

THE
TENEBRIONIDAE OF
SOUTHERN AFRICA

XXXVIII. ON THE MORPHOLOGY OF THE LARVAE OF
SOME STIZOPINA (COLEOPTERA: OPATRINI)

by

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III. Key to the larvae of *Stizopina*

1. Clypeus with median tubercle (Text figs. 2, 11, 14, plate I). Gula broader than long (Text fig. 4). Inner margin of trochanter and femur of fore leg with slender setae or dense, long hairs (Text figs. 16, 20) 2
- Clypeus without tubercle (Text figs. 5, 12, 13). Gula longer than broad (Text fig. 3). Inner margin of trochanter and femur of fore leg with two to three stout, strongly sclerotized spines (Text figs. 17, 18, 19, 21) 3
2. Disc of head centrally bare, only a few setae laterally, along epistomal margin and two posterior setae (Text fig. 11). Interior half of ventral discs of trochanter and femur with a few single setae (Text fig. 16). Interior half of stipes maxillaris bare (Text fig. 4). All abdominal nota bare (ninth notum excluded) except for a few short setae along margins and tiny discal setae. Apex of ninth abdominal notum with numerous small setae, the longest discal setae about one ninth the length of notum (Text fig. 27).

Parastizopus armaticeps (Peringuey)

- Entire disc of head covered with setae (Text fig. 14). Interior half of ventral discs of trochanter and femur with an aggregation of long, fine setae (Text fig. 20). Interior half of stipes maxillaris densely set with long hairs (Text fig. 7). All abdominal nota with setae of varying length. Apex of ninth abdominal notum with four slender setae, the longest discal setae one fourth the length of notum (Text fig. 28).

Ennychiatus caraboides (Fairmaire)

3. Entire surface of eighth and ninth abdominal notum set with sharply pointed, small spines (Text fig. 32). The whole disc of ninth abdominal notum strongly concave (Text fig. 37). Diameter of abdominal spiracles more than one-and-a-half times as long as third antennal segment.

Amathobius mesoleius Gebien

- Surface of eighth and ninth abdominal notum with single, slender or small, spherical, squamiform setae (Text figs. 29, 30, 31, 35, plate II). Disc of ninth abdominal notum convex, flat or only centre slightly concave (Text fig. 35, plate II). Diameter of abdominal spiracles shorter than or as long as third antennal segment 4
- 4. Ninth abdominal segment rounded. Eighth and ninth abdominal notum with distinct brown markings (Text figs. 15, 35, plate II) 5
- Ninth abdominal segment triangular (Text figs. 29, 30, 31). Eighth and ninth abdominal notum uni-coloured or ivory with a light yellowish tint 6
- 5. First eight abdominal nota covered with small, spherical, squamiform setae and long hairs posteriorly (Plate II). Ventral surface

of femur and tibiotarsus densely set with long hairs (Text fig. 21). Membranous elevation of mandible with several small stout spines dorso-interiorly (Text fig. 13). Setae on base of claw of mid and hind legs almost as long as the extremely pointed, sclerotized part of claw (Text fig. 25). Pygopodia reduced to small globular processes.

Psammogaster malani Koch

- First eight abdominal nota, anteriorly and posteriorly, with a row of very fine setae (Text fig. 35). Ventral surface of femur and tibiotarsus with a few single setae (Text fig. 20). Setae on base of claw of mid and hind legs much shorter than the sclerotized part of claw (Text fig. 26). Membranous elevation of mandible with one small, stout spine and one slender seta dorso-interiorly (Text fig. 12). Pygopodia small, but conform and projecting.

Periloma alkfeni Gebien

6. Ninth abdominal notum broader than long, sides gradually narrowing towards the blunt apex; disc bare apart from marginal and median setae (Text fig. 31). First abdominal sternum with an anterior row of four setae.

Nemanes expansicollis Fairmaire

- Ninth abdominal notum about as long as broad, sides strongly narrowing towards the pointed apex, with some small discal setae apart from marginal and median ones (Text figs. 29, 30). First abdominal sternum with numerous setae anteriorly 7

7. The two long median setae on ninth abdominal notum one third to one fourth the length of segment, the two small setae between them tiny or missing; setae along base fairly dense, the longest ones three quarters of the length of the median discal setae; marginal setae slender, five to six times as long as broad (Text fig. 29). Ventral part of ninth abdominal notum rather densely set with irregularly scattered long setae (Text fig. 36). Exterior margin of ventral disc of fore coxa bordered by five to seven soft setae. Setae at interior margin of trochanter and femur slender (Text fig. 17).

Eremostibes opacus Koch

- The two long median setae on ninth abdominal notum one fifth the length of segment, the two small setae between them stout, always present; setae along base few, the longest ones hardly half the length of the median discal setae; marginal setae about four times as long as broad (Text fig. 30). Ventral part of ninth abdominal notum with a few regularly placed setae (Text fig. 34). Exterior margin of ventral disc of coxa bordered by three stronger setae. Setae at interior margin of trochanter and femur shorter and stouter.

Eremostibes barbatus Koch

Preface

Since 1960 good progress has been made in the taxonomic and morphological research of the larvae of South African Tenebrionidae and the following papers dealing systematically with different tribes or subtribes have already been published:

- (a) The Tenebrionidae of Southern Africa.—XXXII. Descriptive notes on the early stages of *Onymacris rugatipennis* Haag and *Lepidochora discoidalis* Gebien and keys to genera and species of Adesmiini and Eurychorini. *Ann. Transv. Mus.*, 1962, **24**: 161-180, 28 figs., 15 plates.
- (b) The Tenebrionidae of Southern Africa.—XXXIII. Description of the larvae of *Gonopus tibialis* Fabricius and *Gonopus agrestis* Fahraeus (Gonopina, sensu Koch 1956). "Cimbebasia", Windhoek, 1963.
- (c) The Tenebrionidae of Southern Africa.—XXXIV. Descriptive notes and a key to the larvae of *Zophodes fitzsimonsi* Koch, *Bantodemus zulu* Koch and *Quadriдерes femineus* (Lesne) (Coleoptera: Platynotina s. str.). *J. ent. Soc. S. Afr.*, 1963, **26** (2) (In press).

Papers on the Anomalipina of the Platynotini, the Drosochrini and the Zophosini are in preparation.

I. Introduction

The present paper deals with the larvae of some species of the Stizopina, a subtribe of the Opatrini (Koch, C., 1963). The study is based on larvae which were reared during the last three years in the insectarium of the Transvaal Museum.

It may be of interest to give a short general review of the main traits found in the larvae of the different tribes so far studied, to indicate the position of the Stizopina as far as represented by the examined material.

The representatives of the tribes of the Tentyriinae viz. the Adesmiini, Zophosini and Eurychorini all comprise larvae of weak sclerotization with a whitish to ivory cuticle (with a brownish tint on head and prothorax in some cases only) without apparent cuticle sculpture such as holes or distinct patterns of muscle attachments. Ocelli are never developed. In the Adesmiini and Eurychorini the legs are slender with broad triangular claws (more slender and strongly pointed only in *Stenocara eburnea* Pascoe), weakly convex dorsally and flattened ventrally. Stout or tubercle-like spines never occur on inner margins of segments, only *S. eburnea* has a few somewhat stronger setae on femur. The front leg of this species shows some similarity to the legs in the Zophosini which generally have a long slender claw, not quite as pointed as in *S. eburnea*, stronger spines on inner margin of tibiotarsus and, in all examined genera (*Zophosis*, *Calosis*, *Gyrosis*, *Onychosis*), numerous short, stout spines along inner margin of femur, and in addition very long hairs dorso-laterally.

The ninth abdominal segment is basically very similar in the Adesmiini and Zophosini with its broad-to more pointed-ovate notum which in its apical overlapping portion is flat and in both tribes the apical half is covered with slender spines (with the exception of the *Onymacris bicolor*-group which has spherical, squamiform setae). The ninth abdominal sternum is large and reaches, including the pygopodia, almost the length of notum. The pygopodia are well developed, especially long and pointed in the Zophosini, again similar to *S. eburnea*.

The ninth abdominal notum of the Eurychorini (with exception of *Lepidochora*) is broad-to pointed-triangular, the apical portion compact and strongly curved upwards; strong, pointed spines are confined to margins. A large articulating membrane connects notum and sternum.

In the *Lepidochora*-group the ninth abdominal notum is semi-globular with small hook-like spines on surface. The sternum is globular, the pygopodia greatly reduced and situated apically.

The Adesmiini and Zophosini larvae form a more coherent intertribal group than the larvae of the Eurychorini, where the *Lepidochora*-group appears very specialized and rather far apart in its characters from the rest of the Eurychorini, though linked by the larvae of *Stips* and *Arthrochora* which combine features of both groups.

The studies on the larvae of some tribes of the Tenebrioninae viz. Drosochrini, Platynotini and Opatrini show that there is a trend in these tribes (except for the Stizopina) towards stronger sclerotization of the body (in the Drosochrini, where several *Micrantercus* species and one *Diestecopus* species were studied, confined to head and last segment). Connected with this development is the appearance of very distinct muscle patterns, mainly on head, thorax and the last two segments, and the formation of punctures and deep holes which in *Anomalipus* may be transformed into sensory-capsules. Also significant is the expansion of the ventral volume of the ninth abdominal notum which reduces the ventral aperture allowing only the development of a gradually more and more reduced sternum. The final stage is reached in the larvae of *Anomalipus* where the sternum is reduced to a small appendage and the pygopodia are no longer developed and where only a few bristles indicate their original site. In those Stizopina species where the last notum is cordiform the excessive development of the ventral part is also indicated.

A further important feature, brought about by the stronger sclerotization (loss of possibly general light sensitivity of cuticle) and hand in hand with it, a way of living which may not completely be confined underground, is the occurrence of ocelli in all studied Drosochrini, Platynotini and Opatrini (numerous Gonocephalum species, Caedius species, Scleron species), but not in the Stizopina of Opatrini with their light cuticle.

The front legs of the Drosochrini and Platynotini are compact, the femur is especially shortened and at its anterior margin rectangularly bent. The claw is large, in the Platynotini about as long as tibiotarsus (shorter in *Quadrideres*), strongly convex dorsally and pointed with a fairly broad, flattened surface. In both tribes there are strongly sclerotized tubercles which are often fused, on inner margins of femur and trochanter. In the Drosochrini the trochanter is prolonged and the tibiotarsus shortened, so that the claw becomes longer than the tibiotarsus. In strong contrast are the legs in the Stizopina, which are slender with a small claw which is very pointed and extremely convex dorsally with strongly reduced ventral surface. *Psammogaster* with its more flattened front claw has sharply pointed mid and hind claws.

The Stizopina are, unlike the subtribes of the other Opatrinae studied, the most incoherent group. To give a subtribal definition for the Stizopina is difficult because of the variety of the occurring forms. Hardly any character is common to all species. All larvae are of light colour, weakly sclerotized and have slender, rather delicate legs with small, strongly pointed claws and reduced ventral surface. The epipharynx seems to be in all cases of the simple formation as in *Parastizopus*. The teeth of the mandibles show the same basic features, though the shape and armature

of the membranous elevation varies considerably. For further definition the Stizopina in question have to be subdivided into four groups: 1. *Parastizopus-Ennychiatus*, 2. *Eremostibes-Nemanes*, 3. *Amathobius*, 4. *Psammogaster-Periloma*.

The first two groups have the cordiform shape of the ninth abdominal notum, with discal setae of considerably varying length, in common, but in *Parastizopus* and *Ennychiatus* we do not find the stronger marginal setae of *Eremostibes* and *Nemanes* and the ventral aperture of the notum is up to twice as large (*Ennychiatus*) as the closed part, while in *Eremostibes* and *Nemanes* as well as in *Amathobius* the closed ventral part of the notum is more strongly developed and larger than the aperture. In *Parastizopus* and *Ennychiatus* the pygopodia are longer than in the remaining genera. Another characteristic, found in all other genera, is that the strongly sclerotized spines on inner margin of trochanter and femur of front legs, are missing in *Parastizopus* and *Ennychiatus*. But the most startling feature which distinguishes the first group very definitely from the

others, is the formation of a median tubercle on clypeus. Both species have also the development of peculiar micro-structures of the cuticle in common and probably the ability of some yet unidentified secretion. The *Eremostibes*-group lacks any special features. *Amathobius* is separated from the former groups by the apparent lack of discal setae on labrum (only one specimen with head), and the hollowed disc of ninth abdominal notum which is densely set with short uniform spines. Finally the last group, consisting of *Psammogaster* and *Periloma*, is segregated from the other genera of the Stizopina, dealt with in this paper, by the dorsally more rounded, membranous elevation of mandible with two or several short aggregated setae instead of the otherwise stretched row of fine, long setae. The main feature however is the semi-globular shape of the ninth abdominal notum with the slightly raised margin in *Periloma alfkeni*. Though the two species of the last group are undoubtedly more nearly related to each other, there are striking differences especially in the armature of all parts of the body.

II. Descriptions

1. *Parastizopus armaticeps* (Peringuey)

The description is based on a larva 26.0 mm. long, 4.0 mm. wide, head-capsule 2.7 mm. broad. Body spindle-shaped, tapering strongly posteriorly; cuticle fairly soft, mat, of ivory to faint-greenish colour, body segments transverse. Legs with small pointed claws. Ninth abdominal notum cordiform with blunt, slightly raised apex and scattered short, pointed setae. Clypeus with a large median tubercle.

Head

(Text figs. 1, 2, 4, 8, 9, 11, plate I.)

Width not quite twice the length and about a quarter narrower than pronotum; sides rounded, broadest posteriorly, epistomal margin emarginate, pleurostomal portion forms a brownish, more strongly sclerotized transverse strip; frontal suture not complete anteriorly; two pointed setae at epistomal margin, two very small ones between them and a few longer setae on latero-anterior portion of epicranium, a few microsetae latero-posteriorly and one longer seta on each side at some distance from coronal suture; some fairly short setae along anterior two-thirds of side margins. Ocelli absent. Ventral part of epicranium with scattered setae, portion next to gula with two longer setae and an aggregation of microsetae. Segments of antenna tubiform, the second slightly longer than first and about a third narrower, third segment a quarter the length of second and a third of its width. The first segment has a brownish ring below apex, second and third are brownish apart from apex of second, on the interior side of which is the lunate main sensorium, and underneath it a few microsetae. Clypeus trapezoidal, somewhat more than twice as broad as long, posterior part yellowish, fairly sclerotized, with a medianly raised tubercle; along anterior margin of this portion three pointed setae on each side. Labrum transverse-ovate with a discal row of about twelve setae and about the same number bordering the anterior margin. Epipharynx simple, anterior margin set with about fourteen strong flattened setae; medianly on disc two small spines joined by four round sensillae, above them six larger sensillae in two vertical rows reaching almost to the anterior margin; the basal sclerotized band bears exteriorly a broad, triangular distal process, more interiorly a much longer and thinner process and medianly two flattened projections which protrude in an oblique angle; the discal surface is covered medianly by trichoid microprocesses which become more discoidal laterally. The mandibles are bifid, but often the lower apical tooth is not very well defined and more or less fused with the superior one; dorsally there is a small additional triangularly pointed tooth above the pointed molar of left mandible, on the right mandible there is only an indication of an additional tooth as

a faintly projecting rotundity; the most remarkable feature is the broadened exterior surface consisting in the lower part of the setiferous membranous elevation which extends far on dorsal and lateral surface of the mandible; the exterior surface of membranous elevation shows dorsally a row of setae which runs down towards the articulation, ventrally there are only a few microsetae near the condyle; the anterior, more strongly sclerotized part of the exterior surface, shows in its lower half fine vertical ridges. Stipes of maxilla stout with one seta medio-basally, a few small ones on exterior basal portion; mala conical with the usual armature; palpus maxillaris inserted at right angle to mala with four long setae around its articulation, first segment subquadrate, second tubiform and slightly shorter than first and about one third narrower, third segment coniform, shorter than the second and at base about half its width; apex of second segment has one seta medianly and one exteriorly. Submentum trapezoidal, about twice as broad as long, ventral surface with two horizontal rows, each of them with four long setae; mentum barrel-shaped with a few long setae on basal half and laterally; prementum trapezoidal, narrowing basally with brownish semi-circles laterally, two setae on disc; ligula small, rounded, not reaching half the height of first segment of labial palpus, tipped by four fine setae; first segment of palpus labialis somewhat longer than broad, second about as long as this width and half as wide, setaless. Gula almost twice as broad as long. Hypopharyngeal sclerite tricuspidate, the ventral tooth strongest and projecting horizontally.

Thorax

All nota transverse, when extended about twice as broad as long, the width increasing somewhat from pro- to metanotum. Pronotum about one quarter wider at base than anteriorly, with rounded sides; anteriorly a horizontal stripe of about twelve short, fine setae, posteriorly four setae, some setae laterally, all setae not longer than first antennal segment. On meso- and metanotum the anterior row of setae is omitted, present are a few very fine and short scattered setae. Presternum of prosteronum brownish with one short seta latero-basally, eusternum with two small median setae; pre- and eusterna of meso- and meta-sternum with some short scattered setae. Mesothoracic spiracle round-ovate, one quarter broader than long.

Legs

(Text figs. 16, 23.)

Legs slender, all segments elongate. Tibiotarsus and femur of mid and hind legs about one quarter narrower than those of fore legs, length of coxae of

mid and hind legs about twice the width, those of fore legs stouter. Armature on all legs practically the same. Long, stiff setae border the flat exterior surface of fore coxa, some smaller setae on ventral surface and laterally; trochanter with fairly long setae on inner margin and a few on ventral disc, femur with some sharply pointed setae on inner and a few finer setae along exterior margin and on ventral surface; tibiotarsus at base one quarter narrower than femur, about twice as long as broad, convex throughout, ventral surface bare except for one short median seta, exterior margin with only two setae, inner margin with eight fine, pointed setae, the longest ones somewhat shorter than the length of base of claw; the length of the unsclerotized base of claw about one third of the whole claw with one short seta on surface and one on inner margin; claw, including base, somewhat more than half the length of tibiotarsus, very pointed and strongly convex dorsally, ventral flattened surface very narrow.

Abdomen

(Text fig. 27, plate 1.)

First eight abdominal nota strongly transverse, about twice as broad as long, abdomen tapering towards ninth segment. Segments bare except for a few, widely spaced short setae along posterior margin and one seta on each side antero-laterally. There are some irregularly placed microsetae on discs, their number somewhat increasing on the last segments. Posterior band of eighth notum with fine, rather densely arranged setae on lateral portions and very few short, pointed setae along lateral margins. Spiracles round, very small, diameter about as long as third antennal segment. A few short setae dispersed over sterna, aggregating anteriorly on first sternum and increasing and becoming longer on eighth sternum. Ninth abdominal notum cordiform, convex above, somewhat broader than long with blunt, slightly upcurved apex which has a somewhat darker and more glossy appearance (glandular?) than the remainder of the body; the base has a transverse band of microsetae, the disc shows irregularly distributed, sharply pointed setae, most of them very small, four longer setae, about one ninth of the length of notum, form a horizontal row medianly, the lateral exterior setae are rather short, the longest ones not quite one fifth of the length of segment; the ventral surface of notum has long finely pointed setae. Ninth abdominal sternum, including pygopodia, about as long as notum, sternum with scattered setae; pygopodia long, conical, distal surface set with setae, proximal surface bare with one or two setae at base only.

The whole body of the larva, even the mouthparts, apart from the palpi, is covered with imbricate micro-scales which are triangular to bluntly pointed, and give the cuticle a strange mat and yet shimmering appearance.

The earliest instars of the larva

(Text fig. 39.)

The egg of *Parastizopus armaticeps* Per. is round-oval, 1.08 mm. to 1.44 mm., white, cuticle mat, finely sculptured. The first instar is white, 2.7 mm.

long, 0.7 mm. broad, head-width 0.48 mm. Length of second antennal segment about one third the width of head, slightly blown up, third segment half as long as the second. Tubercle on clypeus not yet developed. Egg-bursters from mesonotum up to the seventh abdominal notum, the thoracic ones very small, the mesonotal one sometimes not discernible; on abdominal segments egg-bursters raised on yellowish tubercles which become often triangular and plate-like toward pygidium, the one on seventh notum tiny, not raised and sometimes missing. Ninth abdominal notum triangular, pointed, longer than broad.

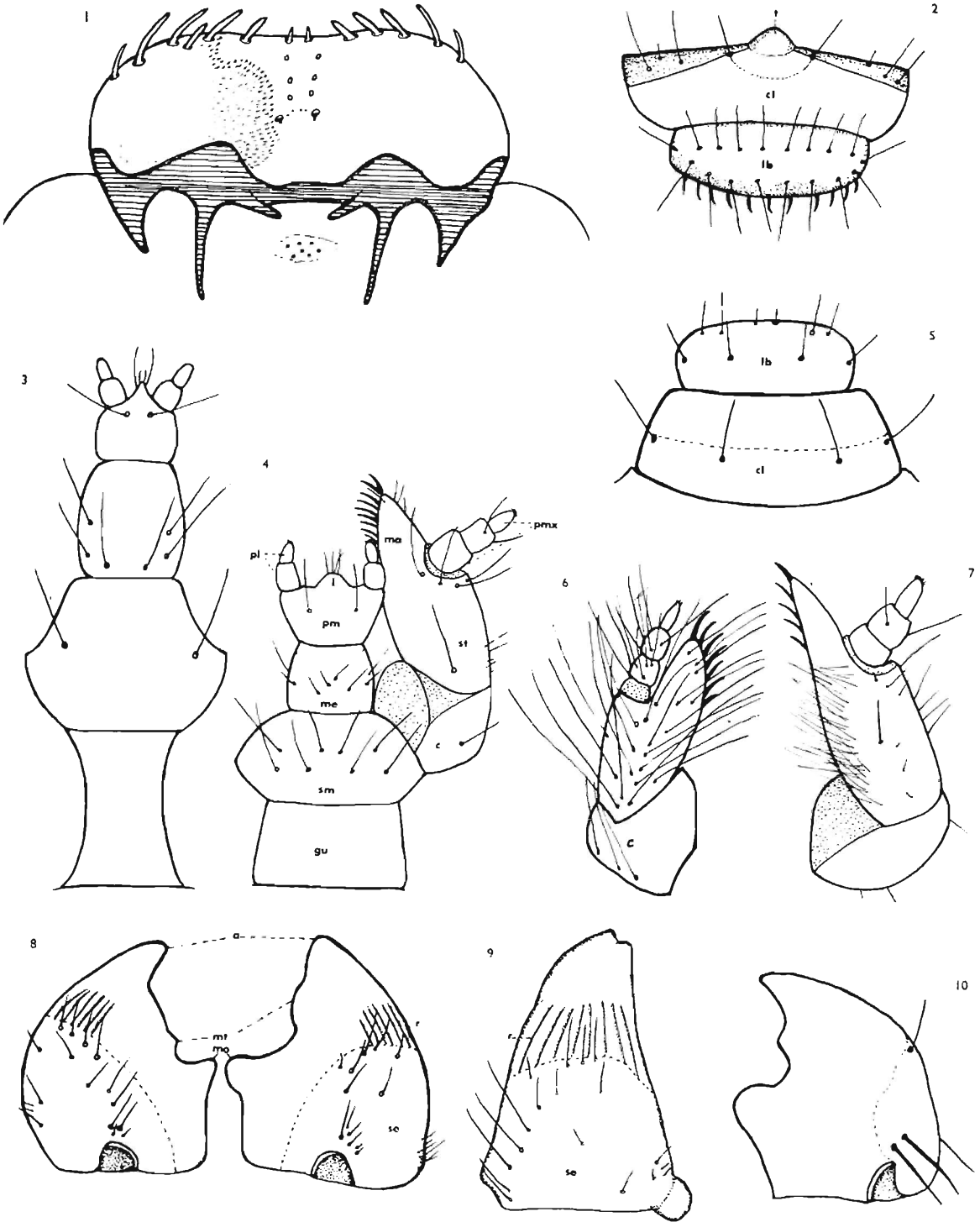
At first sight second instar very similar to first, still white with hardly any sign of sclerotization apart from the tips of the apical teeth of mandibles, head-width from 0.5 mm. to 0.52 mm., the last abdominal segment still more stretched than in the first instar, up to one-and-a-half times longer than broad, and sharply pointed. Distribution of setae on nota as in grown-up stages, but relatively longer.

The larvae of *Parastizopus armaticeps* remain astonishingly long, unsclerotized and completely white. A larva of 6.2 mm. length, head-capsule 0.96 mm. broad, still shows only slight sclerotization of the apical teeth of mandibles and hardly any on the claws. The third antennal segment is still half the length of the second, the abdomen still very pointed, but the basal width about the same as the length, and there is still no tubercle developed on clypeus. The first larva with a faint sign of this is 13.0 mm. long, head-width 1.6 mm. This stage is reached in about six to eight weeks under insectarium conditions. At this stage the antennae and ninth abdominal notum have reached the proportions of the grown-up larva, but the body-setae are still much longer, as is usual in younger larvae. The cuticle is yellowish, the legs still appear very delicate.

The delicateness of the first four to five stages with their hardly sclerotized mandibles and claws makes one wonder where and how these larvae survive in nature. Certainly their sensitivity and the inadequate conditions in our insectarium were partly responsible for the difficulty of breeding this species. For almost four years we kept adults from the Kalabari Gembok Park without obtaining any larvae. In February 1961 a few, still very small larvae were found. In Decem-

FIGS. 1-10

Fig. 1: *Parastizopus armaticeps* (Peringuey). Epipharynx; fig. 2: Same species. Labrum and clypeus, frontal view. cl, clypeus; lb, labrum; t, tubercle; fig. 3: *Eremostibes opacus* Koch. Labium and gula; fig. 4: *Parastizopus armaticeps* Peringuey. Maxilla and labium. c, cardo maxillaris; gu, gula; me, mentum; ma, mala; pl, palpus labialis; pm, prementum; pms, palpus maxillaris; sm, submentum; st, stipes maxillaris; fig. 5: *Eremostibes opacus* Koch. Clypeus and labrum; fig. 6: *Psammogaster malani* Koch. Right maxilla; fig. 7: *Pnychiatus caraboides* (Fairmaire). Left maxilla; fig. 8: *Parastizopus armaticeps* (Peringuey). Mandibles, dorsally. a, apical tooth; ms, molar; mt, median, additional tooth; r, ridges on sclerotized part; se, setose membranous elevation; fig. 9: Same species. Exterior surface of right mandible; fig. 10: *Eremostibes opacus* Koch. Right mandible, dorsally.



ber-January 1962, thirteen larvae only were reared from fifty beetles. Four of these were preserved, the others perished. From thirty-four adults from the Brandberg 112 larvae hatched in February-March 1962, from which ten larvae were killed. At the end of April 1962 there were only five larvae left and one pupa.

When the larvae were almost grown-up I found most of the larvae on the surface and "cocoon" built up from sand-particles, the small stones glued together by a hyaline, homogeneous mass of narrower and broader bands. As we did not find any larvae or pupae in these "cocoon", it is not certain whether these structures were built by the larvae of *Parastizopus armaticeps*, though nothing else was found in the container.

Material

Fifteen larvae, nine medium to full-grown. One pupa. Largest larva 27.0 mm. long, 4.5 mm. broad, head-width 2.88 mm. Parents from Tsisab-Gorge, Brandberg (North-western S.W. Africa), November 1961, C. Koch leg. Described specimen belongs to this series.

Fourteen larvae, mostly the very earliest stages, two medium size. Sixteen beetles alive. Largest larva 22.0 mm. long, 3.0 mm. broad, head-width 2.24 mm. Parents from Mata Mata (Southern Kalahari Gemsbok Park), February 1957, C. Koch leg.

2. *Ennychiatus caraboides* (Fairmaire)

The description is based on a larva 10.0 mm. long, 2.0 mm. wide, head-capsule 1.3 mm. broad. Body spindle-shaped, soft, ivory. Fresh specimens may be covered with whitish flakes. Segments transverse with scattered brown setae. Ninth abdominal notum cordiform with some single, very long setae apart from small scattered ones. Clypeus with a small tubercle.

Head

(Text figs. 7, 14.)

About twice as broad as long, sides rounded, whole surface covered with fairly widely spaced pointed, erect setae of varying length, the longest about the length of second antennal segment. Pleurostoma not as sclerotized as in *Parastizopus*. Ventro-lateral portion of epicranium set with setae of different lengths, portion next to gula at each side with one long single seta. Ocelli absent. First segment of antenna small, subquadrate, second segment more than twice as long as the first, about twice as long as broad, apex slightly dilated, third segment not quite half the length of second. Clypeus and labrum similar as in *Parastizopus*, but tubercle on clypeus not as prominent. The features on epipharynx not properly recognized, as I did not want to dissect the only larger specimen, but I am almost certain that there will be not much difference from *Parastizopus*. The upper apical teeth of mandibles are more strongly pointed, the exterior surface of mandibles is not flattened as in *Parastizopus* but carinate, the large membranous elevation bears dorsally a row of pointed setae, subparallel to exterior margin, one longer seta at ventral articulation and one in centre of exterior surface of elevation. The maxilla

is distinguished by long hairs on inner half of stipes and the very pointed mala which is as long as maxillary palpus. Submentum and mentum densely covered by long hairs, prementum with some hairs on basal half. Gula somewhat broader than long.

Thorax

Measurements as in *Parastizopus armaticeps*. The pronotum is bordered anteriorly by a row of fine, brown, pointed setae, the longest about the length of the second antennal segment, medianly and posteriorly a row of more widely spaced setae. Meso- and metanotum with an anterior and posterior row of setae of equal length as on pronotum, but with scattered very small setae between these rows. Pre- and eusternum of prosternum each with a group of a few small setae; on meso- and metasternum more setae, more widely spread. Mesothoracic spiracle round, its diameter as long as third segment of maxillary palpus.

Legs

(Text fig. 20.)

Though the shape of the legs follows the same principle as in *Parastizopus* with small, sharply pointed claws, the armature differs considerably. The tibiotarsus bears at interior margin four strong, sharply pointed setae only, and interior margin and part of the ventral surface of femur and trochanter are densely set with long and fine, brown setae. Mid and hind leg very similar, as usually the setae on ventral surfaces are stronger.

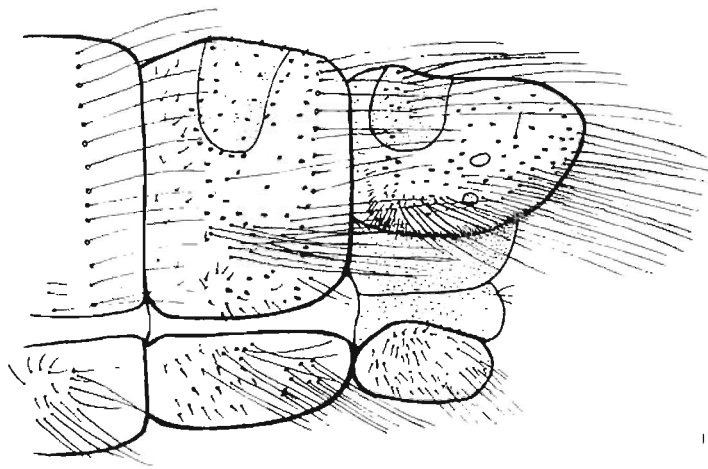
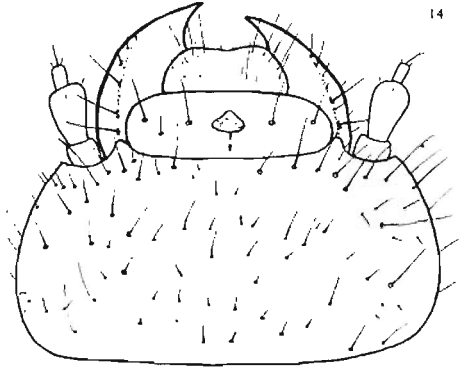
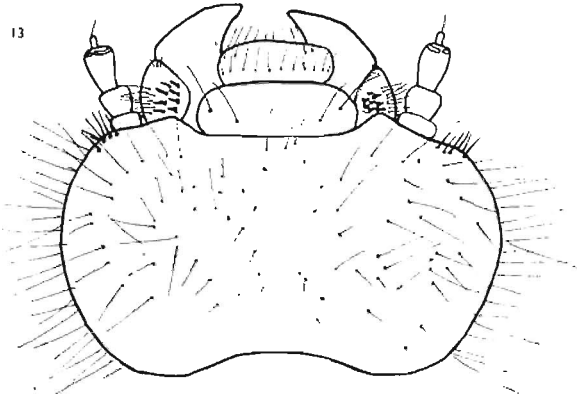
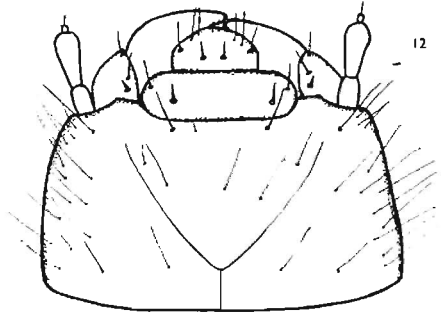
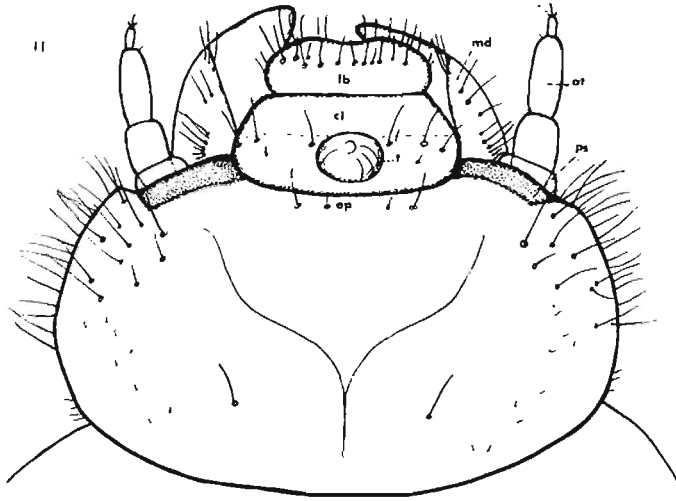
Abdomen

(Text fig. 28, plate 11.)

Strongly tapering, nota transverse, eighth segment two-thirds the width of the first one. Each notum, up to the eighth, shows two transverse rows of very pointed, widely spaced longer setae about as long as the second antennal segment, the first one medio-anteriorly, the other one posteriorly; the spaces in front of the anterior row and between the rows are filled with scattered small setae. Lateral margins with a few setae, hardly longer than the dorsal ones. Spiracles round, very small, diameter one quarter less than the length of third antennal segment. Ninth abdominal notum cordiform, strongly tapering off, base somewhat broader than length of segment. No distinct pattern of setae which are very unequally distributed. A transverse row of about four very long, sharply pointed setae is situated a little below the basal third, the setae are one fourth to one third of the length of notum, four setae of about half their length underneath them in groups of two, a few short setae are scattered between the long setae;

FIGS. 11—15

Heads of: fig. 11: *Parastizopus armaticeps* (Peringuey); fig. 12: *Periloma alfkeni* Gebien; fig. 13: *Psammogaster malani* Koch; fig. 14: *Ennychiatus caraboides* (Fairmaire); fig. 15: *P. malani*. Part of seventh and the eighth and ninth abdominal segments, lateral view.



the upcurved apex is armed with four setae, the outer ones twice as long. Lateral and ventral parts of ninth abdominal notum set with long, stiff setae. Ninth abdominal sternum has long lateral setae and a few shorter ones on surface. Pygopodia long, slender with fine small setae on dorso-exterior surface. (Not fully extended and so not to be seen in described specimen.)

Notes on the earliest instars of the larva and on a peculiar cuticle derivate

No first-stage larva obtained yet. One larva of about 3.0 mm. length, probably second instar, has very long setae on all parts of the body, reaching about the length of the segments to which they belong. The setae on second to sixth abdominal sternum are especially long and dense. A larva of 5.2 mm. length still shows long setae, particularly on posterior row of abdominal nota, the small intermediate setae on nota not yet developed.

Ennychiatus caraboides F. is almost as difficult to breed as *Parastizopus armaticeps* Per. From twenty-two adults received on the 3rd July, 1961 we only found one small (second stage?) larva on the 26th October, 1961, and only on the 8th January, 1963, when thirteen adults were left two more larvae hatched.

The larvae were fixed in formaldehyde-alcohol-glacial-acetic-acid and transferred into 70 per cent alcohol. On the 11th February, 1963 photos were taken of the largest larva to demonstrate a peculiar layer of a whitish, flaky substance covering the larva, unfortunately the photo did not come out too well. At the end of March, when I wished to repeat the photo and study the larva closer, the white substance had completely disappeared, only small, brown patches were visible. This appeared to be dirt adhering to the cuticle. Apart from dirt particles it appears under strong magnification to be a conglomeration of a gel-like substance. It seemed similar to the substance which held the "cocoon" together, found with *Parastizopus* larvae (p. 10). The flaky substance appears to be dissolved by the alcohol.

Material

Three larvae. Largest larva 10.0 mm. long, 2.0 mm. broad, head-width 1.3 mm. Eleven beetles alive. Parents from Mynfontein, De Aar distr. (Cape Province), July 1961, C. Koch leg.

3. *Amathobius mesoleius* Gebien

The description is based on a larva 11.0 mm. long, 2.0 mm. broad, head-width 1.44 mm. Body sub-cylindrical, slightly tapering towards pygidium, of medium sclerotization, yellowish, practically bare. Ninth abdominal notum triangular, disc concave. Surface of eighth and ninth abdominal notum covered with small pointed spines.

Head

Not quite twice as wide as long, slightly convex above, epistomal margin straight, sides gently rounded, pleurostomal portion finely defined but not as strongly sclerotized as in *Parastizopus*; cuticle slightly rugose. One seta on each side of epistome,

one seta on latero-anterior portion of epicranium, four setae bordering latero-ventral base of antenna, two setae anteriorly at lateral margin, ventral parts of epicranium with long yellowish hairs. Ocelli absent. Clypeus trapezoidal, not quite twice as broad as long with two short discal setae and one on each side at border to anterior half. Labrum two-and-a-half times wider than long, disc strongly convex without setae, anterior margin with eight setae. Epipharynx and antenna as in *Parastizopus*. Formation of mandible very similar to that of *Parastizopus*, but membranous elevation not extending as far on dorsal and ventral surface and with only two setae each next to condyle and dorsal articulation, no ridges on sclerotized part. Maxillae similar to *Parastizopus*, submentum with one seta only on each side. Gula about twice as long as broad. Hypopharyngeal sclerite as in *Parastizopus*.

Thorax

Pronotum about one third broader than long with straight anterior and convexly curved posterior margin extending partially over mesonotum, sides straight, notum broadening somewhat posteriorly. Meso- and metanotum slightly wider than pronotum, about three times as wide as long. All three nota practically bare apart from two short setae medio-laterally on disc of pronotum and four fine marginal setae; two marginal setae on meso- and metanotum. Eusterna with a few setae. Mesothoracic spiracle subcircular.

Legs

(Text fig. 18.)

Difference in size between fore legs and mid and hind legs greater than in *Parastizopus*. Fore tibiotarsus over one third longer and twice as broad as mid and hind tibiotarsi; fore femur twice as long and broad as those of mid and hind legs. Ventral surface of all segments almost bare except for single setae, about four on coxa, one on trochanter, two on femur, one on tibiotarsus, one on base of claw. Interior margins of trochanter and femur each with two sclerotized tubercles, and that of tibiotarsus with two short pointed setae about as long as second segment of labial palpus. Claw conical, pointed, slightly longer than half the length of tibio-

FIGS. 16--26

Left fore legs, ventrally, of:

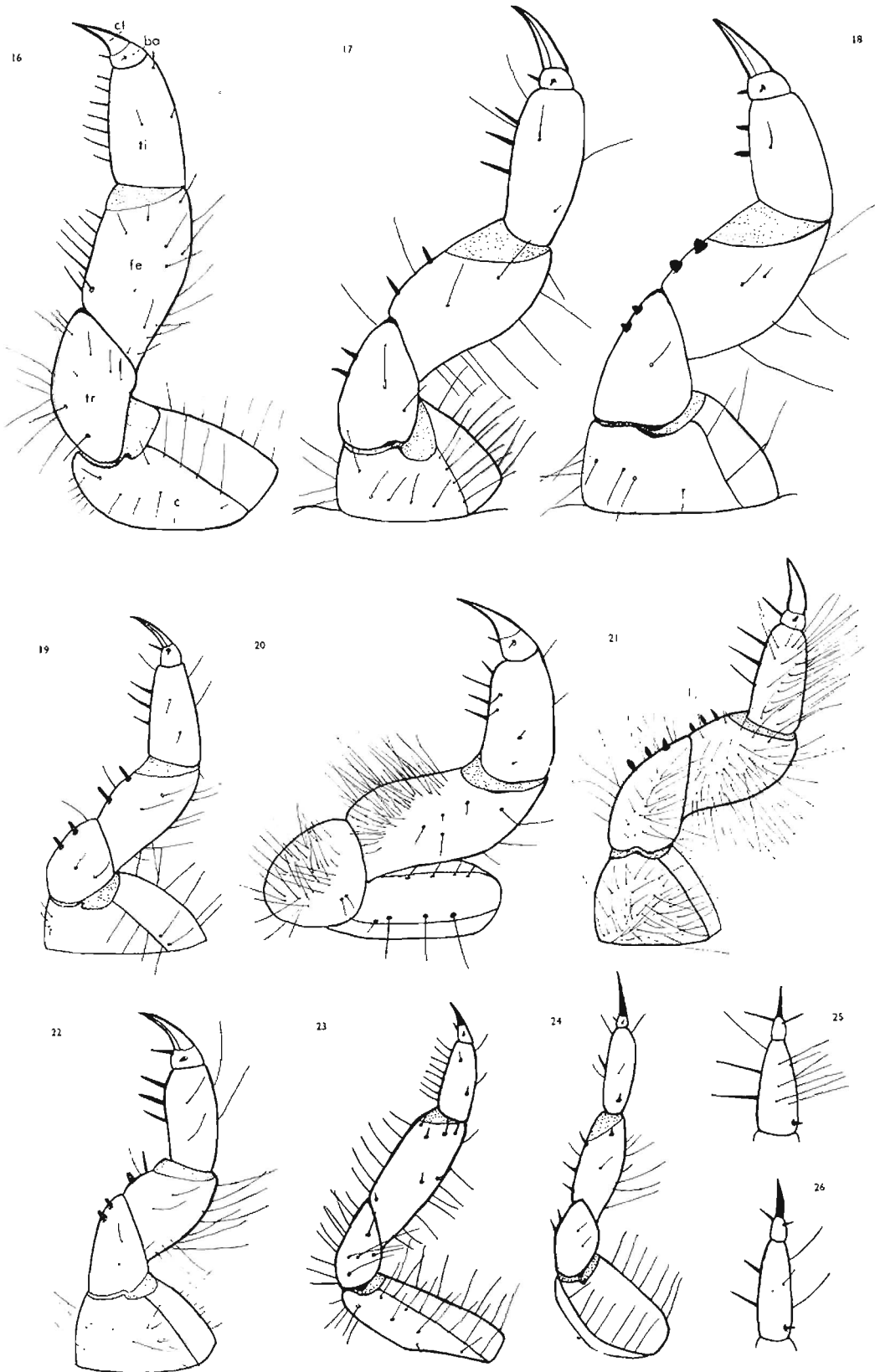
Fig. 16: *Parastizopus armaticeps* (Peringuey). ba, base of claw; c, coxa; cl, sclerotized part of claw; fe, femur; ti, tibiotarsus; tr, trochanter; fig. 17: *Eremostibes opacus* Koch, fig. 18: *Amathobius mesoleius* Gebien; fig. 19: *Nemanes expansicollis* Fairmaire; fig. 20: *Ennychiatus caraboides* (Fairmaire); fig. 21: *Psammogaster malani* Koch; fig. 22: *Periloma alfheni* Gebien.

Left mid legs, ventrally, of:

Fig. 23: *Parastizopus armaticeps* (Peringuey); fig. 24: *Eremostibes opacus* Koch.

Tibiotarsus and claw of mid legs, ventrally, of:

Fig. 25: *Psammogaster malani* Koch; fig. 26: *Periloma alfheni* Gebien.



tarsus; unsclerotized base of claw large, one third of the whole claw. Tibiotarsus and femur of mid and hind legs each with one short, stout seta on ventral surface, situated posteriorly on the former and anteriorly on femur.

Abdomen

(Text figs. 32, 37.)

Abdominal nota transverse, about twice as broad as long, with last segments slightly tapering. First to seventh notum bare except for one hardly visible fine, short seta latero-posteriorly. Surface of eighth notum with scattered, tiny, pointed spines, along posterior margin becoming somewhat longer, a few very fine lateral setae. Sterna bare except for an anterior semi-circle of fine setae on first sternum and one seta in each corner of first to eighth sternum. Abdominal spiracles circular, diameter more than one-and-a-half the length of third antennal segment. Ninth notum triangular, somewhat broader than long, disc hollowed, small, brown, sharply pointed spines scattered over the whole of dorsal surface, along exterior margins of about double length. Lateral and ventral surface of ninth notum with fairly long yellowish hairs. In both specimens the ninth sternum is partly retracted into the ventral opening of the notum which is closed ventrally for half its length. The pygopodia are shorter than in *Parastizopus*, their armature and that of the remaining parts of sternum seems to be very similar to that of *Parastizopus*.

The first-stage larva is unknown yet.

Material

Two larvae, one damaged. Largest larva 11.0 mm. long, 2.0 mm. broad, head-width 1.44 mm. Parents from Mata Mata (Southern Kalahari Gemsbok Park), October 1957, C. Koch leg.

4. *Eremostibes opacus* Koch

The description is based on a larva 16 mm. long, 2.0 mm. broad, head-width 1.4 mm. Body slender, tapering posteriorly, cuticle soft, glossy, ivory to light-brown. Ninth abdominal notum triangular, pointed with slightly raised apex, pointed strong setae along margins; four long, fine setae and a few short setae scattered on disc.

Head

(Text figs. 3, 5, 10.)

Twice as broad as long, sides rounded, narrowing somewhat anteriorly; epistomal margin straight, parts adjoining clypeus brown, more strongly sclerotized. Pleurostome indicated, but not as strongly sclerotized as in *Parastizopus*. Two epistomal setae, one seta each on anterior and lateral portions of epicranium, two very fine and short ones at each side at some distance from base, three setae along latero-ventral articulation of antenna. Ventral parts of epicranium furnished with long setae. Clypeus trapezoidal, somewhat broader than long with four discal setae. Labrum oval with four discal and six marginal setae, the two median ones slightly forward, very short and fine. Shape of mandible and its teeth similar to those of *Parastizopus*, but

generally with only two basal setae dorsally (in the given specimen two setae on right, three on left mandible); one seta ventrally, and one on apex of membranous elevation. General appearance of maxilla and labium very similar to *Parastizopus*, submentum with only two setae as in *Amathobius*. Gula longer than broad. Antennae and epipharynx as in *Parastizopus*. Ocelli absent.

Thorax

Pronotum trapezoidal, basally more than one third broader than anteriorly; anterior and lateral margins straight, posterior margin slightly convex. Meso- and metanotum about the same width as pronotum; metanotum about one quarter shorter than pronotum, mesonotum still somewhat shorter. Pronotum with four widely spaced long fine setae as long as second antennal segment, along anterior and posterior margins; on meso- and metanotum posterior ones only present, lateral margins with a few fine setae. Tiny, hardly visible microsetae are scattered on each notum. Mesothoracic spiracle oval, not quite twice as broad as long. Presternum of prosternum with one lateral seta, eusternum with four setae, pre- and eusternum of meso- and metasterna set with numerous fairly long setae.

Legs

(Text figs. 17, 24.)

Size decreases from fore to hind legs, the latter about one fifth shorter and almost half as narrow as front legs. Front coxa with one anterior seta on ventral surface, some at the base, outer side margins bordered by five to seven long, fine setae. Trochanter with two short, strong spines on inner margin and three to four setae on ventral surface. Femur with two strong, slender spines, a fine long seta between the spines and two long setae on disc. Tibiotarsus with two to three (number different on either side of specimen) slender, marginal spines, five times as long as broad and one long discal seta. Claw slender, strongly pointed, a little more than half the length of tibiotarsus, the large unsclerotized base bearing one short seta on surface and one at inner margin. Armature on mid and hind legs identical with that on fore legs, but one additional strong, pointed spine, posteriorly on disc of tibiotarsus and anteriorly on femur.

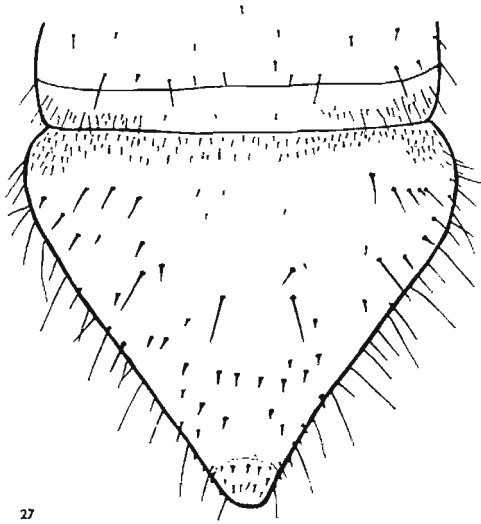
Abdomen

(Text figs. 29, 36.)

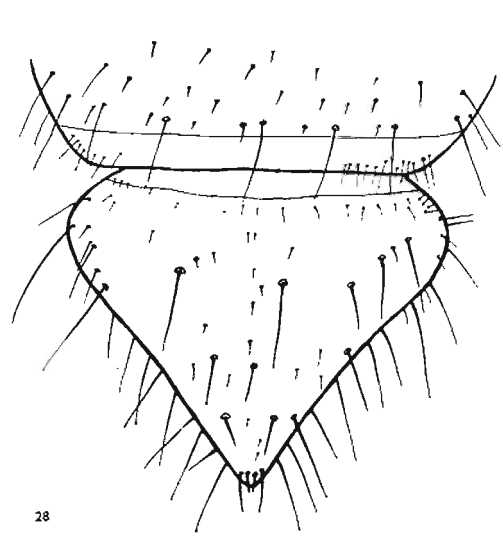
First six abdominal segments transverse, sixth and seventh subquadrate. Nota bare apart from a line of four widely spaced setae along posterior band.

FIGS. 27—32

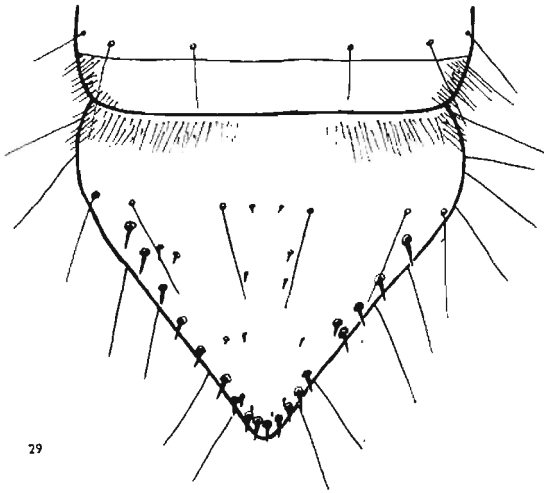
Part of the eighth and the ninth abdominal notum of: Fig. 27: *Parastizopus armaticeps* (Peringuey); fig. 28: *Erynychiatus caraboides* (Fairmaire); fig. 29: *Eremostibes opacus* Koch; fig. 30: *Eremostibes barbatus* Koch; fig. 31: *Nemanes expansicollis* Fairmaire; fig. 32: *Amathobius mesoleius* Gebien.



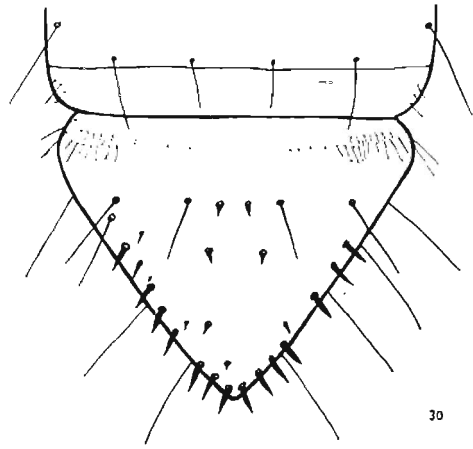
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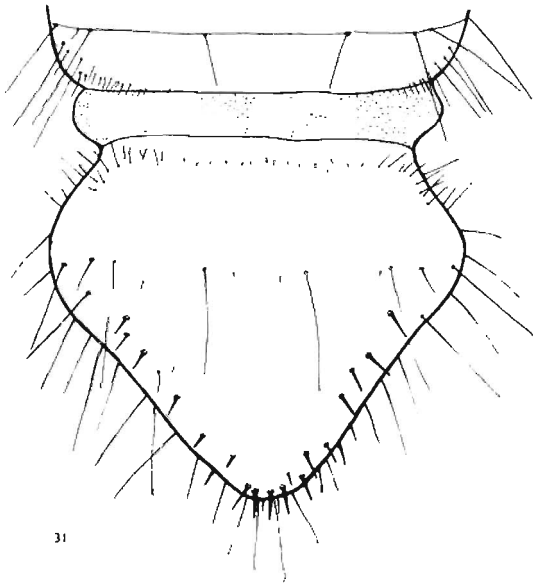
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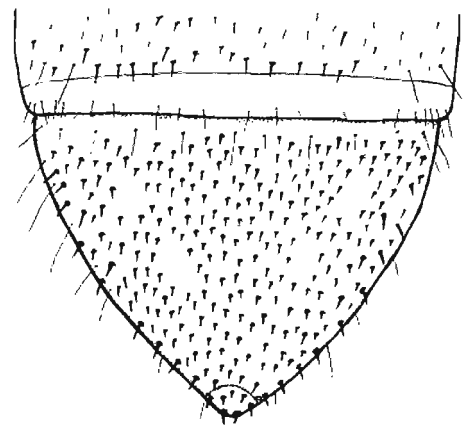
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31



32

Spiracles round, very small, diameter as long as third antennal segment; two small setae are situated next to each spiracle, the more dorsal one laterally underneath the spiracle, the more ventral one in lateral or latero-anterior position. The sterna have in each corner one seta, the first sternum in addition an anterior semi-circular band of setae, the eighth sternum with some smaller setae along posterior band, which join a row of fine, lateral setae on the eighth notum, present on this segment only. Ninth abdominal notum pointed-triangular, at base somewhat wider than long, the apex slightly upcurved; along the base a band of some shorter hairfine setae, the outer ones longest; somewhat underneath the broadest diameter is a transverse row of six long setae almost a third the length of notum; apex and side margins, nearly up to the broadest diameter, are bordered by strong, pointed spines, on apex about three times as long as broad, the more anterior ones somewhat longer; on disc a few irregularly scattered small spines, latero-ventral portions of notum with long, fine brownish hairs, rather widely spaced on surface, more aggregated along border to intersegmental membrane. Pygopodia small, conical, distal surface covered with fine hairs.

The first-stage larva

The egg of *Eremostibes opacus* Koch is oval, white about 1.4 mm. long and 0.9 mm. broad. The first-stage larva measures from 2.8 mm. to 3.6 mm. in length with a head-width of 0.48 mm. to 0.52 mm. respectively. It is remarkable that the eggs and first-stage larvae of the much larger *Parastizopus armaticeps* Per. do not differ in size from those of *Eremostibes opacus* K. The egg bursters however are much smaller and I could not detect any on meso- and metanotum. The distribution of body setae is practically the same as in *Parastizopus*.

Material

Nine larvae. One beetle first generation. Nine beetles and three larvae alive. Largest larva 16 mm. long, 2.0 mm. broad, head-width 1.4 mm. Parents from Klipaar (North-eastern Cape Province), November 1961, L. Vari leg. Described specimen belongs to this series.

Thirty-eight larvae. Four pupae. Seventy beetles first generation. Thirty beetles alive. Parents from Mata Mata and Twee Rivieren (Southern Kalahari Gemsbok Park), November 1960, C. Koch leg.

5. *Eremostibes barbatus* Koch

(Text figs. 30, 33, 34.)

The larva of *E. barbatus* looks very similar to the larva of *E. opacus*. Generally the setae on the respective parts of body are fewer and often shorter and stouter than in *E. opacus*. This refers to almost or fully grown-up larvae of about the last three stages. As usually the length of setae depends on the age of the larva. Setae in younger larvae are relatively much longer than in older larvae. For further details see key, p. 22.

Material

Fourteen larvae. Eight pupae. Five beetles first generation. Six beetles and twenty-five larvae alive.

Largest larva 14 mm. long, 1.8 mm. broad, head-width 1.3 mm. Parents from Mynfontein (De Aar distr., Cape Province), July 1961, C. Koch leg.

6. *Nemanes expansicollis* Fairmaire

The description is based on a larva 10.0 mm. long, 1.5 mm. broad, head-width 1.3 mm. Body sub-cylindrical, from thorax to seventh abdominal segment of subequal width; cuticle tender, semi-transparent, glossy, practically bare, of ivory colour with a faint yellowish tint on head and last three segments. Ninth abdominal notum broad-triangular, margins bordered by slender spines, disc bare except for a transverse row of long, hairfine setae.

Head

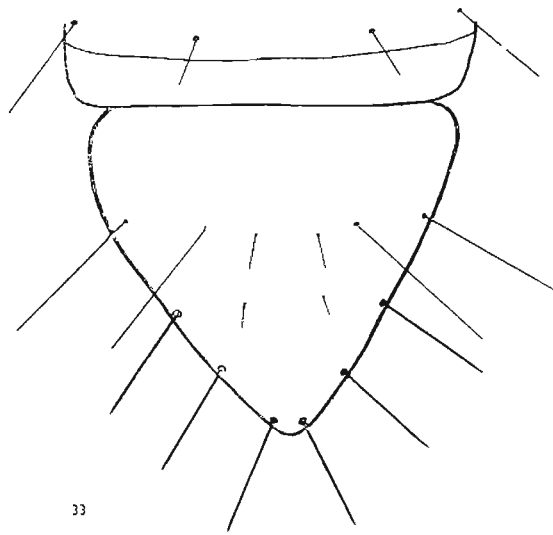
Not quite twice as wide as long, sides rounded, dorsally bare except for two setae underneath epistomal margin, one seta underneath antennal insertion and one seta on each side of epicranial half, about one third from base and at some distance from suture. Ventral portion of epicranium up to gula with fine, long setae. Ocelli absent. Clypeus and labrum both simple, transverse ovate, the former has two long setae on each side, the latter four pointed discal setae, somewhat shorter than clypeus, and about six finer marginal setae. Epipharynx as in *Parastizopus* with long median processes on basal sclerotized band. Mandibles in shape and armature as in *Eremostibes opacus* but apical teeth and molar part more sharply pointed. Maxilla and labium as in *E. opacus* but submentum with about five setae. Gula longer than broad. Segments of antenna tubiform, the second not quite twice the length of the first, the third half the length of the first segment and about one third narrower.

Thorax

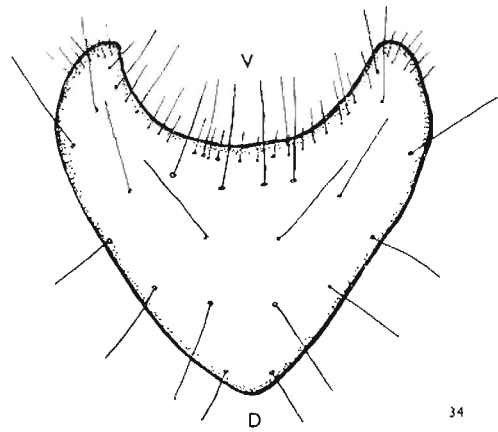
Pronotum trapezoidal, at base about one sixth wider than anteriorly and about twice as long as meso- and metanotum. Not a bare except for four widely spaced fine setae anteriorly and posteriorly on pronotum, and four setae posteriorly on meso- and metanotum, a few setae laterally. Presternum of pronotum with one, eusternum with two setae; pre- and eusterna of meso- and metasterna each with two setae. Mesothoracic spiracle small, round, diameter the length of third antennal segment.

FIGS. 33—39

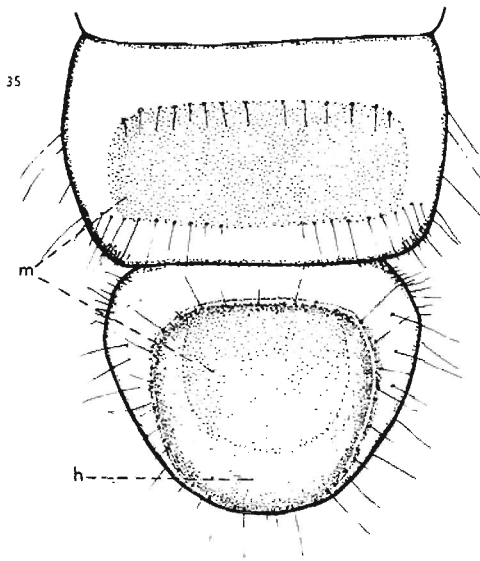
Fig. 33: *Eremostibes barbatus* Koch. Ninth abdominal notum of second-stage larva, 4.0 mm. long; fig. 34: Same species. Ventral portion of ninth abdominal notum. D, dorsad; V, ventrad; fig. 35: *Periloma alfkeni* Gebien. Eighth and ninth abdominal notum. m, brown markings; h, hollowed portion; fig. 36: *Eremostibes opacus* Koch. Ventral portion of ninth abdominal notum; fig. 37: *Amathobius mesoleius* Gebien. Part of eighth and the ninth abdominal segment, lateral view, fig. 38: *Periloma alfkeni* Gebien. First-stage larva. e, egg-bursters; fig. 39: *Parastizopus armaticeps* (Peringucy). First-stage larva.



33



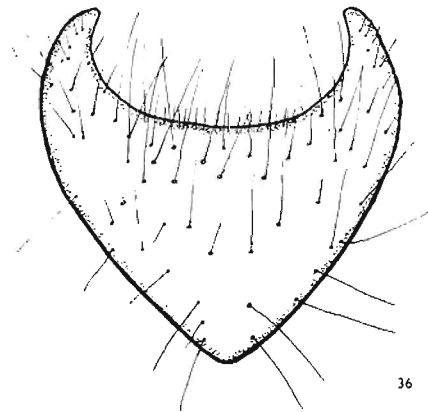
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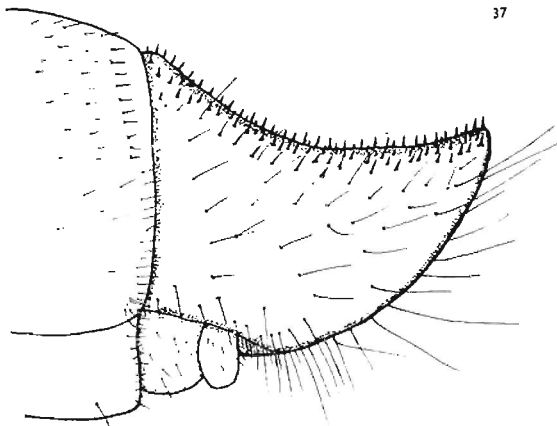
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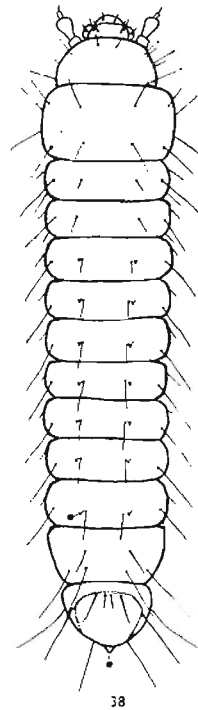
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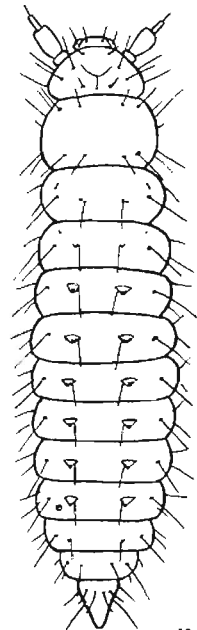
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37



38



39

Legs

(Text fig. 19.)

The legs of *Nemanes expansicollis* are practically identical with those of *Eremostibes opacus*, the colouring of the spines is more greyish-brown in contrast to the reddish-brown ones in *E. opacus*.

Abdomen

(Text fig. 31.)

First to sixth segment transverse, seventh and eighth subquadrate. The eighth notum shows a yellowish tint which is also to be seen very faintly on seventh notum. There are four very fine, inconspicuous setae along posterior margins of nota, one very fine seta antero-laterally; eighth notum in addition with one seta latero-posteriorly and a few long setae at the basal corners. Spiracles round, one quarter less in diameter than mesothoracic one. Sterna with one fine seta in each corner; first sternum has in addition anteriorly two median setae and the eighth sternum has three setae posteriorly between the two lateral ones. Ninth abdominal notum broad triangular, gradually narrowing from the broadly curved base towards the blunt, raised apex; convex above, disc sloping from base towards apex. A yellow tint extends on apical three-quarters, but is absent from basal quarter and lateral curvatures. The margins are bordered by slender, greyish-brown setae about half the length of the second antennal segment. Lateral basal parts have some very fine, light setae which continue as a fine strip of microsetae along basal margin. The dorsal disc is bare except for a transverse row of six long, fine setae about a third of the length of notum and situated at the broadest diameter, between them a few microsetae. Ventral parts of notum with long setae. Ninth abdominal sternum with scattered hairs. Pygopodia small, coniform with short setae distally and one seta on exterior surface.

The egg of *Nemanes expansicollis* is 1.4 mm. long and 0.9 mm. broad, white. First-stage larva not yet obtained.

Material

Three larvae. One pupa. Largest larva 10 mm. long, 1.5 mm. broad, head-width 1.3 mm. Parents from between Luderitz and Haalenberg (Southern Namib), September 1962, C. Koch leg.

7. *Psammogaster malani* Koch

The description is based on a larva 10.0 mm. long, 1.9 mm. broad, head-width 1.3 mm. Body subcylindrical, very delicate, white. From mesonotum to eighth abdominal notum with broad bands of small, spherical, brown squamiform setae and long hairs. Large oval patches of ochre pigmentation on eighth and ninth abdominal notum, the latter semiglobular.

Head

(Text figs. 6, 13.)

Transverse-ovate, medianly, at broadest point, a third narrower than pronotum at base. Sides evenly rounded, epistomal margin straight, centre of base of disc with a concave fine, brown ridge; frons with some scattered short brown spines; dorsal, lateral

and ventral portions of epicranium with long yellowish hairs. Ocelli absent. Clypeus trapezoidal about twice as broad as long with four discal setae. Labrum transverse-ovate with a discal and a marginal row of fine pointed setae, the discal ones as long as labrum. Epipharynx as in *Parastizopus*. Mandibles large, general appearance similar to preceding genera; the dorsal setose elevation shows a group of stronger setae at inner and a few finer setae at outer dorsal margin, two to three setae at apical point and some longer ones along ventral margin. Segments of antenna tubiform, slightly dilated apically, second segment somewhat longer than first, third one fifth of the second. Maxilla and labium are distinguished from those in the other genera by the enormously long hairs on all parts and the position of the palpus maxillaris which does not form a rectangle with mala but is in parallel position to it. Gula slightly longer than broad.

Thorax

Pronotum trapezoidal, anteriorly tapering off for one quarter; all margins straight, at base one third broader than long; meso- and metanotum half as long as pronotum, the latter covered with long, light hairs, about one third the length of the segment, their distribution somewhat weaker medianly; mesonotum with a transverse, median row of long hairs, in front of it some small, spherical, brown squamiform setae, followed anteriorly by a row of long hairs, widely set apart, portion next to pronotum set with short, fine setae; armature of metanotum the same, but the scaly band broader, occupying about one third of the segment. All sternal parts have fine long hairs. Mesothoracic spiracle round-oval, twice as broad as third antennal segment.

Legs

(Text figs. 21, 25.)

Slender and very delicate. Fore legs twice as long and broad as mid and hind legs. Ventral surfaces of all segments covered with long, fine hairs. Inner margin of trochanter and femur of fore leg with three strong, triangular spines each, tibiotarsus with three, base of claw with one slender, pointed seta, about seven times as long as broad, one smaller stout seta at the outer margin of base of claw; claw slender one quarter shorter than tibiotarsus, pointed, but dorso-ventrally flattened, in contrast to the dorsally strongly convex claws of the other described species, which appear almost three-edged. The claws of mid and hind legs are almost as pointed and slender as the basal setae which reach almost the same length as the claw itself so that the pretarsus appears three-pronged.

Abdomen

(Text fig. 15, plate 11.)

First eight abdominal nota about two-and-a-half times broader than long with a median band of small, spherical, squamiform setae; posteriorly this band is limited by a row of long hairs which extend beyond the following notum. Eighth notum is about one tenth narrower than the seventh with an ovate ochre patch medianly of about half the width of notum. A corresponding wing-like mark is found at base of

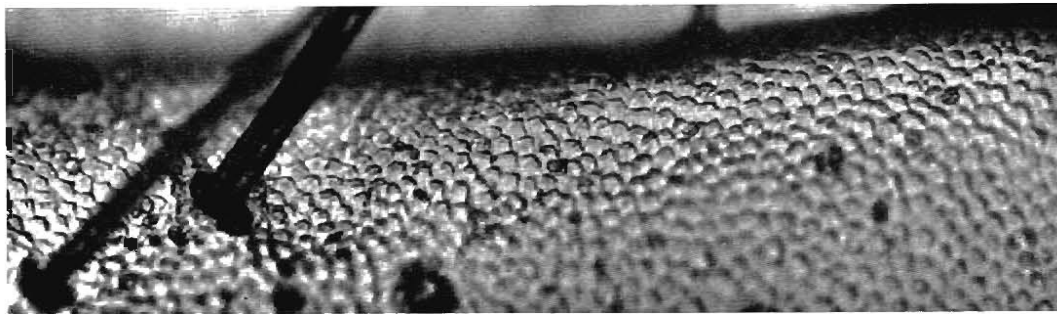
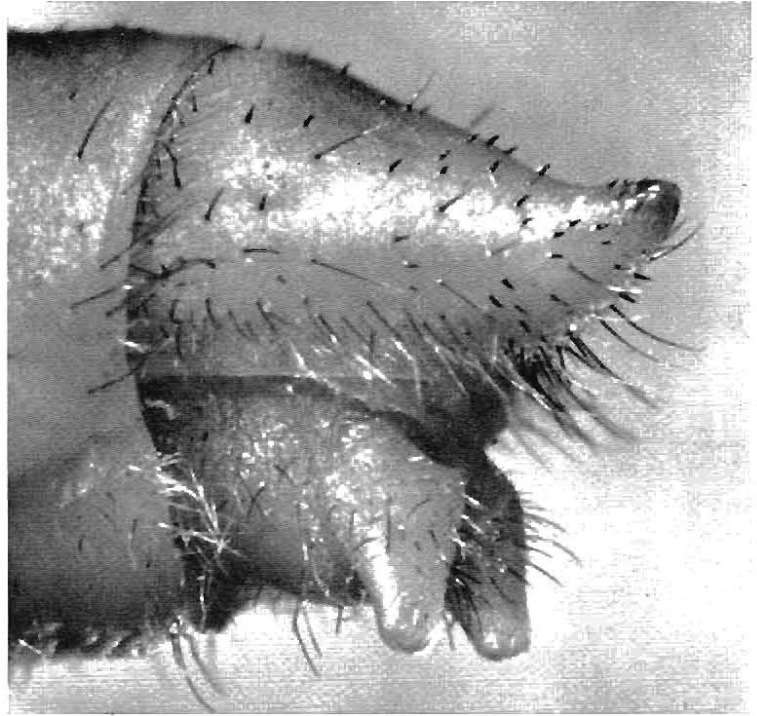


PLATE 1

Parastizopus armaticeps (Peringuey).

LEFT: Lateral view of head, showing tubercle on clypeus. x32.5.

RIGHT: Ninth abdominal segment, lateral view. x42.3.

BELOW: Detail of cuticle, showing the imbricate structure. ca x400.

the ninth abdominal notum which is semi-globular. Squamiform setae are aggregated along the margins, in the centre are a few dispersed ones; exterior margin and ventral surface of notum with long, light hairs. Abdominal spiracles round, small with diameter less than the length of the third antennal segment. Abdominal sterna with a posterior row of long hairs, the surface in front set with fine short setae, on the last five sterna there are some small, elongate squamiform setae. Pygopodia strongly reduced, hardly recognizable as such, only two small setose convexities left.

The first-stage larva unknown yet.

Material

Five larvae. Largest larva 10.0 mm. long, 1.9 mm. broad, head-width 1.3 mm. Parents from Gobabeb (Southern Namib), November 1961, C. Koch leg.

8. *Periloma alfkeni* Gebien

The description is based on a larva 11 mm. long, 1.5 mm. broad, head-width 1.1 mm. Body sub-cylindrical, slightly tapering towards the ends, practically bare. The last two nota with orange-brown patches. Ninth abdominal notum semi-globular with a subcircular area surrounded by a raised margin with small pointed setae.

Head

(Text fig. 12.)

Transverse-ovate with slightly rounded sides, one third narrower than pronotum. Epistomal margin straight with two fairly strong setae, frons with five irregularly placed setae, two setae on each epicranial half at some distance from base; lateral and ventral portions of epicranium with fine, fair hairs. Ocelli absent. Clypeus transverse-ovate with two strong, shorter spines on posterior half and two finer setae, about one half longer, laterally. Labrum dome-shaped, four strong discal setae and six finer marginal setae. Epipharynx as in *Parastizopus*. First segment of antenna tubiform, not quite twice as long as broad, second segment one third longer with dilated apex, third segment one fourth the length of the second, apex dilated. Shape of mandibles very similar to *Parastizopus* with large membranous elevation which bears two short strong setae dorso-basally, ventro-basally two longer finer setae and one seta on apex of elevation. Stipes of maxilla with a median vertical row of long setae; labium as in *Parastizopus*, but setae longer than the segments to which they belong. Gula elongate, about one half longer than broad. Hypopharyngeal sclerite tricuspidate, median process long and sharply pointed.

Thorax

Pronotum trapezoidal, tapering anteriorly, about one third broader than long. Mesonotum somewhat less than half the length of pronotum, metanotum about one half longer than mesonotum (measurements taken from a specimen with more equally extended segments than the specimen described). Anterior margin of pronotum bordered by very fine, short setae, posterior margin with somewhat longer setae about the length of second antennal segment; medianly, between the rows of setae, one seta on each side near middle line and one seta more

laterally; side margins with some fine, fairly short setae. Distribution of setae on meso- and metanotum similar but setae very widely spaced. Mesothoracic spiracle small, round with diameter as long as first segment of labial palpus. Presternum of pronotum bare and brownish, eusternum with several setae; respective parts on meso- and metasternum set with fine setae.

Legs

(Text figs. 22, 26.)

Front legs considerably larger than mid and hind legs, the former about twice as long and broad. The armature follows the pattern of *Eremostibes* and *Nemanes*, but the femur of fore leg is somewhat stouter.

Abdomen

(Text fig. 35.)

The first seven abdominal segments about twice as broad as long, eighth segment one tenth narrower and one fifth shorter. On all eight nota an anterior and posterior row of about six to eight, widely spaced, setae with a few setae between the rows. Setae of posterior row of eighth notum denser and longer, bordering an orange-brown, transverse-ovate patch which shows also setae along anterior margin. All setae fine, light and inconspicuous. Seventh notum slightly brown. A few single setae at sides of all segments. Spiracles round, diameter as long as third antennal segment. All sterna with setae along sides two discal setae anteriorly and posteriorly; first sternal segment anteriorly with a semi-circle of setae and eighth sternum with a posterior row of longer setae. Ninth abdominal notum subglobular, at curvature somewhat broader than long, disc with a raised circle set with tiny somewhat flattened but apically pointed setae, intermixed with longer, hair-fine setae, surrounding a slightly concave area which shows on its basal three-quarter also a brownish tint. Lateral and ventral parts of notum with fine, hairlike setae. The ninth abdominal sternum has long brownish setae, becoming shorter medianly. Pygopodia small, coniform, entire surface set with short setae.

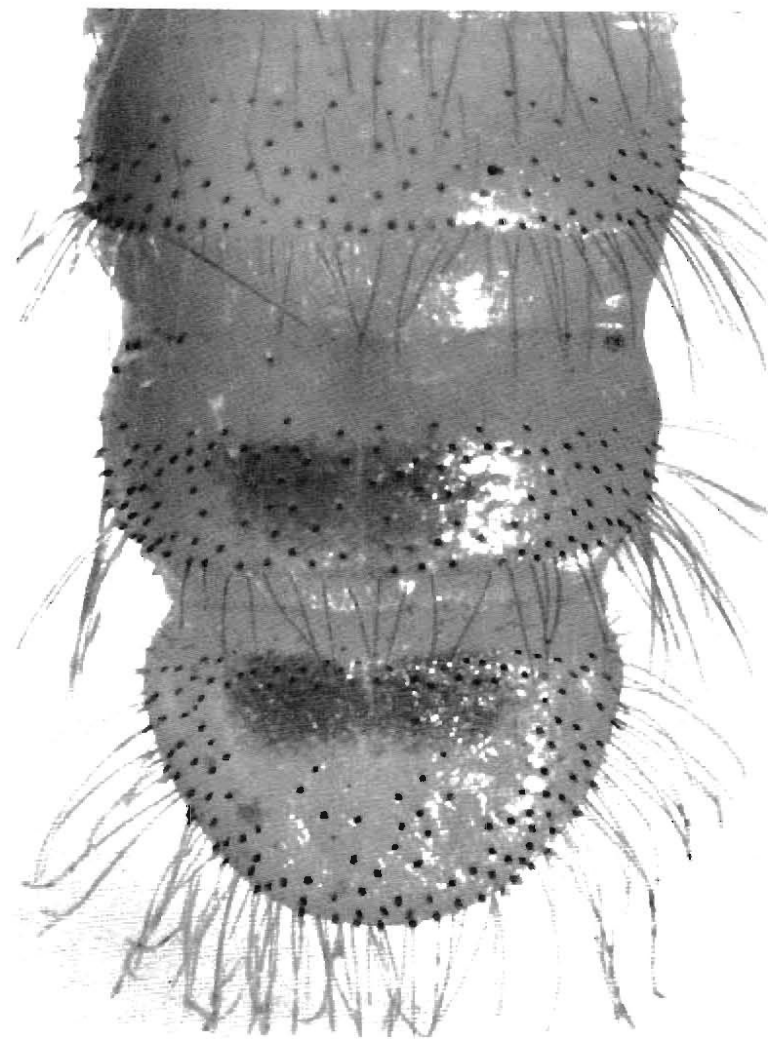
The first-stage larva

(Text fig. 38.)

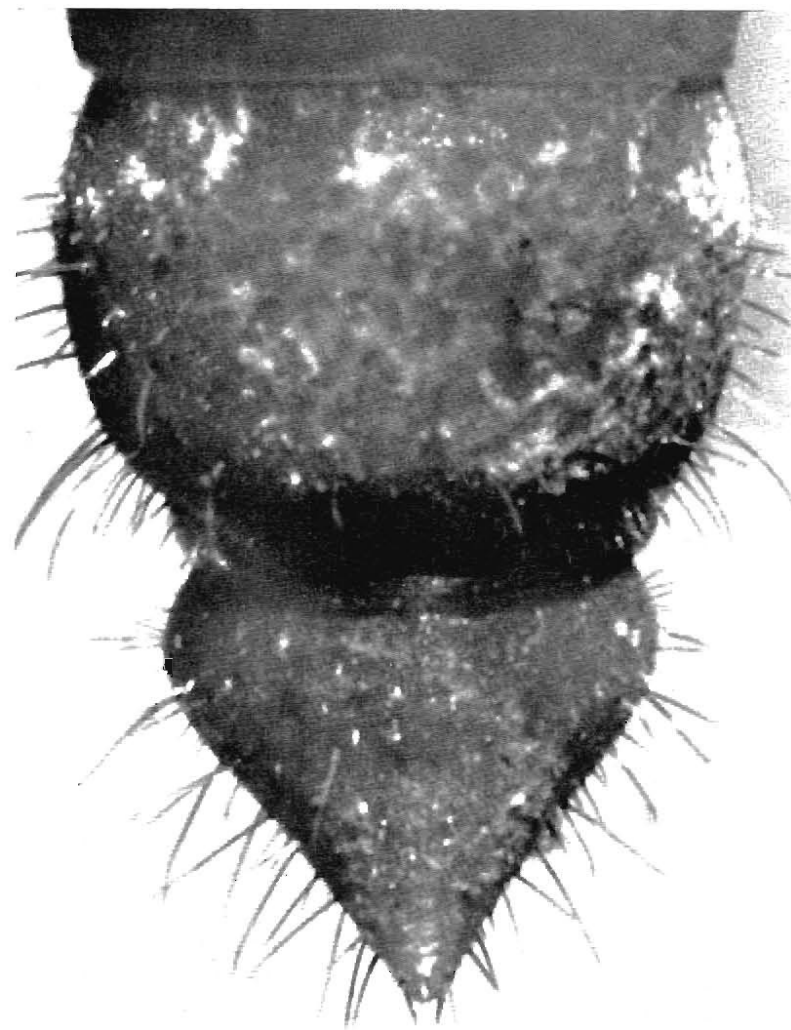
The egg of *Periloma alfkeni* Gb. is oblong, 1.6 mm. long, 0.96 mm. broad, white. The first-stage larva is 3.5 mm. long, 0.7 mm. broad, head-width 0.5 mm., white. Clypeus shows four, labrum two, and dorsal elevation of mandible one fine, brown seta. No egg-bursters are detectable on the thoracic nota, but occur on the first seven abdominal nota and in addition there is one triangular egg-burster at apex of ninth abdominal segment. The notum of this segment shows very faintly the circular raised margin and at its basal contour four setae, the outer ones longer, and two long setae laterally. Of the setae of the legs, the two at the base of claw and the two at inner margin of trochanter are more strongly sclerotized.

Material

Seven larvae. Largest larva 11 mm. long, 1.5 mm. broad, head-width 1.1 mm. Three beetles alive. Parents from Grasplatz, east of Luderitz (Southern Namib), September 1962, C. Koch leg.



Psammogaster malani Koch. The last three abdominal nota. x45-6.



Emmychatus caraboides (Fairmaire). Fifth and ninth abdominal notum, showing the white flakes on discs. x69.

PLATE 11

IV. *Reference*

- KOCH, C. The Tenebrionidae of Southern Africa.—XXIX. *Luebbertia plana* gen. et spec. nov., with a dichotomic analysis of Stizopina (Opatrini). *Sci. Pap. Namib Desert Res. Stat.* 1963. No. 18.

Pretoria,
24 June 1963.

Transvaal Museum
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