

PRINCIPAL DIVISIONS OF PAN-AFRICAN OPATRINÆ

1. Gula transformed into a stridulatory organ, consisting of 100 to 300 entirely symmetrical, transverse, shallowly arcuate, fine carinæ and alternating sulci (figs. 3, 9) 2

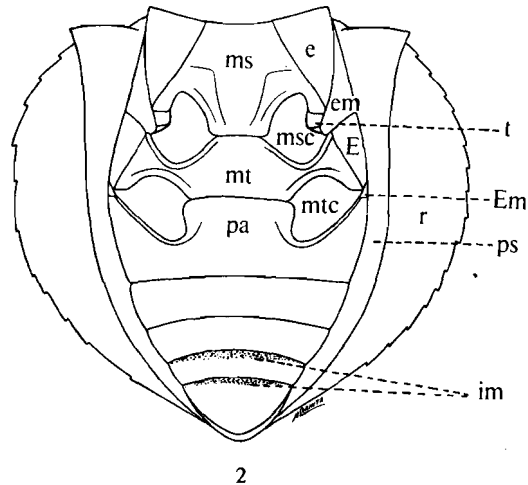
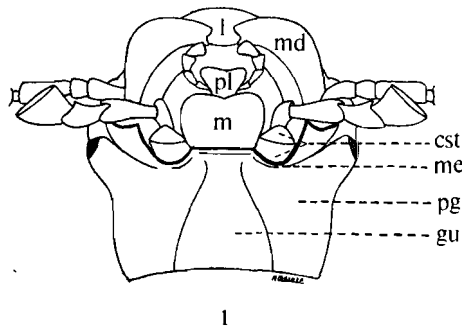


FIG. 1. — Underside of the head of an Opatrin (*Gonopus*).
l : labrum; cst : cardo and stipes of maxillæ; gu : gula;
m : mentum; md : mandible; me : maxillary emargination
of postgenal margin; pg : postgenæ; pl : prelabium.

FIG. 2. — Underside of the hind body of an Opatrin (*Gonopus*).
e : episternum of mesosternum; E : episternum of metasternum;
em : epimeron of mesosternum; Em : epimeron of metasternum;
im : inter-segmental membranes; ms : mesosternum; msc : meso-
coxal cavity; mt : metasternum; mtc : metacoxal cavity; pa : inter-
coxal process of abdomen; ps : pseudopleura; r : ventrally reflected
portion of elytra; t : trochantin of mesocoxa.

This character which I introduced into the systematics of *Tenebrionidæ* in 1953, was overlooked by former authors. The only references I was able tracing in literature have been made by GEBIEN in his descriptions of *Selinus edentatus* and *Glyptopteryx forticostis*. However, this author attributed to it merely a specific value and

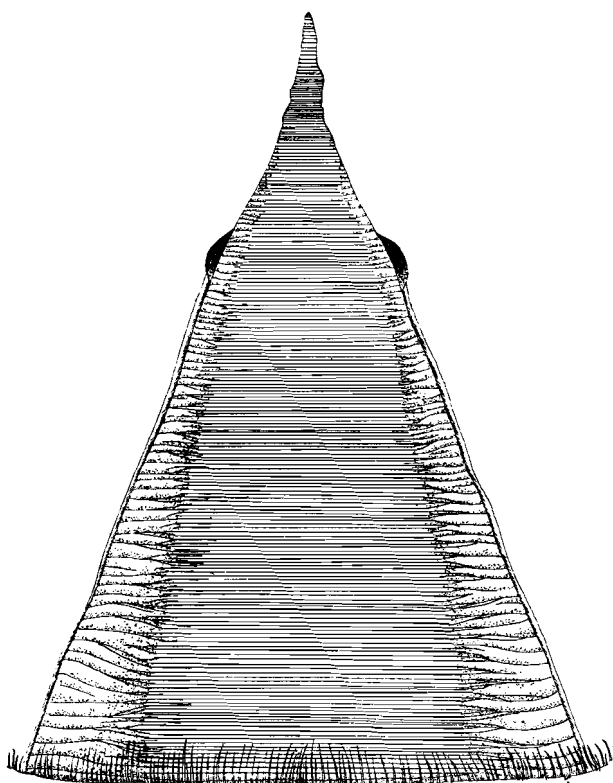


FIG. 3. — The stridulatory gula in *Platynotini*
(drawn after a ♂ specimen of *Anchophthalmus plicipennis* PÉRINGUEY,
from Elisabethville).

did not realize its systematic importance. Two rich tribes, viz. the African-Indian-American *Platynotini* and the Southern African *Oncotini*, exhibit a stridulatory gula and this without any exception whatsoever. Stridulatory organs seem to be frequent in the *Tenebrionidæ*, but as they are usually hidden, only a few of them have been described so far. Sometimes they are paleogenetic characters of a systematically super-ordinate value, as for instance the above mentioned stridulatory gula of *Platynotini* and *Oncotini*, or the occipital stridulatory organ of *Cryptochilini* and *Vansonini* (which

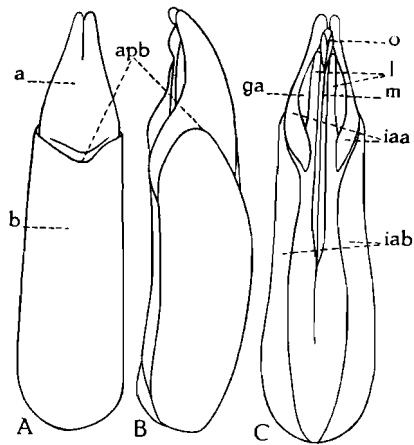


FIG. 4. — *Ædeagus* of *Zophodes tristis* FÄHRAEUS.

a : apicale; b : basale; m : median lobe of penis; apb : apical margin of basale;
 l : lacinia; ga : ventral groove of apicale; iaa : inflexed alæ of apicale; iab : inflexed
 alæ of basale; gb : ventral groove of basale; o : apical orifice of penis.
 A : dorsal surface; B : lateral aspect, with the ventral surface at left;
 C : ventral surface.

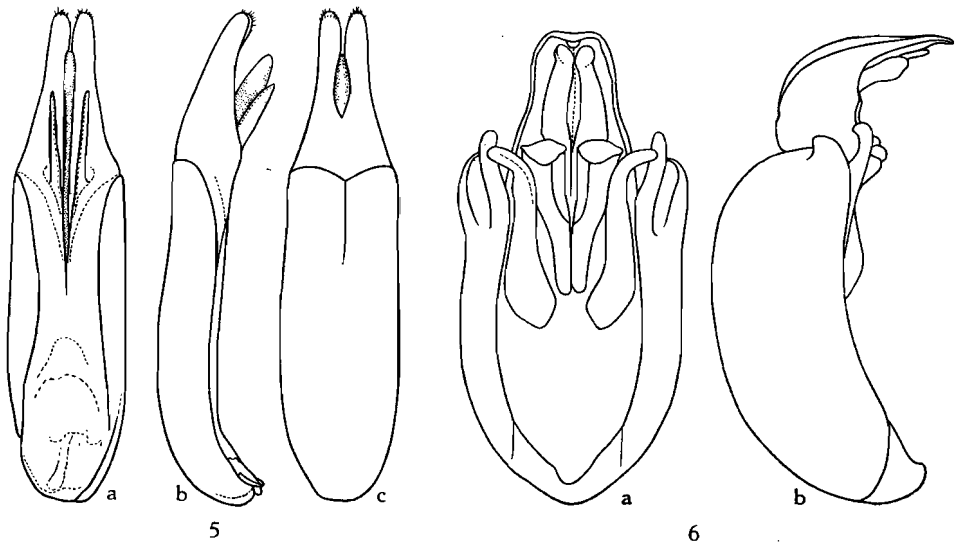


FIG. 5. — *Ædeagus* of a Madagascar *Melanocratus* sp.

a : ventral surface; b : lateral aspect, with the ventral surface at right;
 c : ventral surface.

FIG. 6. — *Ædeagus* of an *Anomalipus* sp.

with triple pairs of lacinia and armatures on the apical portion of basale.
 a : ventral surface; b : lateral aspect, with the ventral surface at right.

I have described in 1949), but sometimes they reveal a polygenetic origin, as it is shown in various genera of *Tentyriini* (e.g. the femoral-pseudopleural stridulatory organ in the genera *Homala*, *Oterophlæus*, *Psammoica*, *Cantopipleurus* *Symphoxycara* of *Oxy-cara*, cf. KOCH, 1943) or in the Molurini in which only the genus *Sridulomus* possesses a femoral-pseudopleural stridulatory organ (cf. KOCH, 1955b).

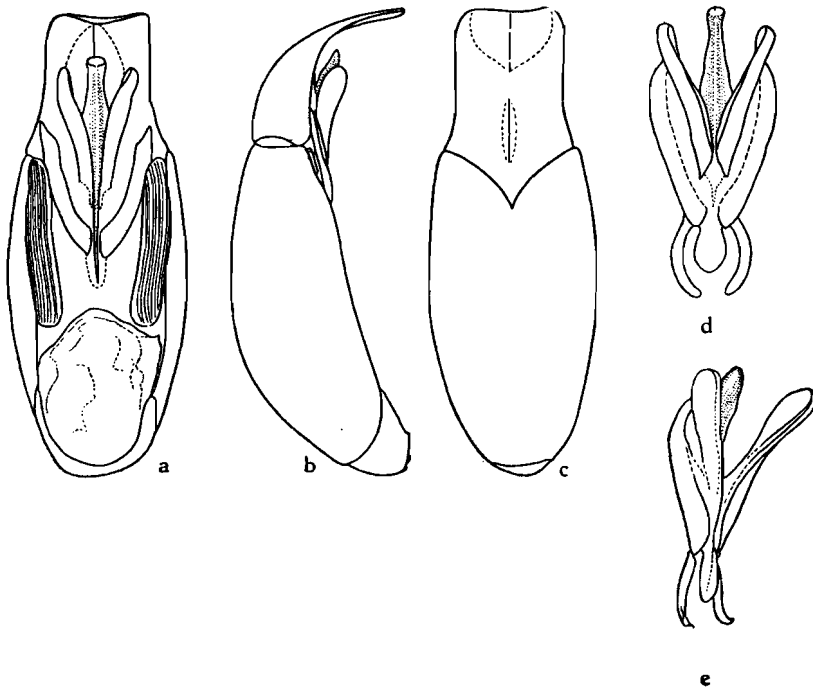


FIG. 7. — Aedeagus of an *Anomalipus* sp., with double pairs of lacinia. a : ventral surface; b : lateral aspect, with the ventral surface at right; c : dorsal surface; d : outer surface of penis and double pairs of lacinia; e : ditto, diagonal view.

- Gula simple, irregularly sculptured or smooth, without stridulatory structures 3
- 2. Inner sclerites of aedeagus composed of the penis plus one to three pairs of lacinia (figs. 4 to 7); in a few exceptional cases, viz. some species of *Anomalipus*, without lacinia (fig. 8), when the mentum is large, constricting the maxillary emargination of postgenæ and concealing the basal portion of maxillary palpi (but not the cardo and stipes of maxillæ) (fig. 75), being three to four times as broad as one of the maxillary emarginations of postgenæ.

I. — **PLATYNOTINI.**

KOCH, 1953 *a*, Rev. Fac. Cienc. Lisboa, 2, III, p. 269.

See p. 62.

Tropical and Southern African, Madagascar and neighbouring islands, Indian, Malayan archipelago, southern part of North America, South America, Antilles.

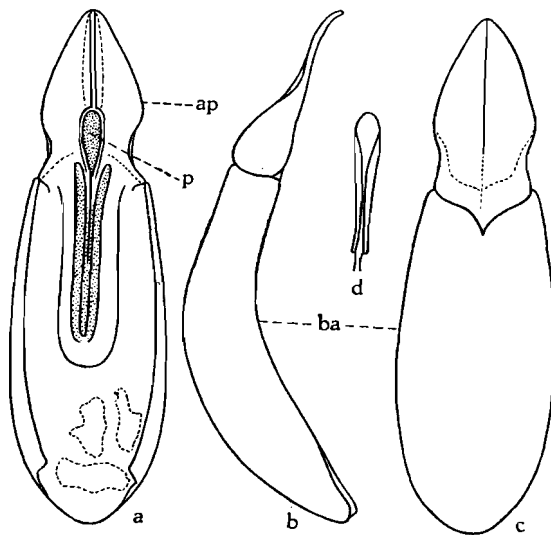


FIG. 8. — Aedeagus of an *Anomalipus* sp.

exhibiting a simple penis, but no lacinia (ap : apicale; ba : basale; p : penis).
a : ventral surface; b : lateral aspect; c : dorsal surface; d : the extracted penis.

- Inner sclerites of aedeagus confined to the simple penis, without lacinia (figs. 11, 12). Mentum, as usual in the *Opatrinæ*, of moderate size, not constricting the maxillary emargination of postgenæ, leaving exposed entirely the maxillary palpi, at the best twice as broad as one of the maxillary emarginations (fig. 10).

II. — **ONGOTINI.**

(Figs. 13, 206.)

KOCH, 1953 *a*, Rev. Fac. Cienc. Lisboa, 2, III, pp. 267, 274. — KOCH, 1954 *a*, Ark. f. Zool. Stockholm, 2, VII, p. 1.
Southern African (map 5).

This tribe is peculiar among all the other *Opatrinæ* by the often truncate and non-emarginate epistome, as well as by the frequent occurrence of tubercles on the secondary intervals of elytra. Although being sharply separated from the *Platynotini*, its phylogenetic relationship seems to be probable by the presence of a stridulatory gula (fig. 9).

The three subtribes are briefly established as follows :

Oncotina. — Prosternal apophysis bent towards foramen (with the exception of *Menederopsis constrictus* KOCH); apical margin of epistome shallowly emarginate.

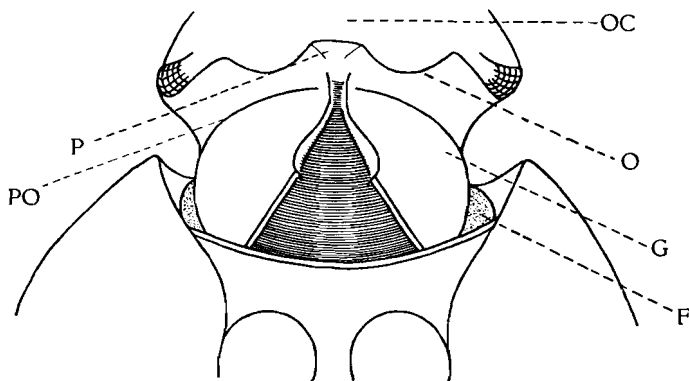


FIG. 9. — The stridulatory gula in the *Oncotini*.
G : gula; O : oral or postgenal margin; OC : oral cavity; P : pre-gular apophysis;
PO : postoral transverse sulcus; F : prothoracic foramen.

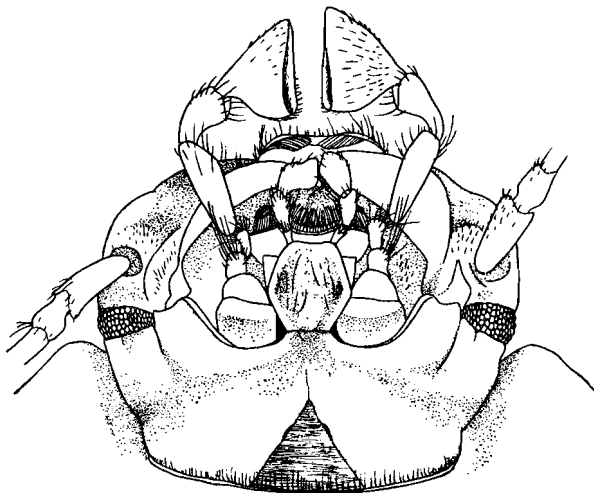


FIG. 10. — Under surface of head of *Eurynotus (Biolus) granulatus* (FABRICIUS).

Schyzoschelina. — Prosternal apophysis bent towards foramen; apical margin of epistome truncate.

Eurynotina. — Prosternal apophysis horizontally projecting beyond coxal cavities.

The genera belonging to this tribe are : *Menederopsis* KOCH, *Ograbies* PÉRINGUEY, *Hirtograbies* KOCH, *Phaleriderma* KOCH, *Onco-*

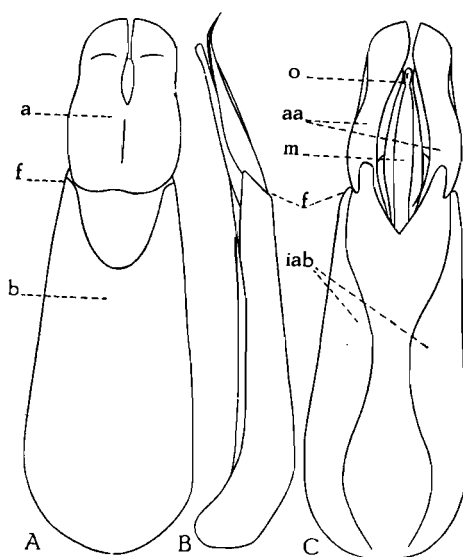


FIG. 11. — *Ædeagus* of *Eurynotus* (s. str.) *capensis* (FABRICIUS).
 a : apicale; b : basale; m : median lobe or penis; f : joint between
 basale and apicale; aa : ventrally separated parameres of apicale;
 iab : inflexed alæ of basale; gb : ventral groove of basale; o : apical
 orifice of penis.

A : dorsal surface; B : lateral aspect, with ventral surface at left;
 C : ventral surface.

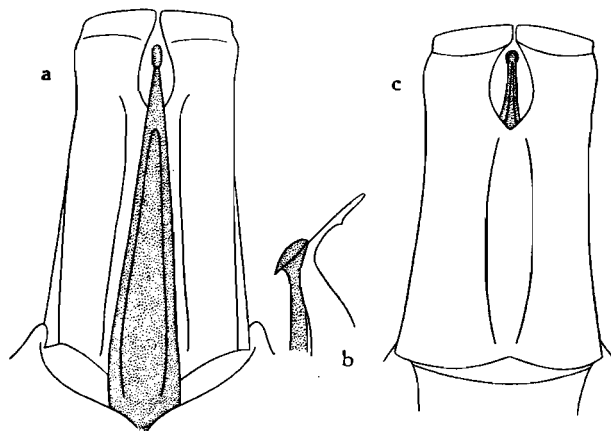


FIG. 12. — Apicale of the *ædeagus* of *Menederes* (s. str.) *dannheimeri* KOCH,
 with the ventrally entirely exposed and simple penis.
 a : ventral surface; b : lateral aspect of apical portion,
 with the ventral surface at left; c : dorsal surface.

tus BLANCHARD, *Capidium* KOCH, *Colophonesthes* KOCH, *Byrrhoncus* KOCH, *Isoncophallus* KOCH, *Stridigula* KOCH, *Menederes* SOLIER, *Psectrapus* SOLIER, *Heteropsectropus* KASZAB, *Schyzoschelus* KOCH, *Eurynotus* KIRBY and *Phylacastus* FAIRMAIRE.

- 3. Ædeagal tegmen uni-partite, without separated apicale and basale; inner sclerites always composed of the penis plus lacinia (figs. 14, 15, 180-186, 207, 218, 219, 252, 253) 4

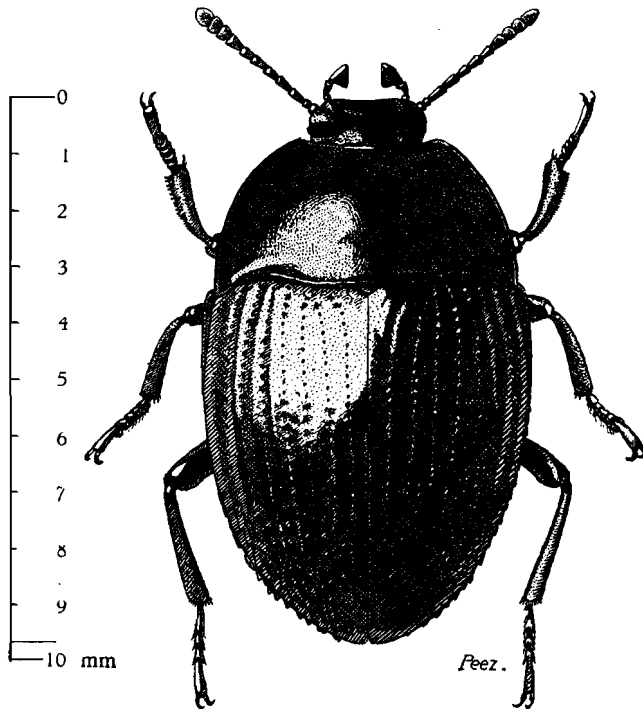


FIG. 13. — *Eurynotus* (s. str.) *barbosai* KOCH.

- Ædeagal tegmen bi-partite or tri-partite, divided clearly into an apicale and a basale by articulation sutures; inner sclerites with or without lacinia (figs. 20, 24, 25, 29-31, 33, 34, 36, 37, 41-45) 6
- 4. Apical portion of ædeagal tegmen divided at least apically (fig. 20), if not distinctly so (*Litoborina* of *Litoborini*), then broad and subtruncate (fig. 180). Eyes bare. Antennæ not clubbed distally. Body never densely covered with scales, in a single case (*Gridelliopus*, fig. 217) with adherent scaly bristles, when the upper surface of anterior tibiæ is straight, inermous, and the pronotum broader than elytra. Body apterous, with the single exception of *Silvestriellum*, fig. 221, in which

- the elytra are costate and the anal sternite of abdomen is broadly marginate 5
- Apical portion of ædeagal tegmen uniform and fused also apically, narrow, attenuate (fig. 14). Eyes with erect scales between corneal facets. Antennæ very short, with sharply demarcated, four-segmented

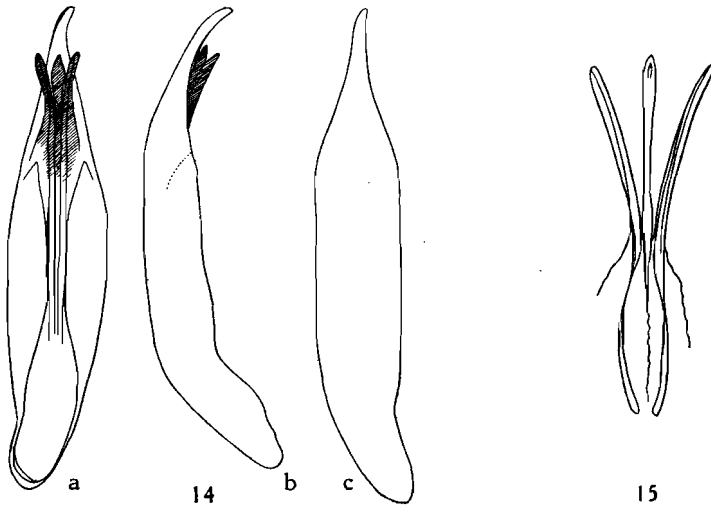


FIG. 14. — Ædeagus of *Leichenum* sp.
a: ventral surface; b: lateral aspect,
with the ventral surface at right;
c: dorsal surface.

FIG. 15. — The extracted penis with
lacinia of ædeagus of *Leichenum* sp.,
outer surface.

club distally. Body densely clothed with sessile, broad scales. Upper surface of anterior tibiae with numerous subdentiform tubercles, the outer apical angle produced outwards and dentiform. Pronotum narrower than elytra. Body alate, but the elytra not costate and the anal sternite of abdomen immarginate (figs. 16, 17).

V. — **LEICHENINI** n. trib.

(Figs. 16, 17.)

Leichenina of *Opatrini* REICHARDT, Tabl. Analyt. Faune U.R.S.S., 19, Inst. Zool. Acad. Sci., Leningrad, 1936, pp. 24, 203.

The *Leichenini* can not be regarded a subtribe of *Opatrini*, as their ædeagal tegmen is uni-partite, neither exhibiting a suture between the apical and basal portions of tegmen, nor a median suture on the apical portion, nor possessing any intermediate sclerites between apicale and basale. Their systematic position may be close to the *Litoborini*, with which they agree in the similarity

of ædeagal structure, the presence of lacinia of ædeagus, the general shape of body and tarsi, although being sharply separated by numerous other morphologic particulars.

The single genus of this tribe, viz. *Leichenum* BLANCHARD, has a wide distribution in the eastern parts of the African Continent, Mediterranean Europe, the temperate and tropical areas of Asia,

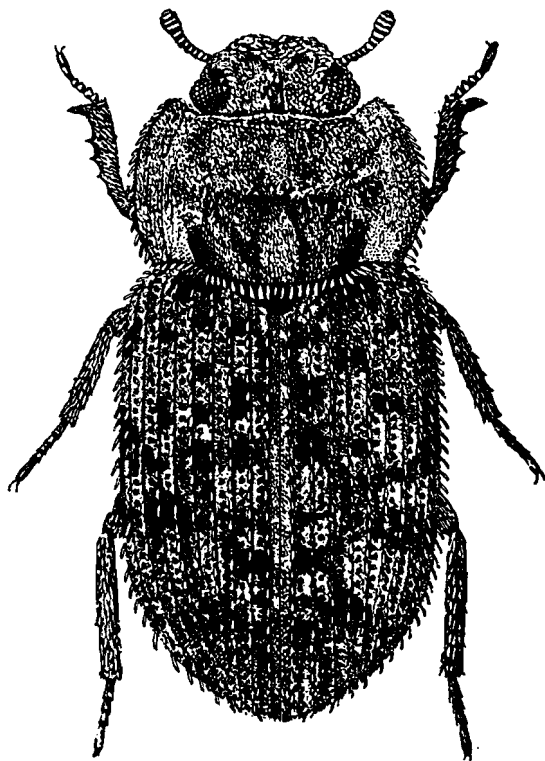


FIG. 16. — *Leichenum canaliculatum* KLUG (after GRIDELLI, 1939).

Madagascar and Malayan archipelagos, occurring also in South-western Australia (cf. GRIDELLI, 1939, Atti Mus. Trieste, XIV, pp. 210, 211).

5. Tarsi with normal preapical segment, clearly heteromerous (fig. 205); in the ♂ the anterior tarsi not or moderately dilated. Mentum unipartite, without lateral wings, emarginated apically (fig. 177). Maxillary palpi with more or less strongly enlarged basal segment; apical segment triangular to fairly securiform (figs. 187, 188, 220, 223). Pseudopleura not occupying the entire ventrally reflected portion of elytra (figs. 179, 230), if exceptionally so, then the integument of upper surface covered with dense bristles (fig. 217).

III. — LITOBORINI.

Litoborinæ ANTOINE, Bull. Soc. Sc. Nat. Maroc, 1941, XXI.

Litoborini ESPAÑOL, « Eos », Rev. Esp. Ent., Madrid, 1945, XX, p. 219. — KOCH,

1953 a, Rev. Fac. Cienc. Lisboa, 2, III, pp. 269, 272.

See p. 275.

The *Litoborini*, originally believed to be endemic to the Atlasic and central areas of the Mediterranean Province, occur in discontinuous ranges of distribution practically in the whole of the African Continent (map 2).

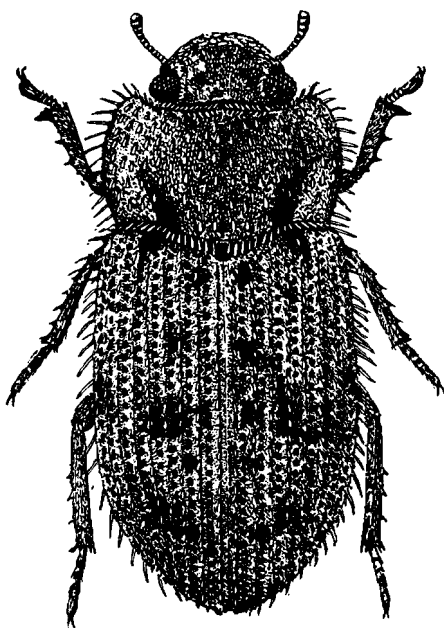


FIG. 17. — *Leichenum muelleri* GRIDELLI (after GRIDELLI, 1939).

- Anterior and intermediate tarsi with rudimentary preapical segment which is very small, narrowly cylindrical and enclosed by the bi-lobate third segment (figs. 239, 245); the tarsi therefore appearing as if homonomous and composed of only four segments. Mentum with acute lateral wings, rounded apically (fig. 237). Apical segment of maxillary palpi in the ♂ extremely enlarged, very strongly securiform; basal segment small (fig. 236). Pseudopleura occupying the entire, ventrally reflected portion of elytra; the pseudopleural crest exposed dorsally. Integument of upper surface of body bare and strongly shiny.

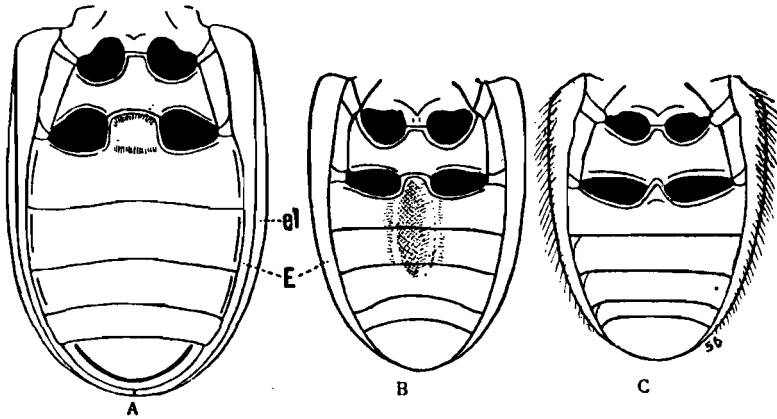


FIG. 18. — Under side of hind body in some *Opatrina*.
 A: *Microstus granulatus* BILLBERG; B: *Monatrum carinatum* GEBLER;
 C: *Udebra fimbriata* MÉNÉTRIES (all after REICHARDT).

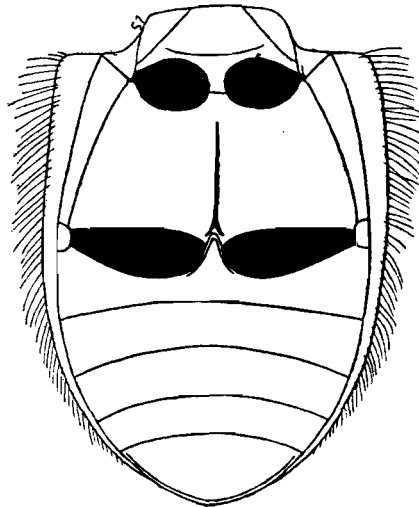


FIG. 19. — Under side of hind body in *Anemia dentipes* BALLION
 (after REICHARDT).

IV. — **LOENSINI** n. trib.

Erected for the single Southern East African genus *Loensus* (map 2), described by GEBIEN under the homonymous name *Pedinopsis*.

See p. 402.

6. *Ædeagal tegmen* bi-partite, without intermediate sclerites between apicale and basale (figs. 20, 21, 24, 26, 29, 30); the parameres of apicale

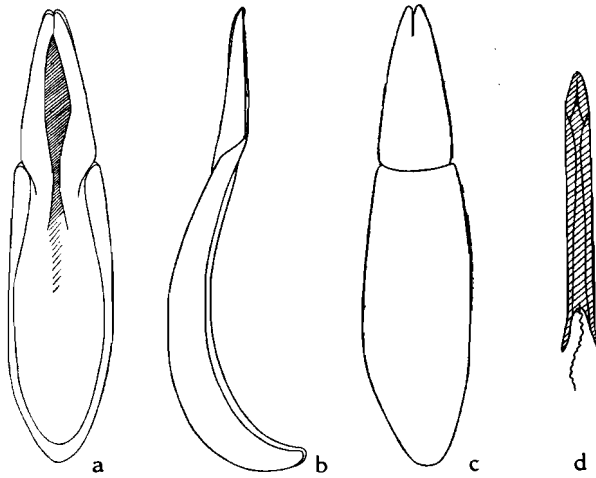


FIG. 20. — Aedeagus of *Melanimon tibialis* (FABRICIUS).
 a : ventral surface; b : lateral aspect, with the ventral surface at right;
 c : dorsal surface; d : the outer surface of the extracted penis.

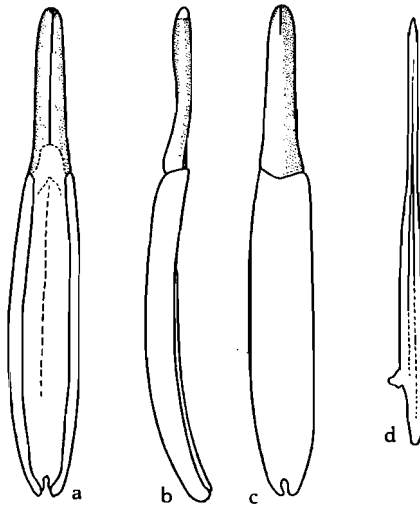


FIG. 21. — Aedeagus of *Anemia* sp. from South-west Africa (Abachaus).
 a : ventral surface; b : lateral aspect, with the ventral surface at right;
 c : dorsal surface; d : the outer surface of the extracted penis.

non-movable; inner sclerites, with a single exception (*Melanimini*, figs. 20, 21), with well developed lacinia (figs. 25, 26, 31) 7

— Aedeagal tegmen partially or altogether tri-partite, with more or less developed intermediate sclerites between apicale and basale (figs. 33, 36,

41, 49, 51, 58, 63, 65, 66); the parameres generally movable and opening sidewise (fig. 42), often enclosing the penis; inner sclerites rarely with lacinia (figs. 43-45, 54-56) 10

- 7. Inner sclerites of ædeagus with lacinia (figs. 25, 26, 29-31). Body apterous. Intercoxal process of basal sternite of abdomen broad, rounded to subtruncate (fig. 19 *a* and *b*). Metasternum very short (fig. 19) and the apicale of ædeagus longer than the basale or about as long as the

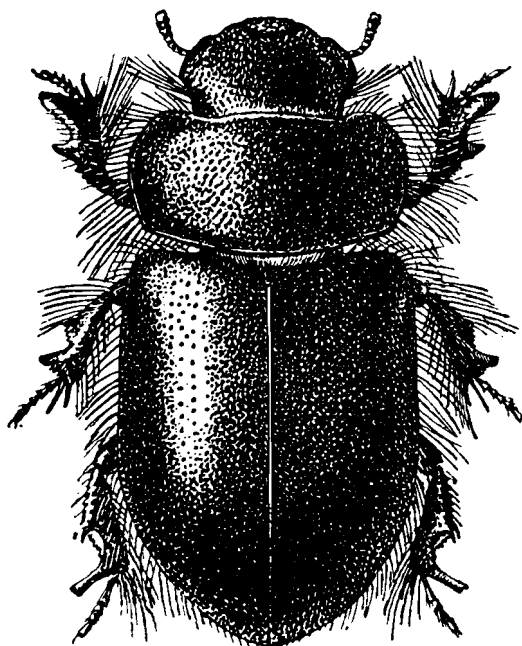


FIG. 22. — *Anemia fausti* SOLSKY (after REICHARDT).

latter (figs. 29, 30), except for the *Pythiopini*, when the basal sternite of abdomen is very large, as long as, or longer than, the two following sternites combined (figs. 27, 28). Anterior tarsi in the ♂ strongly dilated, except for *Pythiopus*, in which the mesosternum bears a prominent, dentiform and erect callosity (fig. 27c)..... 8

- Ædeagus without lacinia (figs. 20, 21). Body fully winged. Intercoxal process of basal sternite of abdomen very narrow and acuminate (fig. 18). Metasternum long and the apicale of ædeagus considerably shorter than the basale (fig. 20). Basal sternite of abdomen of usual size, distinctly shorter than the two following sternites combined. Anterior tarsi non-dimorphic.

IX. — **MELANIMINI** n. trib.

(Figs. 22, 23.)

Melanimonina of *Opatrini* REICHARDT, 1936, Tabl. Analyt. Faune U.R.S.S., 19, Inst. Zool. Acad. Sci., Leningrad, pp. 24, 62.

The *Melanimini* have to be considered an independent tribe and not a subtribe of *Opatrini*. Apart from the very characteristic morphology of their body, the neatly bi-partite ædeagus lacks the inter-

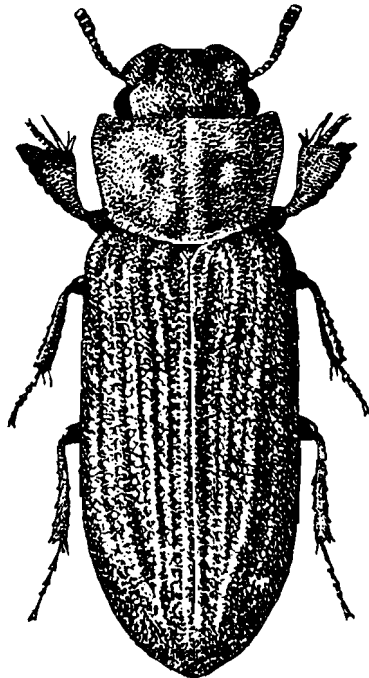


FIG. 23. — *Cnemeplatia atropos* COSTA (after REICHARDT).

mediate sclerites between apicale and basale, which are constantly developed in the *Opatrini*. Recorded from the whole world, but apparently xerophilous, with only the genus *Melanimon* STEVEN to be found also in Northern Europe and Asia. Of the many genera of this tribe *Philhammus* FAIRMATRE, *Cnemeplatia* COSTA, *Anemia* LAPORTE DE CASTELNAU and *Histiæa* FAIRMATRE ⁽¹⁾ occur also in the African Continent, with the three last mentioned genera represented in Africa South of the Sahara.

8. Apicale of ædeagus large, not or only slightly shorter than basale (figs. 29, 30). Body of oval shape (fig. 32). Metasternum short, considerably

(¹) About the systematic position of this genus cf. KOCH, 1953 b.

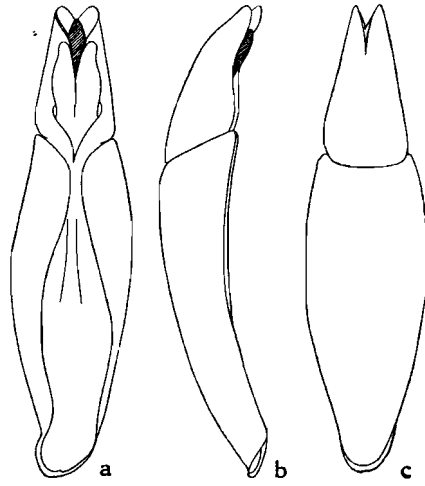


FIG. 24. — Aedeagus of *Pythiopus cornutipectus* KOCH.
 a : ventral surface; b : lateral aspect, with the ventral surface at right;
 c : dorsal surface.

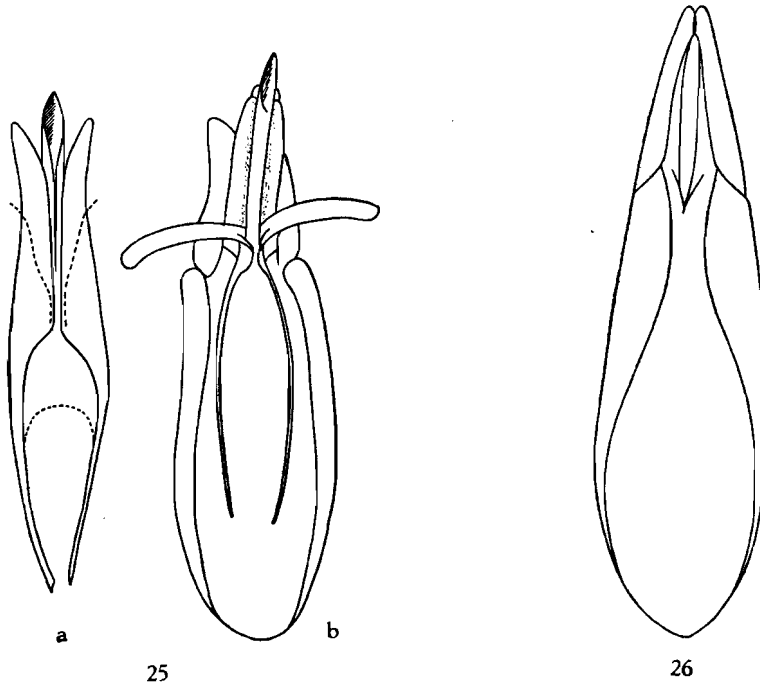


FIG. 25. — a : *Pythiopus cornutipectus* KOCH. Penis and lacinia. — b : *Meglyphus andreaei* KOCH. Ventral surface of aedeagus, with the inner sclerites layed open and the lacinia stretched outwards.

FIG. 26. — Ventral surface of the aedeagus of *Meglyphus andreaei* KOCH.

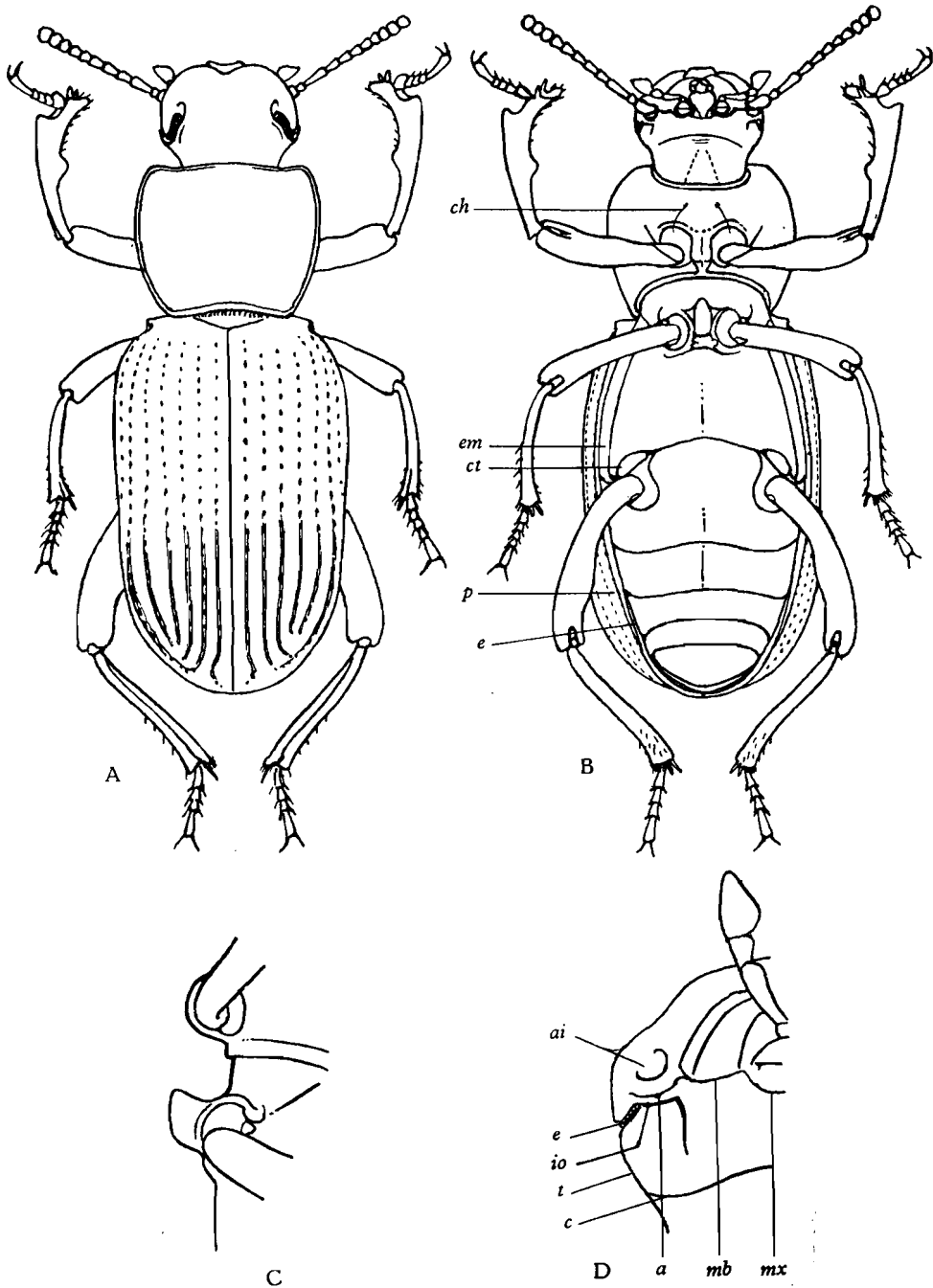


FIG. 27.

- shorter than basal sternite of abdomen; the latter of usual size, distinctly shorter than the two following sternites combined (fig. 19 *a* and *b*). 9
- Apicale of α edeagus small, considerably shorter and less than half the length of the basale (figs. 24, 26). Body of subparallel shape (figs. 27,

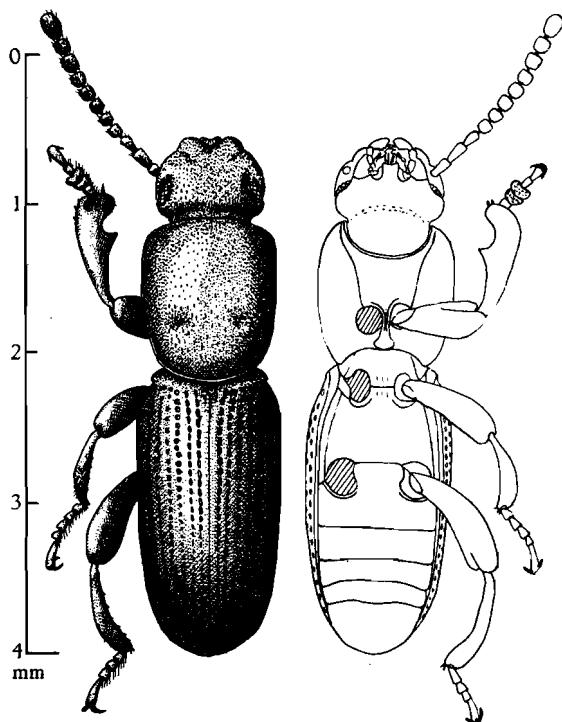


FIG. 28. — *Meglyphus andreaei* KOCH.

28). Metasternum very large, only a quarter shorter than basal sternite of abdomen or about as long as the latter. Basal sternite of abdomen enlarged, as long as the two following sternites combined or longer (figs. 27, 28).

EXPLANATION OF FIGURE 27.

FIG. 27. — *Pythiopus cornutipectus* KOCH, ♂.

A : dorsal aspect. — B : ventral aspect (*ch* : chætotaxical bristles; *ct* : trochantinal sclerite of metacoxal cavities; *e* : epipleuron; *em* : metasternal episternum; *p* : pseudo-pleuron). — C : lateral view of the prominent mesosternal callosity. — D : under surface of head (*ai* : antennal insertion; *c* : cervical sulcus; *e* : ventral section of eye; *io* : infra-ocular slit; *t* : tempora).

VIII. — PYTHIOPINI.

(Figs. 27, 28.)

KOCH, 1953 *c*, Ann. Transv. Mus., XXII, p. 231. — KOCH, 1955 *a*, Ann. Transv. Mus., XXII, p. 450.

Unique among all *Opatrinæ* by the enlarged metasternum which in this case, however, is not correlate with the development of wings or lengthening of legs, as the body is apterous and the legs of slow motion. Usually the enlargement of metasternum is due either to the development of wings (e.g. in the *Opatrinus* of *Platy-*

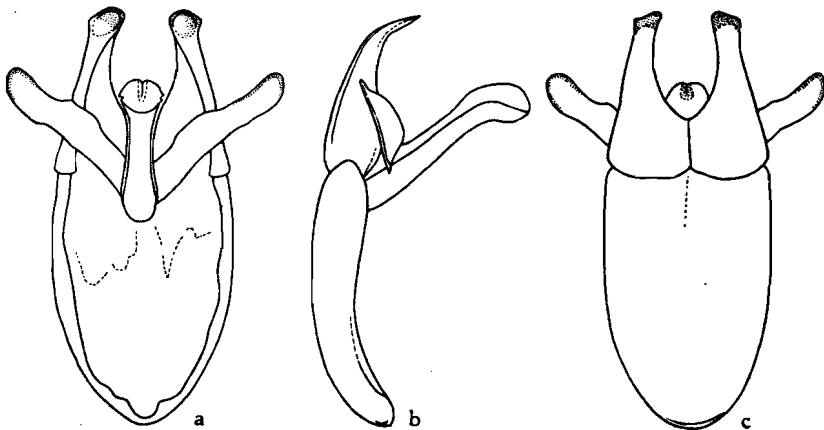


FIG. 29. — Aedeagus of *Dendarus tristis* LAPORTE DE CASTELNAU.
a : ventral surface; b : lateral aspect, with the ventral surface at right;
c : dorsal surface.

notini) or to particularly long and fast moving legs (e.g. in the *Zophosini* and *Crypticini*). Without displaying any signs of a somewhat closer affinity to the *Pedinini* and *Dendarini*, the *Pythiopini* may be placed nevertheless near to these two palæarctic tribes. They agree with both in the generally divided eyes, the complete pseudopleura of elytra, the principles of the structure of aedeagus, as well as in the usually dilated anterior tarsi in the ♂.

Two genera : *Meglyphus* MOTSCHOUJSKY and *Pythiopus* KOCH.

An ancient tribe, endemic to the Western and South-central Cape Province and the western part of Great Namaqualand (map 5).

9. Aedeagal tegmen with the basale being decidedly abbreviate and much shorter than the apicale; sutures between apicale and basale, as well as the parameral division weak. Mentum with median carina. Intercoxal process of basal sternite of abdomen not broader than mesosternal apophysis.

VII. — PEDININI.

MULSANT & REY, 1853 *b*, pp. 37, 147 (« Pedinaires »). — ESPAÑOL, 1945, « Eos », Rev. Esp. Ent., Madrid, XX, pp. 218, 226.

Euro-Mediterranean and in the southern parts of Palæarctic Asia. Of the three genera *Pedinus* LATREILLE, *Colpotus* MULSANT & REY and *Cabirutus* (MULSANT & REY) only a single species, viz.

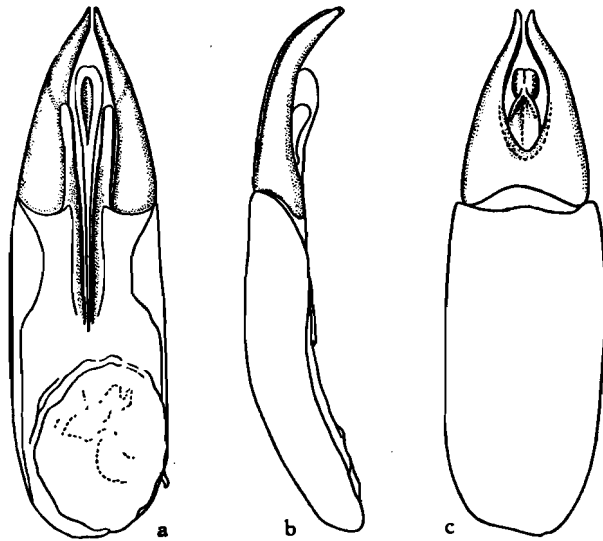


FIG. 30. — Aedeagus of *Phylan* sp. from Morocco (Azrou).
a : ventral surface; b : lateral aspect, with the ventral surface at right;
c : dorsal surface.

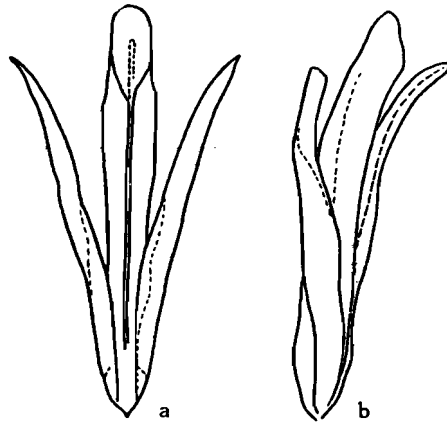


FIG. 31. — The extracted penis and lacinia of *Phylan* sp. from Morocco (Azrou).
a : outer surface; b : diagonal view.

Cabirutus cyrenaicus GRIDELLI, penetrates from the East into the north-eastern corner of the African Continent, namely to Mediterranean Egypt and Cyrenaica (map 2). MULSANT & REY in their splendid monograph of *Opatrinæ* assigned to this natural tribe the three genera *Pedinus*, *Colpotus* and *Cabirutus*. This tribe, having

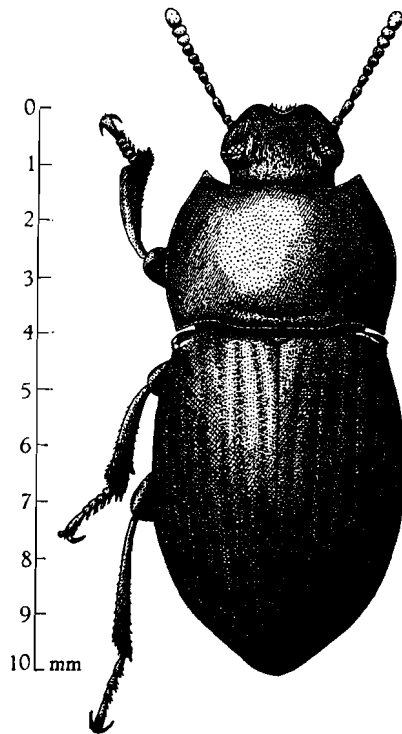


FIG. 32. — *Bioplanes meridionalis* MULSANT & REY.

been confused past recognition by the erroneous interpretation of subsequent authors, such as LACORDAIRE, REITTER and GEBIEN, it was ESPAÑOL who re-established this group in exactly the same conception as originally proposed by MULSANT & REY, confirming these authors' division by the study of the copulatory organs of ♂. However, at this occasion, no credit was given to these great French scientists.

- Basale and apicale of ædeagus of about equal length; sutures between both parts well marked; parameral division deep, the parameres usually gaping (figs. 29-31). Mentum without median carina. Intercostal process of basal sternite of abdomen broader than mesosternal apophysis.

VI. — DENDARINI.

(Fig. 32.)

ESPAÑOL, 1945, « Eos », Rev. Esp. Ent., Madrid, XX, pp. 216, 225.

Circum-Mediterranean, in the East expanding as far as the Transcaspian Province. A single species of probably Atlantic origin, viz. *Phylan* (s. str.) *gibbus*, spreading to Northern Europe.

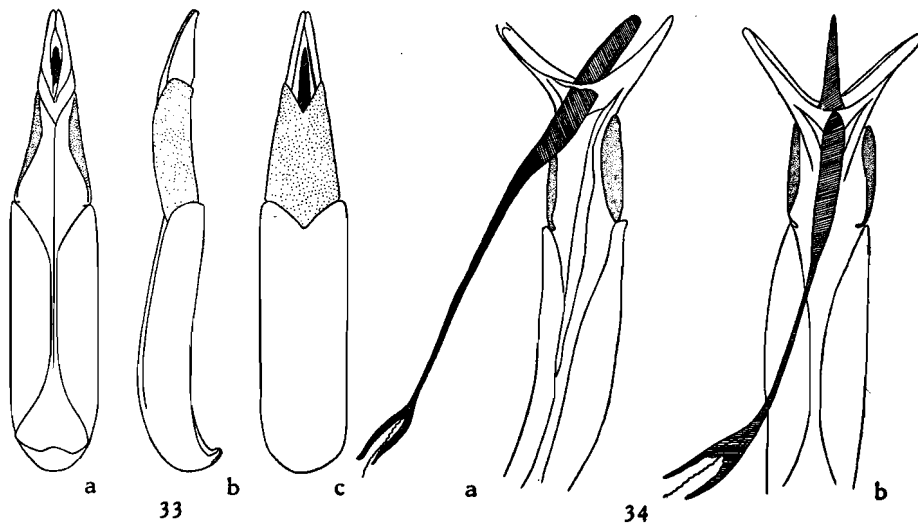


FIG. 33. — Aedeagus of *Heterocheira fryeri mocambicola* KOCH (dotted : intermediate sclerite between basale and apicale; striolate : exposed portion of penis).

a : ventral surface; b : lateral view, with the ventral surface at right; c : dorsal surface.

FIG. 34. — Ventral surface of the aedeagus of *Heterocheira fryeri mocambicola* KOCH, with opened parameres and after removal of the covering external membranes (dotted : inflexed alæ of the intermediate sclerite between basale and apicale; striolate : penis).

a : exact ventral view; b : diagonal view.

To this tribe belong the genera *Isocerus* LATREILLE, *Dendarus* LATREILLE, *Bioplanes* MULSANT & REY, *Phylan* STEPHENS, *Micrositus* MULSANT & REY, and *Heliopathes* DEJEAN ⁽¹⁾. With the exception of the Central-Mediterranean *Bioplanes* and the disjunct, West- and East Mediterranean *Micrositus* (cf. ESPAÑOL, 1947, Trab. Mus. Barcelona, nueva ser. zool., I., p. 15), all the other genera are also represented in the north-western part of the African Continent, there being strictly confined to the Atlasic Province and not extending eastwards beyond Tunis (map 2).

⁽¹⁾ Because of nomenclatoric reasons DEVILLE & MÉQUIGNON (L'Abeille, 1938, p. 319) proposed for *Heliopathes* the name *Heliochæx* BEDEL.

10. *Ædeagal tegmen* only partially tri-partite (figs. 36, 41, 51, 58, 63, 65, 66). The dorsal intermediate sclerite inserted at the base of parameres, overlapping the latter, exactly dorsal in position and not produced around tegmen towards the ventral surface of apicale, therefore without inflexed alæ ventrally; very small to minute, transverse, occupying only a very small part of the length of parameres. The base of parameres

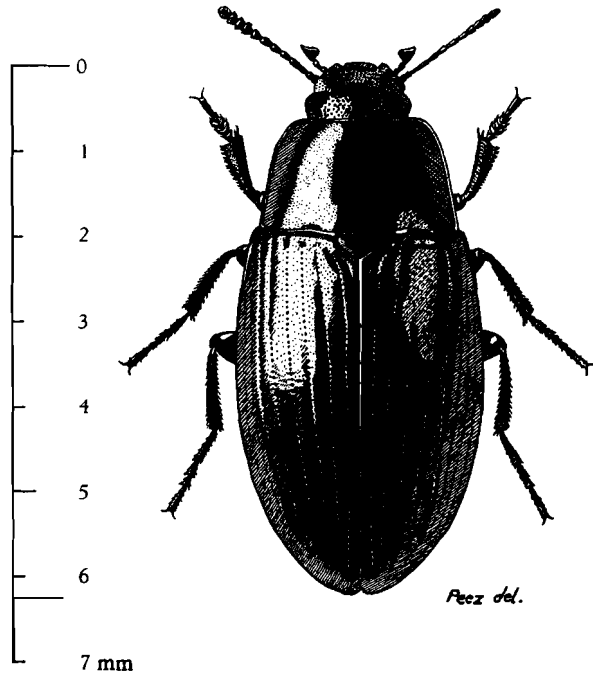


FIG. 35. — *Heterocheira fryeri mocambicola* KOCH.

- directly jointed to the articulation surface of basale, usually underneath the overlapping, dorsal intermediate sclerite (fig. 58). Anterior tarsi in the ♂ rarely dilated, but if so, then the tibiæ not spinose. **11**
- *Ædeagal tegmen* truly tri-partite (figs. 33, 34). The dorsal intermediate sclerite inserted at the base of apicale, very distant from parameres and with its apical sutures joining the base of parameres, but not overlapping them, dorso-latero-ventral in position, produced around tegmen towards the ventral surface of apicale and there with narrow inflexed alæ; very large and about a quarter longer than parameres. The base of parameres dorsally exposed, jointed to the apical margin of dorsal intermediate sclerite and not to the articulation surface of basale from which it is widely separated by the entire length of intermediate sclerite (figs. 33, 34). Anterior tarsi in the ♂ dilated, the tibiæ spinose.

XII. — **HETEROCHEIRINI** n. trib.

(Fig. 35.)

This new tribe, the species of which were misinterpreted and placed to the *Pedinini* sensu LACORDAIRE and auct., is isolated among all *Opatrinæ* by the unique and truly tri-partite structure of ædeagal tegmen. The inner sclerites of ædeagus are confined to the simple penis. The alate body, the epistomal emargination, the intersegmental membranes between the apical sternites of abdomen, the formation of body, as well as the movable and unclasping parameres of ædeagus place this new tribe into the relationship of the *Opatrini*.

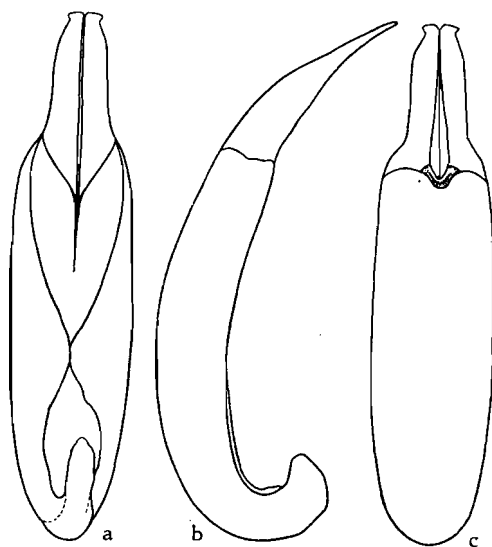


FIG. 36. — Ædeagus

of a *Heterotarsus* sp. from the Belgian Congo Elisabethville Province.
 a : ventral surface; b : lateral aspect, with the ventral surface at right;
 c : dorsal surface.

Erected on the genus *Heterocheira* LACORDAIRE (cf. also KOCH, 1953d, Bol. Soc. Estud. Moçambique, Lourenço Marques, n° 82, p. 5). To the same tribe belongs also *Diphyrrhynchus* FAIRMAIRE (cf. GEBIEN, 1922, Transact. Linn. Soc. London, XVIII, p. 261 and KOCH, 1935, Bull. Soc. R. Ent. d'Egypte, p. 77).

As is the case with the *Phalerini*, *Trachyscelini*, and *Opatrini* of the *Ammobius* group, the *Heterocheirini* display strictly littoral habits and are widely spread along the shores of Eastern Africa, India, Australia, the Madagascar-Malayan-Australian archipelagos, with one species, viz. *Diphyrrhynchus ænescens* FAIRMAIRE, entering into the Palæarctic Region along the shores of the Red Sea.

11. Lacinia of ædeagus always developed, but grown together and forming a uni-partite, foliaceous sclerite, laying above outer surface of penis (fig. 37). Tarsi with rudimentary preapical segment; the latter extremely small and completely enclosed by the strongly dilated, bi-lobate prepenultimate segment; tarsal scheme therefore appearing as if 4-4-3. Tarsi in both sexes very strongly dilated.

XI. — **HETEROTARSINI** sensu novo.

(nec *Heterotarsini* GEBIEN, 1938-1942, p. 672).

The *Heterotarsini*, as interpreted by GEBIEN, 1938-42 (cf. also *Heterotarsinæ* GEBIEN, 1920, p. 11) are a most artificial and mixed group of genera, which, in actual fact, belong to different subfamilies.

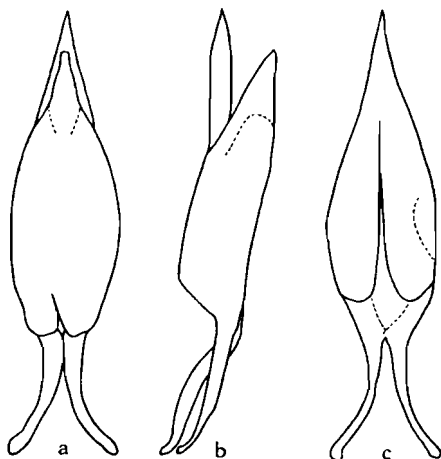


FIG. 37. — The extracted penis with the fused lacinia of ædeagus of *Heterotarsus* sp. from the Belgian Congo Elisabethville Province.
a : outer surface; b : lateral aspect; c : inner surface.

The genus *Heterotarsus* LATREILLE, however, exhibiting a deep opatrinoid emargination of epistome, agrees with the subfamily of *Opatrinæ* also in the similarity of structure of ædeagus (fig. 36) and in the formation of body. By these characters it is sharply separated from all the other genera of the *Heterotarsini* sensu GEBIEN. The latter are not only very different in the structure of ædeagus but disagree strongly with the *Opatrinæ* in the general build of body.

The genus *Heterotarsus* can not fall under the tribe of *Opatrini* because of the peculiar structure of inner sclerites of ædeagus, the formation of tarsi and many other particulars; it stands best for an independent tribe. Tropical African, Indian, Malayan, but also in China, Japan and Formosa. On the African Continent ranging from the southern limits of Sahara to the northern and eastern outskirts of Southern Africa.

- Lacinia of ædeagus rarely developed (figs. 43-45, 54-56); if so, then bipartite and forming a pair of styli or homologous bi-lateral structures. Tarsi with normal preapical segment; the tarsal scheme therefore distinctly 5-5-4. In the ♂ rarely dilated the anterior tarsi alone.

X. — **OPATRINI** sensu novo.

To the *Opatrini* in this new conception belong five sharply separated subtribes which all agree in the presence of intermediate sclerites between the apicale and the basale of ædeagus. This character is of great importance and very constant. ESPAÑOL, 1945, in his

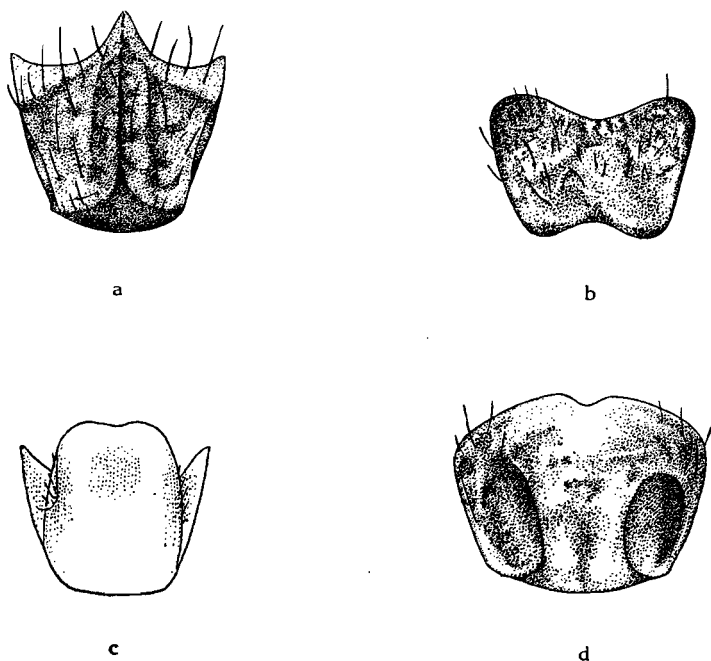


FIG. 38. — The mentum in a few *Opatrini*.
 a: *Pachypterus* (*Trachymetus*) sp. from Senegal (M'Bambey) (*Opatrina*);
 b: *Scleron orientale* (FABRICIUS) from Egypt (*Sclerina*); c: *Blenosia* sp.
 from South-west Africa (Windhoek) (*Stizopina*); d: *Stizopus* sp. from the
 Cape Province (Fraserburg) (*Stizopina*).

recent division of Palæarctic *Opatrinæ*, separated the *Opatrini* from all the other tribes (viz. *Litoborini*, *Pedinini* and *Dendarini*) by the supposed absence of lacinia of ædeagus. This conclusion does not hold, as there exist many species and genera of *Opatrini*, exhibiting lacinia or homologous structures within the ædeagal tegmen. For the greater part, however, these inner sclerites are entirely concealed, as they are closely attached to the penis, and, together with

the latter, entirely or partially enclosed in the alveated parameres of apicale, during the unopened state of rest. As to the great variability and complexity of the inner sclerites of aedeagus in the *Opatrini* I refer to the figures 41, 42, 43, 44, 45, 49, 51, 53, 54, 55, 56, 58, 63, 64, 65, 66. The criterion of the earlier authors and introduced by LACORDAIRE, viz. the non-dilated anterior tarsi in the ♂ of *Opatrini*,

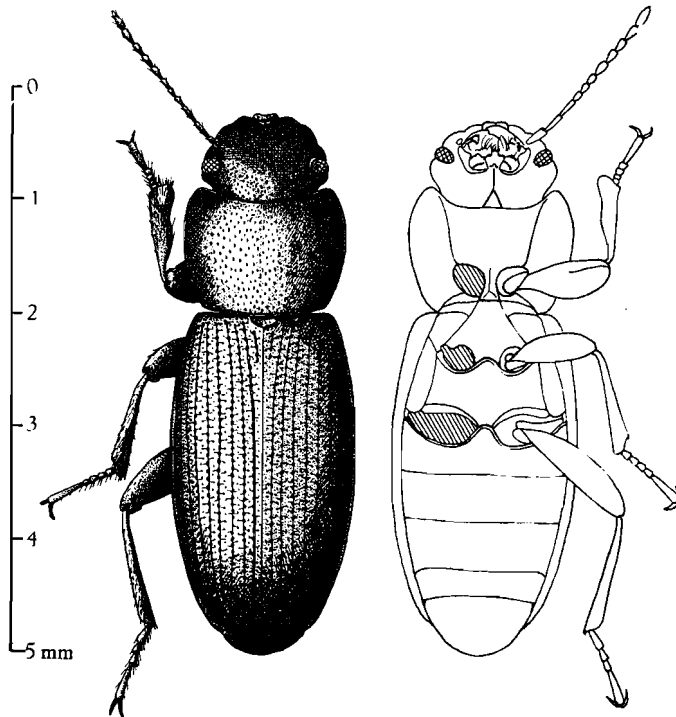


FIG. 39. — *Dilamus bottoi* KOCH, from Southern Africa.

is insufficient, as on the one hand many genera and species occur in the *Opatrini*, the ♂ of which exhibits often strongly dilated anterior tarsi (e.g. *Stenolamus*, *Sulpius*, *Dilamus*, *Pachypterus*, *Mesomorphus* etc.), whereas on the other hand ♂♂ with non-dilated anterior tarsi are frequently found in the *Platynotini*, *Oncotini*, *Litoborini*, *Pythiopini*, *Dendarini*, as well as in all *Leichenini* and *Melanimini*. In the African Continent occur the subtribes of *Sclerina*, *Opatrina*, *Stenolamina*, *Emmallina* and *Stizopina*. Of these groups only the *Emmallina* are exclusively Tropical, while the *Opatrina* are Pan African and the Palæarctic *Sclerina* enter to a moderate extent the Ethiopian and Oriental Provinces of the Tropical African Region. The *Stenolamina* and *Stizopina* are Southern African (map 5). The *Stizopina*, although sharply separated from all the other *Opatrini* by the entirely exposed,

rather broad epipleura and strikingly broad, abruptly abbreviate pseudopleura (fig. 59), can not be regarded a different tribe (as was suggested by GEBIEN, 1938, p. 90). The structure of their aedeagus, with the same intermediate sclerites between apicale and basale (fig. 58) does not differ essentially from all the other *Opatrini*. Of these subtribes the following genera are African or represented also in Africa.

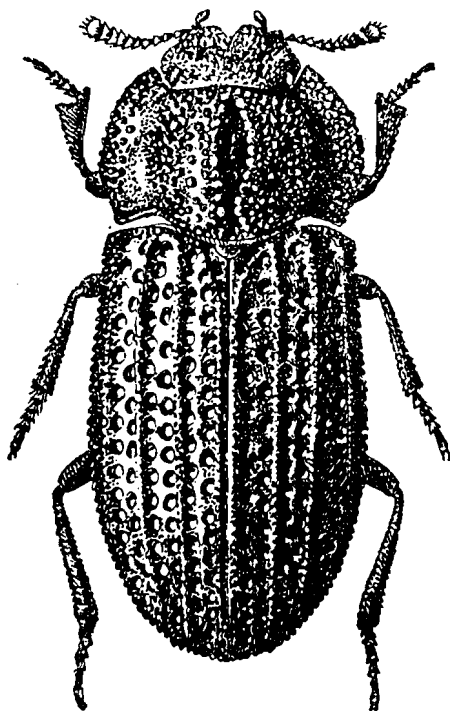


FIG. 40. — *Polycælogastridium sexcostatum* MOTSCHOUJSKY
(after REICHARDT).

1. — *Opatrina*.

a) *Dilamus* JACQUELIN DU VAL (fig. 39). Previously known from Northern Africa and Abyssinia, this genus was recently recorded also from Southern Africa, the Senegal and Sudan (cf. KOCH, 1955a). It has probably a Pan African distribution.

b) *Pseudolamus* FAIRMAIRE. Northern African, but penetrating into the northern parts of Tropical Africa.

c) *Pachypterus* LUCAS. Northern and Tropical African.

d) *Mesomorphus* SEIDLITZ. Tropical African, in its range of distribution almost agreeing with that of *Opatrinus* of *Platynotini*. Occur-

ring also in the northern and eastern parts of Southern Africa, with a single species (viz. *Mesomorphus setosus* MULSANT & REY) entering along the Nile valley into the Palæarctic Region of Egypt.

e) *Sulpius* FAIRMAIRE. Madagascar. On account of the strongly dilated anterior tarsi in the ♂ erroneously placed to the *Pedinini* sensu GEBIEN (1938-1942), this genus exhibits the characteristic structure of ædeagus of *Opatrina*.

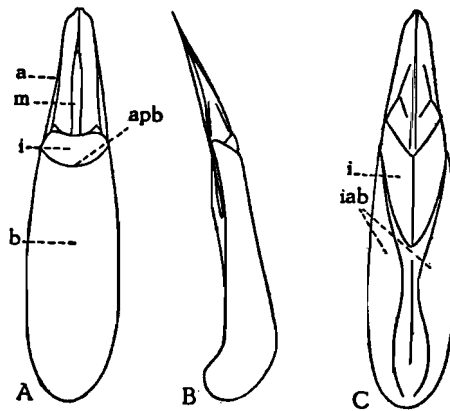


FIG. 41. — Ædeagus of *Gonocephalum gridellii* KOCH.

a : apicale; b : basale; m : median lobe or penis; i : intermediate sclerites between basale and apicale; apb : apical margin of basale; iab : inflexed alæ of basale.

A : dorsal surface; B : lateral aspect, with the ventral surface at left;
C : ventral surface.

f) *Polycælogastridium* REICHARDT (fig. 40). As a relict occurring only on the Gebel Barca in the Northern African Cyrenaica (cf. KOCH, 1939 and 1940).

g) *Gonocephalum* SOLIER. In the whole African Continent.

h) *Opatrum* FABRICIUS. In Africa confined to the western and central parts of Northern Africa.

i) *Opatropis* REITTER. Probably Pan African.

j) *Opatroides* BRULLÉ, (fig. 46). Discontinuous Pan African, hitherto not recorded from the central parts of Tropical Africa.

k) *Lobodera* MULSANT & REY. Northern African and South-west Saharan.

l) *Proscheimus* DESBROCHERS (fig. 47). In Africa found only in Egypt.

m) *Ammotrypes* FAIRMAIRE. Endemic to the Western Sahara.

n) *Perithrix* FAIRMAIRE. Endemic to the Western Sahara.

- o) *Amphitrix* ESPAÑOL. Endemic to the Western Sahara.
 p) *Brachyesthes* FAIRMAIRE. Northern Africa.
 q) *Moralesia* KASZAB (fig. 48). Endemic to the Western Sahara.
 r) *Ammobius* GUÉRIN (fig. 50). In Africa only in the western part of Northern Africa.
 s) *Raynalius* CHATANAY. Endemic to the coast of Senegal.

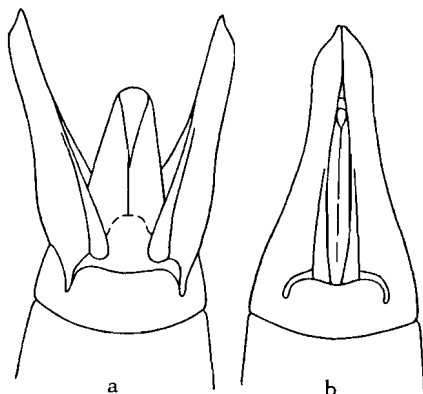


FIG. 42. — Apicale of the aedeagus of *Gonocephalum rusticum* OLIVIER.
 a: with opened parameres; b: in state of rest (after GRIDELLI, 1948).

- t) *Corinta* KOCH. Littoral and endemic to the coast of Portuguese East Africa. There is some supposition that this genus is synonymous with the Philippine genus *Nesocædius* KOLBE.
 u) *Cornopterus* KOCH. Littoral and occurring on the coasts of Portuguese East Africa, Natal and the South-eastern Cape Province.
 v) *Cædius* MULSANT & REY. Practically Pan African, but absent from the western parts of Northern Africa and the south-western parts of South Africa.
 w) *Mateuina* ESPAÑOL (fig. 52). Endemic to the Western Sahara.
 x) *Ammidium* ERICHSON. Confined to the coast of South-western Angola.
 y) *Clitobius* MULSANT & REY. Discontinuous Pan-African, but not in the central parts of Tropical Africa, nor in the southern parts of Southern Africa.

2. — **Stenolamina.**

The single genus *Stenolamus* GEBIEN (fig. 57), which is split up into a great number of sharply separable species, occurs only in the western area of Southern Africa, from the South-western Cape Province northwards as far as Lobito in Central-western Angola.

3. — **Stizopina.**

In a great number of genera of which many are not yet described occurring all over the Southern African Region, with the exception of the south-eastern parts of Portuguese East Africa, Natal and the South-eastern Cape Province (map 5).

a) *Nemanes* FAIRMAIRE (fig. 61). Southern Namib.

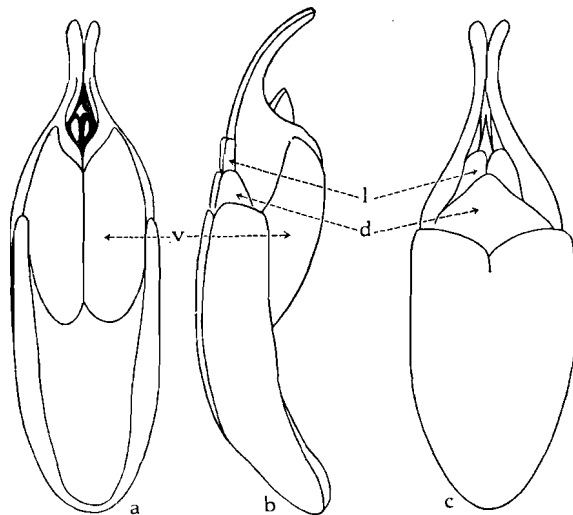


FIG. 43. — Aedeagus of a *Gonocephalum* sp. of the *perplexum* group.
 v : ventral intermediate sclerite between basale and apicale; d : dorsal intermediate sclerite between basale and apicale; l : exposed portion of dorsal pair of lacinia.
 a : ventral surface; b : lateral aspect, with the ventral surface at right;
 c : dorsal surface.

b) *Periloma* GEBIEN (fig. 62). Southern Namib.

c) *Psammogaster* KOCH (fig. 59). Southern Namib.

d) *Syntyphlus* KOCH. Southern Namib. The only known anophthalmous Opatrin.

e) *Parastizopus* GEBIEN (fig. 58). From Central Damaraland to the Northern and Central Cape Province.

f) *Stizopus* ERICHSON. Southern-west African (from the Southern Cape Province into South-western Angola) and Trans-Bechuanian (from Damaraland to Transvaal and Southern Rhodesia).

g) *Helibatus* MULSANT & REY. In the Cape Province, Orange Free State and Transvaal.

h) *Amathobius* GEBIEN. From the Northern Cape Province to Eastern Damaraland and North-western Bechuanaland.

i) *Planostibes* GEMMINGER & DE HAROLD. From the South-western Cape Province into Great Namaqualand.

j) *Blenosia* LAPORTE DE CASTELNAU. From the South-western Cape Province to South-western Angola.

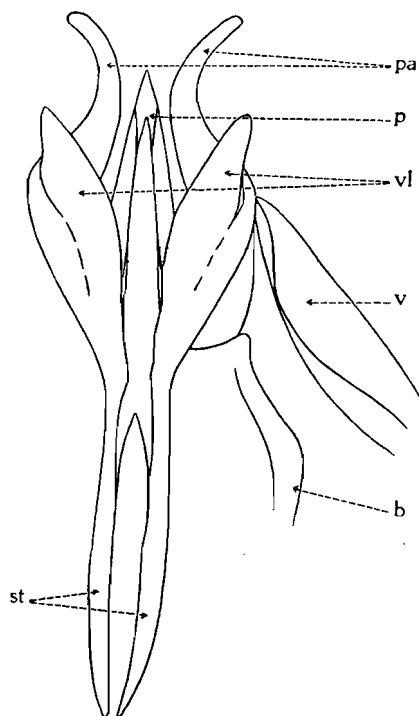


FIG. 44. — Outer surface of the extracted inner sclerites plus parameres of the aedeagus of a *Gonocephalum* sp. of the *perplexum* group. b : a part of the basale of aedeagal tegmen; p : penis; pa : the unfolded parameres of apicale; st : struts of inner sclerites; v : a part of the ventral intermediate sclerite between basale and apicale; vl : the ventral pair of lacinia, fastened to the inflexed alæ of parameres (as is the case in many *Platynotini*).

k) *Blacodes* BLANCHARD. Endemic to the southern part of the South-western Cape Province, the Cape Peninsula included.

4. — **Emmallina.**

With the single genus *Emmallus* ERICHSON (pl. I, fig. 3), occurring in the central and southern parts of Tropical Africa and the northern outskirts of Southern Africa.

5. — **Sclerina.**

a) *Scleron* HOPE. In the central and eastern parts of Northern Africa, and the northern part of Tropical Africa.

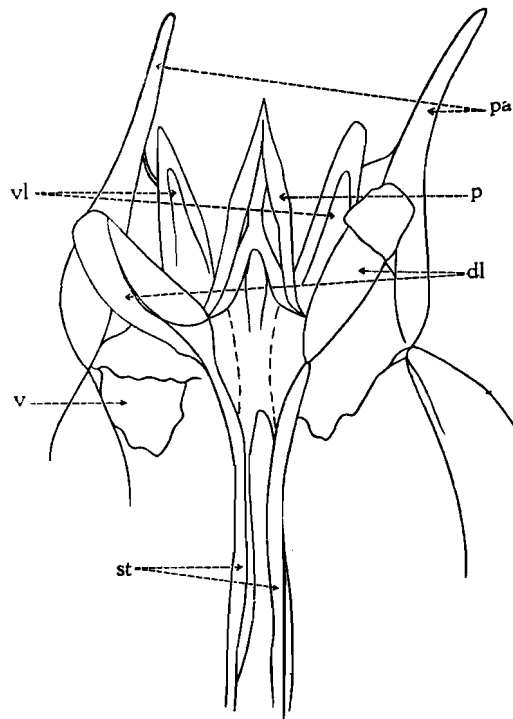


FIG. 45. — The dissected inner surface of the inner sclerites plus parameres of the aedeagus of a *Gonocephalum* sp. of the *perplexum* group. dl : the dorsal pair of lacinia, unfolded; p : penis; pa : the unfolded parameres of apicale; st : struts of inner sclerites; v : a part of the ventral intermediate sclerite between basale and apicale; vl : the ventral pair of lacinia.

b) *Eurycaulus* FAIRMARE. Northern African and in the Western Sahara.

c) *Platynosum* MULSANT & REY (fig. 67). Hitherto only found in the central and eastern parts of Northern Africa, but also in the western part of the Belgian Congo and in South-western Angola.

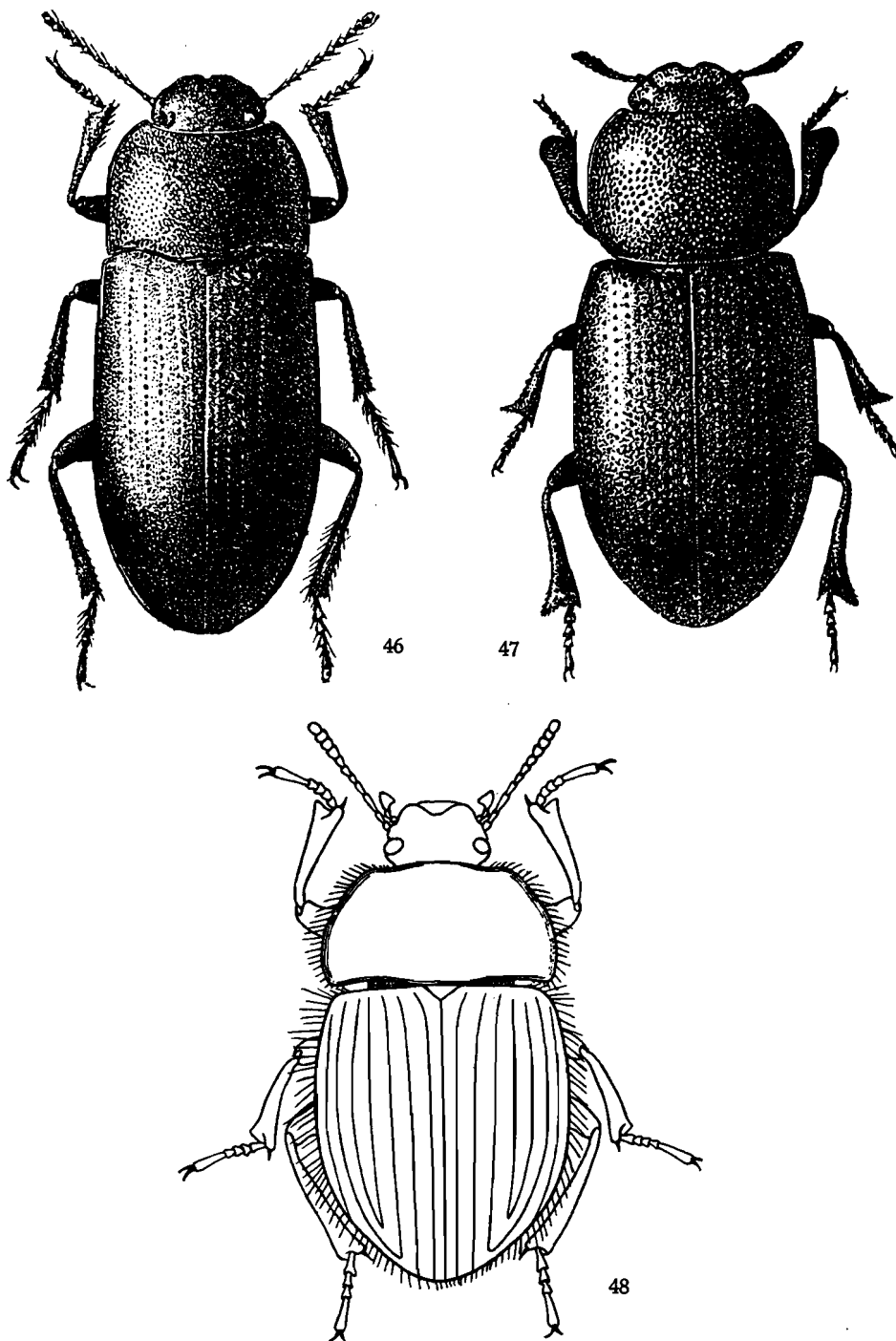


FIG. 46. — *Opatroides punctulatus* BRULLÉ (after REICHARDT).
FIG. 47. — *Proscheimus fulvipes* MÉNÉTRIES (after REICHARDT).
FIG. 48. — *Moralesia longepilosa* KASZAB (after ESPAÑOL, 1944).

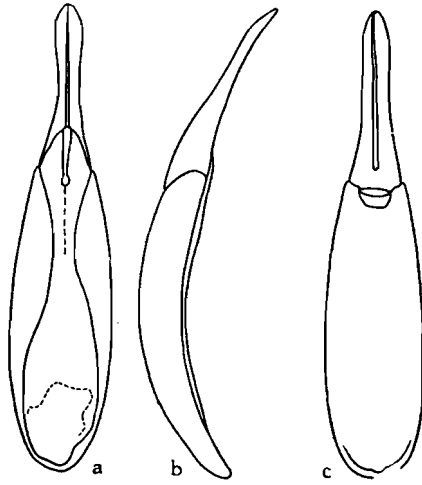


FIG. 49. — *Ædeagus* of *Moralesia longepilosa* KASZAB.
a : ventral surface; b : lateral aspect, with the ventral surface at right;
c : dorsal surface.

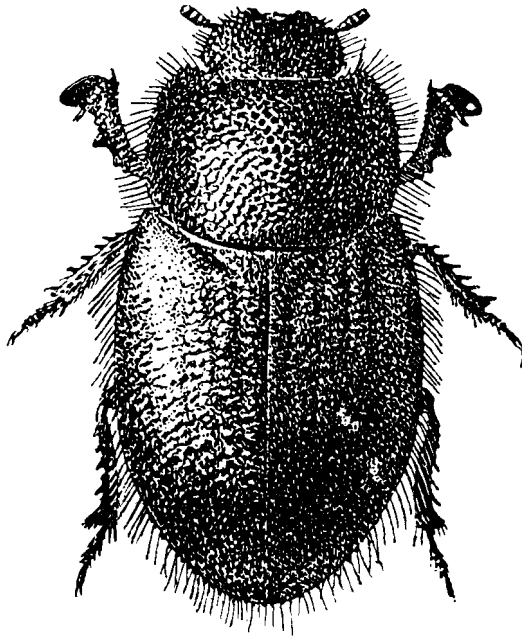


FIG. 50. — *Ammobius rufus* LUCAS (after REICHARDT).

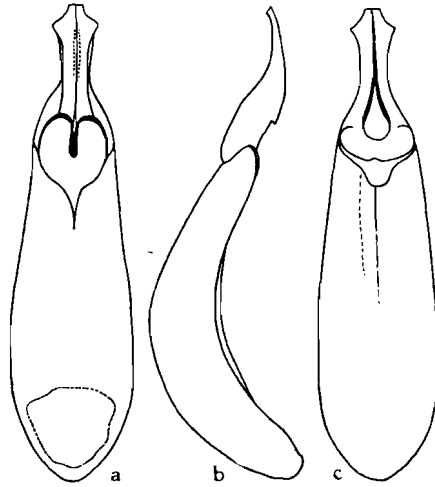


FIG. 51. — *Ædeagus* of a *Cædius* sp. from Ruanda-Urundi.
a : ventral surface; b : lateral aspect, with the ventral surface at right;
c : dorsal surface.

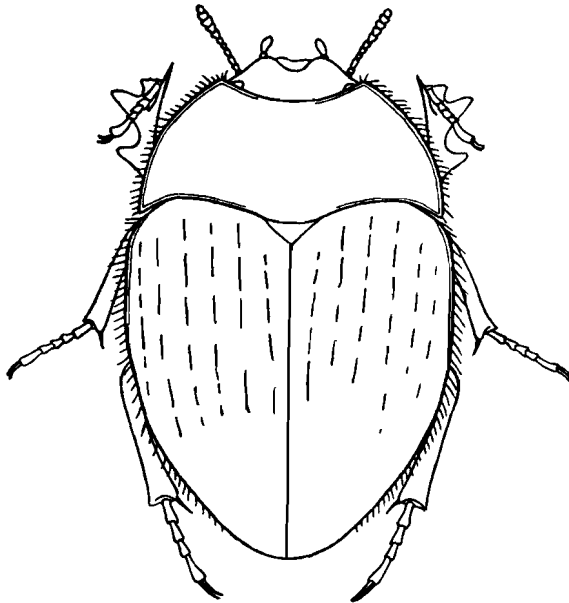


FIG. 52. — *Mateuina kaszabi* ESPAÑOL (after ESPAÑOL, 1944).

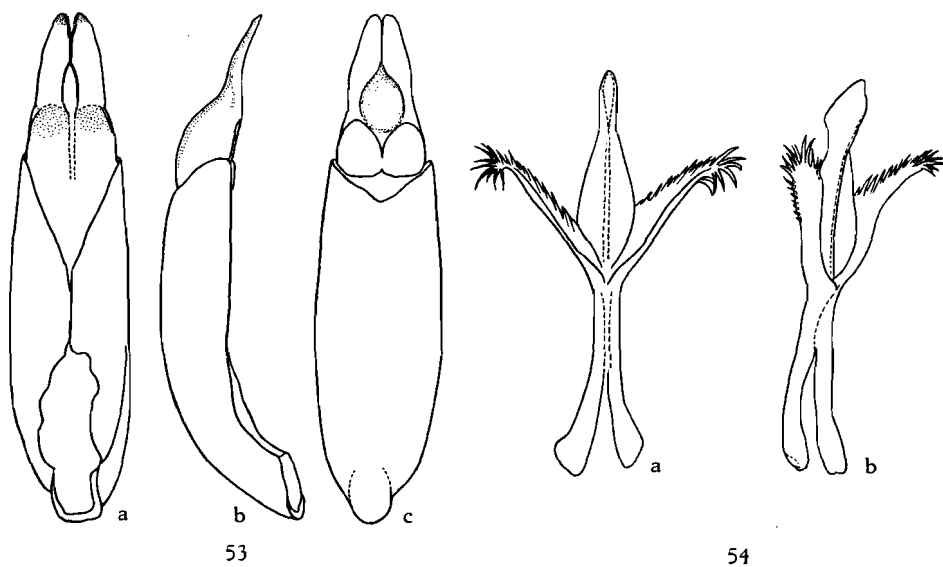


FIG. 53. — Ædeagus of an *Ammidium* sp. a : ventral surface; b : lateral aspect, with the ventral surface at right; c : dorsal surface.

FIG. 54. — The extracted penis and lacinia of ædeagus of a *Clitobius* sp. from the Cape Province. a : outer surface; b : diagonal view.

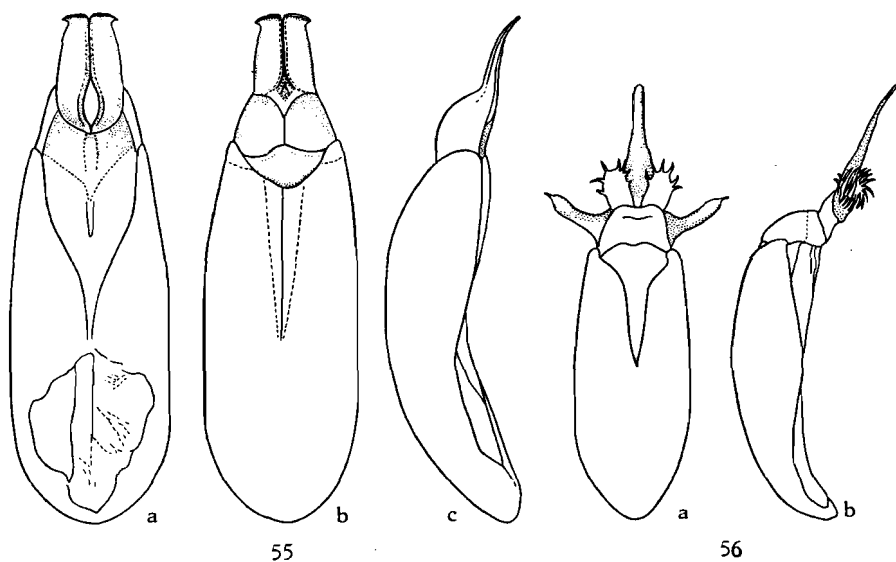


FIG. 55. — Ædeagus of a *Clitobius* sp. from Moçamedes. a : ventral surface; b : dorsal surface; c : lateral aspect, with the ventral surface at right.

FIG. 56. — Ædeagus of a *Clitobius* sp. from Moçamedes, with opened parameres. a : dorsal surface; b : lateral aspect, with the ventral surface at right.

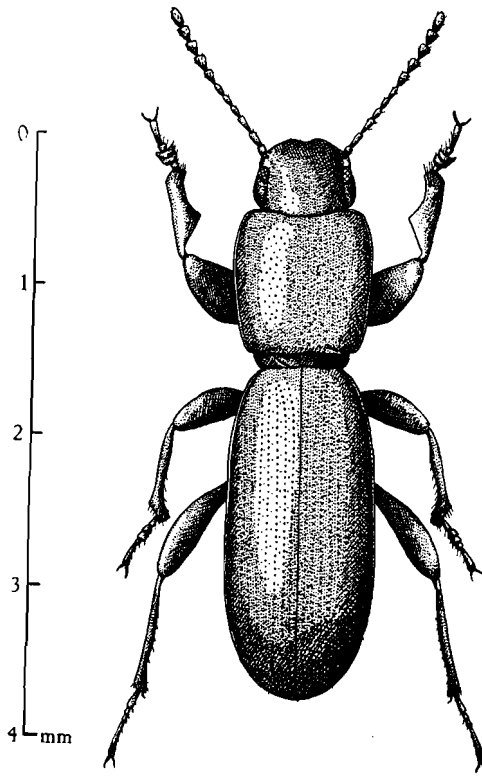


FIG. 57. — *Stenotamus furciphallus* KOCH.

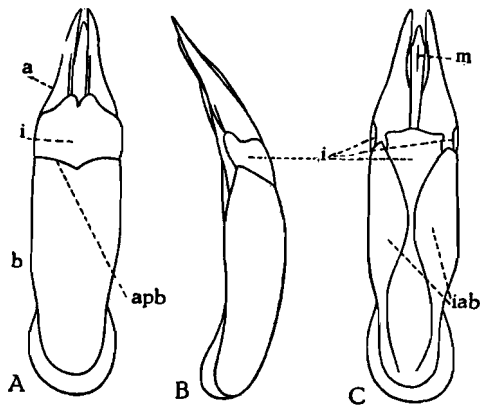


FIG. 58. — Aedeagus of *Parastizopus diehli* GEBIEN.

a : apicale; b : basale; m : median lobe or penis; i : intermediate sclerites between apicale and basale; apb : apical margin of basale; iav : inflexed alæ of basale.

A : dorsal surface; B : lateral aspect, with the ventral surface at left; C : ventral surface.

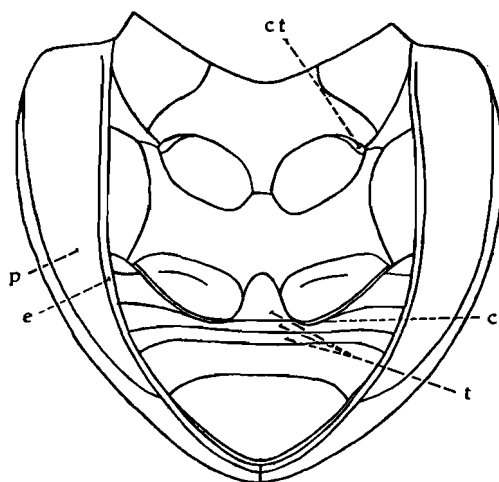


FIG. 59. — Underside of hind body in the Stizopin *Psammogaster malani* KOCH.
 e : the complete and entirely exposed epipleuron; p : the extremely broad and abruptly abbreviate pseudopleuron; c : the practically open metacoxal cavity; ct : the rudimentary mesocoxal trochantin; t : the reduced and somewhat telescoped proximal sternites of abdomen.

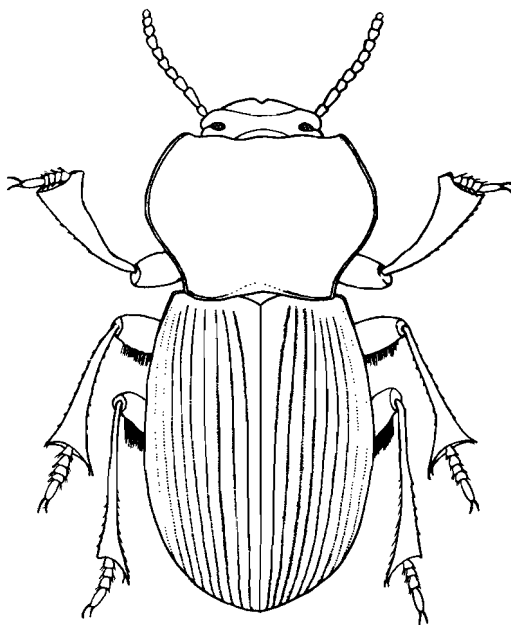


FIG. 60. — *Parastizopus armaticeps* PÉRINGUEY.

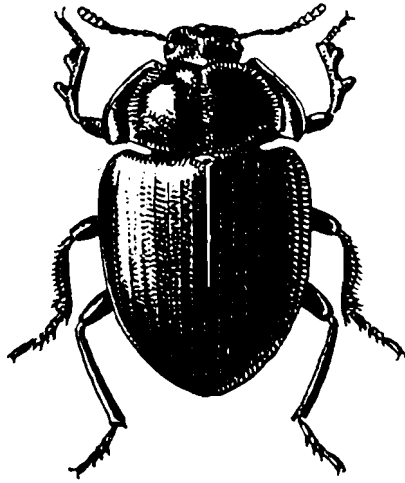


FIG. 61. — *Nemanes expansicollis* FAIRMAIRE (after GEBIEN, 1938).

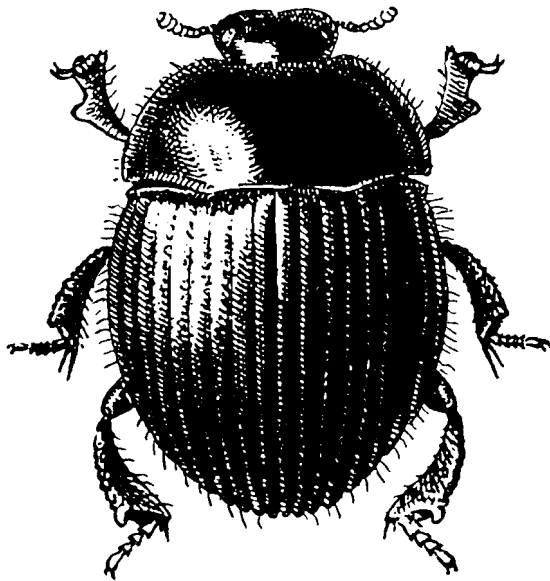


FIG. 62. — *Periloma alfeni* GEBIEN (after GEBIEN, 1938).

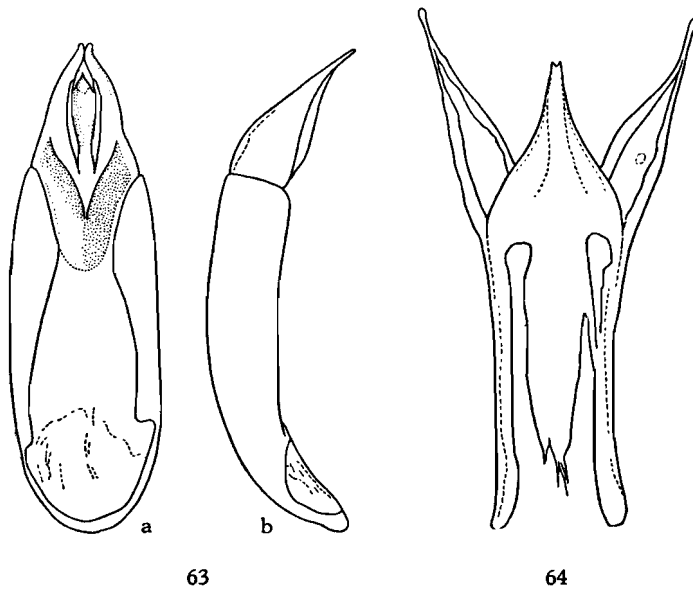


FIG. 63. — Aedeagus of *Emmallus* sp. from the Upemba Park (Mabwe).
 a : ventral surface; b : lateral aspect, with the ventral surface at right.
 FIG. 64. — The dissected portion of the parameres and penis of aedeagus
 of *Emmallus* sp. from the Upemba Park (Mabwe).

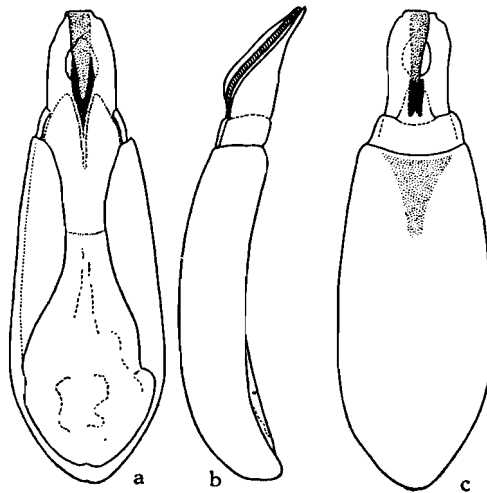


FIG. 65. — Aedeagus of *Emmallus* sp. from South-west Africa.
 a : ventral surface; b : lateral aspect, with the ventral surface at right;
 c : dorsal surface.

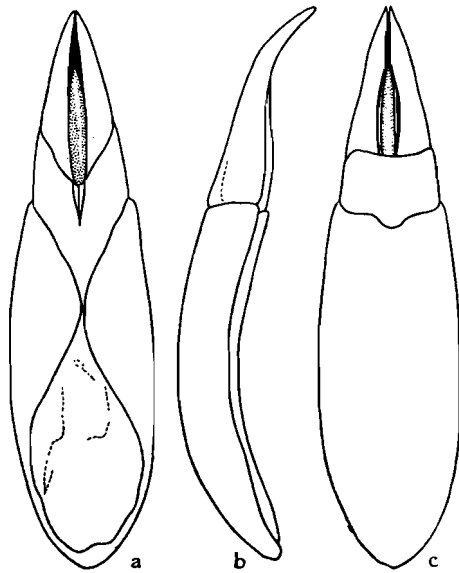


FIG. 66. — *Ædeagus* of *Eurycaulus pachecoi* ESCALERA.
 a : ventral surface; b : lateral aspect, with the ventral surface at right;
 c : dorsal surface.

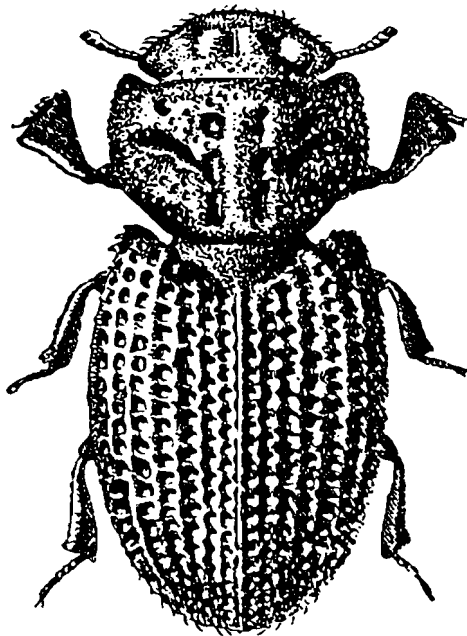


FIG. 67. — *Platynosum collare* MOTSCHOUJSKY (after REICHARDT).