to south

Locality		Color pattern						
		A	B	C	D	E	F	G
Ilhéus	BA					x		
	BA	x						
Diamantino	MT		x					
	ES			x				
Serra de Macaé	RJ		x	x	x			
Nova Friburgo	RJ			x	x		x	x
Itatiaia	RJ	x	x	x				
Passa Quatro	MG	x	x					
S. José de Barreiro	SP	x						
Salesópolis	SP	x	x	x				
São Roque	SP	x						
Paranapiacaba	SP		x					
Iporanga	SP		x					
Ponta Grossa	PR		x	x				
Iguaçu	PR			x				
Northeast of SC	SC	x	x					
Nova Teutônia	SC	x	x	x				
Santo Augusto	RS	x	x					
Chaco de Santiago	ARG.		x					

TABLE 9. *Homalocerus xixim:* variation in coloration.
Localities arranged from north to south

Locality		Color pattern						
		A	B	C	D	E	F	G
Rancho Grande	MT			x				
Serra de Macaé	RJ			x				
Itatiaia	RJ							x
	RJ		x		x			
Cassia dos Coqueiros	SP						x	
Vila Monte Verde	MG							x
Campos de Jordão	SP					x		
Salesópolis	SP							x
Ponta Grossa	PR	x		x				
Morretes	PR			x				
Loreto	ARG.			x				
Northeast of SC	SC	x	x	x				
Nova Teutônia	SC		x	x		x		
S. Francisco de Paula	RS			x				