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Rauno Linnavuori: Revision of the Cicadellidae (Homoptera) of the
Ethiopian Region III. Deltocephalinae, Hecalini

Helsingin Yliopiston
Metsäkirjasto

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SOCIETAS PRO FAUNA ET FLORA FENNICA

REVISION OF THE CICADELLIDAE
(HOMOPTERA) OF THE ETHIOPIAN
REGION III. DELTOCEPHALINAE,
HECALINI

Rauno Linnavuori

**Helsingin Yliopiston
Metsäkirjasto**

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Abstract

LINNAVUORI, RAUNO: Revision of the Cicadellidae (Homoptera) of the Ethiopian Region III. Deltocephalinae, Hecalini. — Acta Zool. Fennica 143: 1—37. 1975.

The taxonomy and phylogeny of the African species of the Deltocephaline tribe Hecalini are discussed. The following new taxa are described: *Odzalana alcumena* sp. n., *O. alcumena kwangoana* ssp. n., *O. curticeps* sp. n., *O. confusa* sp. n., *O. gracilis* sp. n., *Glossocratus afzelii* St. f. *umbrina* f. n., *G. pygmaeus* sp. n., *G. montanus* sp. n., *G. benguellus* sp. n., *Parabolocratalis apicalis* sp. n., *P. distans* sp. n., *Lualabanus curticeps* gen. et sp. n., *L. affinis* sp. n., *L. ornaticeps* sp. n., *Hecalus longicauda* sp. n., *H. plagiatu* sp. n., *H. bahrabiad* sp. n., *H. aurora* sp. n., *H. carinatus* sp. n., *H. macilentus* sp. n., *H. atreus* sp. n., *H. adnexus* sp. n., *H. aither* sp. n., *H. kengeanus* sp. n., *H. imitans* sp. n., *Linnavuoriella berenice* sp. n., *L. conformis* sp. n., *L. brevispinosus* sp. n., *L. masombwensis* sp. n., The Nearctic species of *Glossocratus* Fieber, 1866 are transferred to a new genus, *Neohecalus* gen. n. (Type: *Glossocratus lineatus* Uhler).

Author's address: Dr. Rauno Linnavuori, SF-21220 Somersoja, Finland

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INTRODUCTION

The present article is the third part of a revision of the African Cicadellidae (for the previous parts, see LINNAVUORI 1972a and b). This large leafhopper family is very imperfectly known in the Ethiopian Region. The revision has been made as complete as possible by revising all the existing types of the species described earlier. The most important type collections are located in the British Museum (Distant's and Walker's types), the Moravian Museum in Brno (coll. Melichar), the National Museum in Vienna (Signoret's and Stål's types) and Stockholm Museum (Jacobi's and Stål's types). A very extensive unidentified material from

various parts of Africa was examined. The largest collections studied belong to the following institutes: the Museums of Brussels and Tervuren (a very abundant material from Zaire), Museu do Dundo (Angola), the Museum of Paris (West and Central Africa, Republic of Congo), the Museum of Stuttgart (Ethiopia, Cameroon) and the Museum of Lund (South Africa). My private collection contains numerous specimens from West, Central and Northeast Africa and minor samples from East and South Africa.

I am greatly indebted for the generous co-operation of all the colleagues who have helped me.

SUBFAMILY DELTOCEPHALINAE

Tribe Hecalini

Usually medium-sized or large, often sexually dimorphic leafhoppers. Colour in primitive forms brown, in advanced genera green.

Body elongate, \pm depressed. Head \pm strongly produced, often spatulate, anterior margin usually acute or foliaceous. Crown flattish, frontal region broad, although often indistinctly delimited in adults, always well visible in nymphs. Genae broad. Anterior tentorium branches (Figs. 5a, 10i and 22j) bifurcate, in *Odzalana* (Fig. 3a) apically triramous with the two apical branches provided with a very long filamentous ap-

pendage. Pronotum broad, collar-shaped, flat, lateral margins long and carinate. Elytra narrow, in females often \pm shortened, appendix narrow, 2 closed subapical cells, apical part often with extra cross veins at least in costal margin. Structure of legs of the common Deltocephaline type; in *Glossocratus*, however, dorsal surface of fore and middle tibiae flattened and that of hind tibiae scored. Spinulation of fore tibiae often \pm irregular.

Male genitalia: Apodemes of 1st sternite usually long and narrow (Fig. 11e), lying between the broad apodemes of

2nd sternite. The latter are reduced in the following genera studied: *Odzalana* Lv., *Hecullus* Om. (Nearctic) and *Egenus* Om. (Neotropical). Genital segment usually elongate. Valve short. Genital plates narrowly triangular. Connective (Figs. 4g, 9a, 21g) robust, usually short, Y-shaped but arms generally close to each other (strongly divergent in the Nearctic genus *Dicyphonia* Ball). In *Odzalana* and the Nearctic genus *Hecullus* the connective is strongly prolonged (Fig. 1e). Penis often with a long stem, provided with apical appendages. Genital segment of female elongate, ovipositor sheath usually extending far beyond tip of abdomen. 7th sternite large, hind margin usually truncate with a small triangular median lobe.

Biology: Grass-feeders in steppes, savannahs and savannah forests.

Range: Cosmopolitan.

The African genera of the Hecalini fall within three groups: 1) *Odzalana* Lv. forms a separate evolutionary line differing greatly from the other genera in the colouring, the unique shape of the anterior tentorium branches and the genital structure. The biology also appears to be different. A separate tribe should probably be established for it. 2) *Glossocratus* Fb. represents a primitive type, in which several characters of the ancestors of the tribe have been retained. Species of this genus live on the ground at the roots of tussocks of Gramineae. Nevertheless the body form shows adaptation to living in grasses. 3) The *Hecalus* group, an undoubted derivative of *Glossocratus*-like ancestors, contains recently evolved highly specialized genera, often with rather weak defining characters. Representatives of the group live on grasses pressing themselves close to the leaves. The green colouring and the flattened body are adaptive characters connected with the specialized life style. The group has probably originated in

the Old World tropics and after wide dispersal, possibly partly by adventitious means, reached both Australia (*Hecalus*, *Linnavuoriella* and the endemic *Hecalocratus* Ev.) and, via North America, the grassland areas of South America (*Spangbergiella* Sgn.). In the New World there exists a further group of distinctive genera (*Hecullus* Om., *Dicyphonia* Ball, *Egenus* Om. and *Bonamus* Om.), which are undoubtedly derivatives of other early immigrants to the continents. The males of *Dicyphonia* and *Hecullus*, in particular, have a strongly Eusceline appearance. In my opinion the Nearctic genus *Memmonia* Ball (type: *M. consobrina* Ball), generally regarded as a representative of the Hecalini, actually belongs to the Euscelini. For the Neotropical genus *Cerrillus* Om. (type: *Hecalus notatus* Osb.), a new tribe was described elsewhere (LINNAVUORI 1975:49—50).

EVANS (1947:138—146) included in the subfamily Hecalinae the tribes Hecalini, Dorycephalini, Eupelicini and Paradorydiini, on account of the similarity of the appearance of the body form. As pointed out above, the long flattened body is an adaptive character, which has evolved independently in various Cicadellidae groups. The following main characters separate the Hecalini from these tribes: 1) the cephalic structure: the frontoclypeus clearly extends on to the crown in the Hecalini, while it is totally facial in the others, 2) the anterior tentorium branches are bifurcate in the Hecalini, simple in the others, 3) the structure of the legs, even in *Glossocratus*, is of the advanced Deltocephaline type in the Hecalini, but of a primitive type in the others and 4) the male genitalia are of the Deltocephaline type in the Hecalini, but of primitive types in the other tribes. Consequently the union of the tribes in a single subfamily is undoubtedly unjustified. On the other

hand, the Hecalini share all the principal characters of the Deltocephalinae (a tendency to elongation of the body and the strongly notched genae, mentioned as distinguishing Hecalini from Deltocephalinae, also occur in other Deltocephaline groups, e.g. in the Eusceline genus *Gcaleka* Nd.) and so I regard it as a tribe of this subfamily, as RIBAUT (1952: 318) has also done.

Key to the genera

- 1 (2) Yellow-brown species with dense dark irroration on upper surface. Cells of elytra with numerous brown vermiculate lines and irroration, costal margin with reflexed dark veinlets *Odzalana* Lv.
- 2 (1) Upper surface without dark irroration 3
- 3 (4) Large, opaque brown species. Body, including elytra, densely shagreened and minutely papillose. Genae (Fig. 5f) very broad, lateral margins with a deep rectangular notch below eyes, lower part of genae forming a large bluntly angular lobe at the lateral edge of fore coxae. Legs incrassate, dorsal surface of fore and middle tibiae flattened *Glossocratus* Fb.
- 4 (3) Green or yellowish species. Body not densely shagreened and papillose. Genae narrower, only moderately notched near eyes. Legs gracile, dorsal surface of fore and middle tibiae rounded 5
- 5 (6) Body robust. Head broad. Crown, pronotum and scutellum with \pm developed fulvous bands. Apical area of elytra dark smoky with milky areolate spots, in pale specimens at least tips of some apical veins

- dark. Stem of penis arising from dorsal part of socle
 *Linnavuoriella* Ev.
- 6 (5) Body elongate, without fulvous pattern. Elytra sometimes infumed along veins, but without milky areolate spots, veins totally pale. If penis long, then stem arising from ventral part of socle 7
- 7 (8) Body very narrow and long. Crown much longer than pronotum with margins broadly foliaceous in both sexes. Postclypeus (Fig. 7e) very strongly tapering upwardly. Penis rather short *Parabolocratalis* Ev.
- 8 (7) Body robuster. Crown usually only slightly longer than pronotum, if more than slightly (*Hecalus glaucescens* and *paykulli*), then postclypeus much broader and penis longer 9
- 9 (10) Anterior margin of head in both sexes rounded to face. Penis very short and broad, lamellate, without socle. Side lobes of pygophore very long
 *Lualabanus* gen. n.
- 10 (9) Anterior margin of head acute (except in σ of *Bordesia*) or foliaceous. Stem of penis long, arising from ventral part of socle. 11
- 11 (12) σ : Anterior margin of head rounded to face. ♀ : Anterior two thirds of crown strongly vermiculately rugose
 *Bordesia* Bgv.
- 12 (11) Anterior margin of head always acute or foliaceous. Crown not rugose *Hecalus* St.

Odzalana Linnavuori

Odzalana LINNAVUORI 1969:1154—1156. Type:
O. villiersi Lv.

Rather large, elongate, yellow-brown leafhoppers with dense dark irroration.

Head (Fig. 1a) strongly produced, spatulate, anterior margin foliaceous. Face flat, its lower part short and broad, broadly rounded in outline. Anteclypeus slightly tapering apicad; frontoclypeus strongly broadening upwardly; lora large; genae bluntly angularly notched near eyes; ocellular area broad; ocelli near eyes. Crown slightly concave, minutely shagreened, frontal and discal regions not separated, coronal suture short. Anterior tentorium branches (Fig. 3a) of unique shape, apically triramose, the two apical branches provided with a very long filamentous appendage. Pronotum transversely wrinkled, lateral margins acute, long, diverging caudad. Elytra long, with a distinct appendix, apical cells long, two closed subapical cells; cells (Fig. 2g) with numerous brown vermiculate lines and irroration, costal margin with reflexed dark veinlets. Dorsal surface of fore and middle tibiae rounded, spinulation of the former 1+5, of hind knees 2+2+1.

Male genitalia: Pygophore elongate, narrowly conical, sclerified side lobes with sclerified appendages, without macrosetae. Anal tube long, extending to apex of pygophore, tubular, sclerified. Valve rather long, triangular. Genital plates (Fig. 1d) long and narrow, macrosetae not regularly arranged. Stylus with digitate apophysis, preapical angle prominent, ventral arm long. Connective (Fig. 1e) very long and slender, Y-shaped, arms rather close to each other. Penis symmetrical, stem arising from the ventral part of the sole, very long, band-like, lamellate: gonopore subapical on the ventral surface.

Range: Congolese.

Biology: Representatives of the genus are common at lamps in rain forests; the biology is otherwise unknown. The fact

that only males are known suggests brachypterism in the female sex.

Key to the species

- 1 (2) Small, length 6.5 mm. Crown 0.95—1.0 × as long as pronotum, about 1.3 × as broad as long. Pygophore as in Fig. 3e—f. *curticeps* sp. n.
- 2 (1) Bigger species. Crown at least slightly longer than pronotum 3
- 3 (4) Side lobes of pygophore (Fig. 3b—d) with 3 processes, one in caudo-dorsal, two in caudo-ventral angle *alcumena* sp. n.
- 4 (3) Side lobes of pygophore with 2 processes (one often bifid) in caudo-ventral angle 5
- 5 (6) Side lobes of pygophore (Fig. 2c) with a short claw-like basal process lying in ventral margin far from the apical process *villiersi* Lv.
- 6 (5) Pygophoral processes near each other 7
- 7 (8) Side lobes of pygophore strongly produced, sharp (Fig. 4c), apically dentate, two simple claw-like processes in ventral margin *gracilis* sp. n.
- 8 (7) Side lobes of pygophore short and broad 9
- 9 (10) Apophysis of stylus very long, falcate (Fig. 4b). Side lobes of pygophore (Fig. 4a) with the basal process much shorter than the apical one *confusa* sp. n.
- 10 (9) Apophysis of stylus (Fig. 1f) short, digitate. Processes of pygophore (Fig. 1b—c) of equal length *rubens* (Mel.)

1. *O. alcumena* sp. n.
Length 8.25—9 mm. Like *O. rubens*,

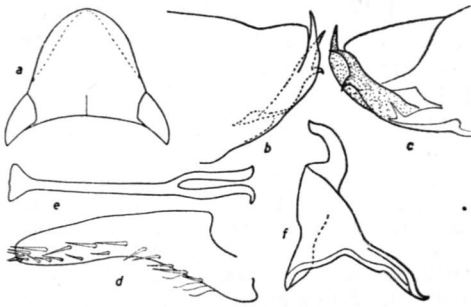


FIG. 1. *Odzalana rubens* (Mel.) (type): a head; b side lobe of pygophore in lateral, c in median aspect; d genital plate; e connective; f stylus.

but crown shorter and more broadly rounded, $1.2 \times$ as long as pronotum, slightly broader than long (27:26).

Male genitalia as in *O. rubens*, but side lobes of pygophore with 3 appendages (Fig. 3b—c), the process in caudo-dorsal angle long, plug-shaped, minutely dentate. Penis somewhat shorter than in *O. rubens*.

Material studied: Zaire: Kinda, 1 paratype, 15.X.1914, L. Charlies; Lulua, Kapanga, 1 ♂, type, II.1934, G. Overlaet. Angola: Cuango, Cafundo, numerous paratypes, IX—X.1969, S. Peles. Type in Mus.Tervuren, paratypes in Museu do Dundo, Angola and in my collection.

1.a. *O. alcumena kwangoana* ssp. n.

Length 6.5—7 mm. Like the nominate form, but smaller and crown shorter and broader, $1.1-1.2 \times$ as long as pronotum, $1.1-1.2 \times$ as broad as long. Dorsal process of pygophore (Fig. 3d) short, knob-like.

Material studied: Zaire: Kwango, Popokabaka, 1 ♂, type and several paratypes, XII.1951, L. Pierquin, Mus.Tervuren, paratypes in my collection.

2. *O. curticeps* sp. n.

Length 6.5 mm. Like the other species, but smaller, with more distinct and dense dark pattern and crown remarkably

short and broad, $0.95-1.0 \times$ as long as pronotum, about $1.3 \times$ as broad as long.

Male genitalia as in *O. rubens*, but side lobes of pygophore (Fig. 3e—f) with two simple claw-like appendages in caudo-ventral angle. Stylus in Fig. 3g.

Material studied: Zaire: Equateur, Mosaka, 1 paratype, 7.IX.1925, R. Hulstaert; Kwamouth, 1 ♂, type and several paratypes, 1.VI.1913, XI.1924, 5.XIII.1925, P. Basilewsky, J. Maes, H. Schouteden; Kwango, Popokabaka, 4 paratypes, XII.1951, L. Pierquin, Mus.Tervuren, paratypes also in my collection.

3. *O. villiersi* Linnavuori

Odzalana villiersi LINNAVUORI 1969: 1156.

Length 7.5—8 mm. Yellow-brown. Face pale greenish yellow. Upper surface densely irrorate with dark brown. Elytra with dense dark brown false veins and irroration, costal margin with numerous dark veinlets, cells with small milky spots, vein brown. Under surface pale yellowish. Tibiae with dark setigerous spots.

Crown $1.44-1.5 \times$ as long as pronotum, at least as long as broad. Male genitalia (Fig. 2c—d) as in *O. rubens*, but appendages of pygophore dissimilar and apophysis of stylus longer.

Material studied: Republic of Congo: Odzala, 1 ♂, type and numerous paratypes, X.1963, A. Descarpentries & A. Villiers, Mus. Paris. Zaire: several exx. from Bomboma,

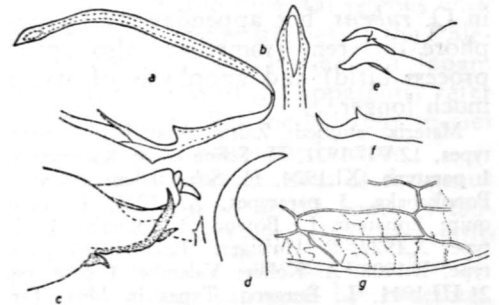


FIG. 2. *Odzalana rubens* (Mel.) (type): a penis; b apex of same, ventral aspect; g subapical area of elytron; e side lobe of pygophore, ventral aspect (Kununga); f ventral process of same (Kununga). — *O. villiersi* Lv.: c pygophore, lateral aspect; d apophysis of stylus.

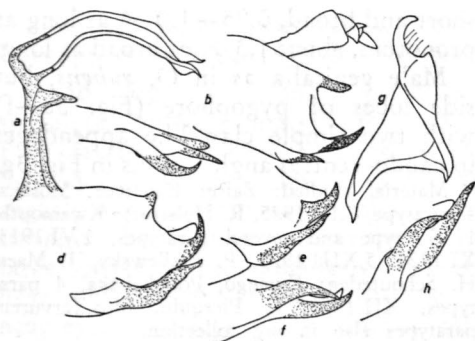


FIG. 3. *Odzalana alcumena* sp. n.: a anterior tentorium branch; b pygophore, lateral aspect; c side lobe of same, ventral aspect. — *O. alcumena kwangoana* ssp. n.: d side lobe of pygophore, lateral aspect; e same, ventral aspect; f same, ventral aspect; g stylus. — *O. curtiiceps* sp. n.: e same; f same, ventral aspect; h side lobe of pygophore, ventral aspect.

12.IX.1935, A. Bal; Coquilhatville, 13.II.1925, R. Hulstaert; Flandria, 1931, R. Hulstaert; Leopoldville, 13.XII.1925, R. Hulstaert; Lokuma, 25.I.1926, R. Hulstaert; Eguateur, Bokote, 12.II.1928, R. Hulstaert; Tshuapa, Bokuma, V.1952, R. Lootens; Ubangi, Bosobolo, 1951, Vachaudes.

4. *O. confusa* sp. n.

Length 7.5—8 mm. Like the preceding species, but crown somewhat shorter, $1.26-1.37 \times$ as long as pronotum (median length), about as long as broad.

Male genitalia (Figs. 3h and 4a—b) as in *O. rubens*, but appendages of pygophore different (sometimes also upper process bifid) and apophysis of stylus much longer.

Material studied: Zaire: Abanghai, 5 paratypes, 12.VII.1921, H. Schouteden; Kwamouth, 1 paratype, XI.1924, H. Schouteden; Kwenga, Popokabaka, 3 paratypes, XII.1951, L. Pierquin; Equateur, Le Botende à Yolombo, 1 ♂, type, X.1927, R. Hulstaert; Lukombe, 1 paratype, X.1908, A. Koller; Yalembe, 1 paratype, 21.III.1911, L. Burgeon. Types in Mus. Teruren, paratypes also in my collection.

5. *O. rubens* (Melichar)

Hecalus rubens MELICHAR 1912: 114.

Length 7.25—8 mm. Like *O. villiersi*,

crown $1.44-1.5 \times$ as long as pronotum, at least as long as broad. Dark irroration less intense. Dorsum of abdomen reddish.

Male genitalia in Figs. 1b—f, 2a—b, e—g.

Material studied: Zaire: Duma, Ubangi Distr., 1 ♂, type, 1.X.1910, H. Schubotz, Mus. Hamburg; Buta, 1 ex., 1911, de Calonne; Equateur, Lokuma, 1 ex., 25.II.1926, R. Hulstaert; Equateur, Mesaka, 1 ex., 7.XI.1925, R. Hulstaert; Kunungu, 2 ex., 3.IV.1921, H. Schouteden; Kwango, Popokabaka, 3 ex., XI.1951, L. Pierquin; Leopoldville, 1 ex., 3.XII.1925, R. Hulstaert; Libenge, 1 ex., I.1937, Leontovitch; Ubangi, Binga, 1 ex., 5.III.1932 and Dongo, 1 ex., 6.XII.1931, H. Brédo.

6. *O. gracilis* sp. n.

Length 6.5—7 mm. Like *O. villiersi*, but smaller and remarkably gracile.

Male genitalia (Fig. 4c—f) distinctive: Side lobes of pygophore strongly prolonged, narrow, minutely dentate apically, ventral margin with two claw-like processes. Apophysis of stylus short, expanding apicad, preapical angle rounded. Penis much shorter than in the other species.

Material studied: Central African Republic: Boukoko, several paratypes, 3.XII.1963, M.

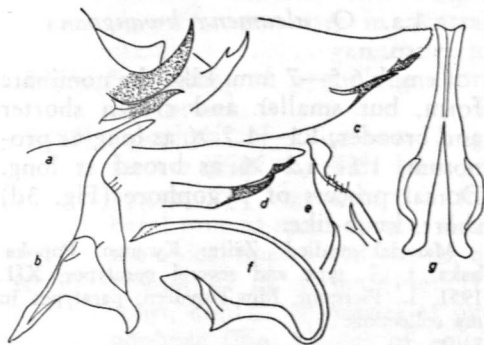


FIG. 4. *Odzalana confusa* sp. n.: a side lobe of pygophore, lateral aspect; b stylus. — *O. gracilis* sp. n.: c side lobe of pygophore, lateral aspect; d same, ventral aspect; e apophysis of stylus; f penis, lateral aspect. — *Glossocratus afzelii* (St.); g connective.

Boulard; La Maboke, 1 ♂, type and several paratypes, 6—9.VI.1973, Linnavuori. Zaire: Ubangi, Dongo, many paratypes, 6.XII.1931, H. Brédo. Type in my collection, paratypes also in Mus. Paris and Mus. Tervuren.

Glossocratus Fieber

Glossocratus FIEBER 1866: 502. Type: *G. fo-
veolatus* Fb.

Cbelusa SIGNORET 1879: 51. Type: *Acoce-
phalus madagascariensis* Sgn., syn.n.

Large, polymorphic, opaque brown leafhoppers.

Body parallel-sided, depressed, densely shagreened and minutely papillose. Brachypterous specimens with short pale scale-like hairs. Head as broad as pronotum, parabolic, in ♀ much longer than in ♂, anterior margin broadly foliaceous. Face (Fig. 5f) flat, in profile concave; anteclypeus broadening apicad, lateral margins curved, a longitudinal median elevation present, frontoclypeus flattish, strongly broadening upwardly, upper margin broadly foliaceous; lora large, extending to lateral margins of genae apically; genae finely hairy, very broad, lateral margins with a strong rectangular notch below eyes, then subparallel directed ventrad and, finally, bent mesad to tip of anteclypeus, a roundedly bluntly angular lobe thus being formed at the lateral edge of the basis of the fore coxae; ocellular area broad, antennal pits shallow, antennae short. Crown ± strongly parabolically produced, apical margin slightly upturned, disk flattish or concave; postfrontal suture not visible, coronal suture long, often ± elevated; ocelli in anterior margin, in the macropterous form near eyes, in the brachypterous form very reduced and located ± far from eyes. Anterior tentorium branches (Fig. 5a) short, incrassate. Pronotum long, lateral margins long, carinate, moderately diverging caudad, disk flattish. Elytra coriaceous, as long as abdomen or shorter, long and

narrow, appendix narrow or absent; two parallel sided subapical cells, the outer much shorter than the central one. Legs rather incrassate; dorsal surface of fore and middle tibiae slightly flattened, that of hind tibiae scored; spinulation of fore tibiae 4+4, dorsal surface also with two rows of stiff setae, spinulation of hind knees 2+2+1+1.

Male genitalia: Pygophore elongately conical, sclerified; side lobes elongately triangular, strongly setose, ventral margin with a brush-like row of stout shortish macrosetae. Anal tube sclerified only apically, concealed by pygophore. Genital plates ending in a slender apical part, sharply triangular, lateral margin strongly insinuated, macrosetae uniseriate arising far from lateral margin. Connective (Fig. 4g) stout, Y-shaped, arms only weakly divergent. Stylus (Fig. 6a) with apophysis short, digitate, preapical angle prominent, basal part broad, ventral arm short. Penis symmetrical, stem arising from ventral part of socle, recurved dorsad, provided with apical appendages, gonopore subterminal on dorsal surface. Pygophore (♀) produced, narrowly conical. 7th sternite large. Osipositor sheath not extending beyond tip of abdomen.

Range: Savannah and steppe areas of the Ethiopian and Oriental regions with an extension to the steppes of the Palearctic region from Hungary to Japan. Records from Australia apparently refer to other genera. For the Nearctic species a new genus is established below.

Biology: Representatives of the genus live on the ground at the roots of tussocks of various Gramineae, especially in moist localities. They are therefore relatively seldom captured by sweeping, but, on the other hand, are often collected at a lamp. The retention of the primitive structural characters is undoubtedly connected with the cryptic life of the species.

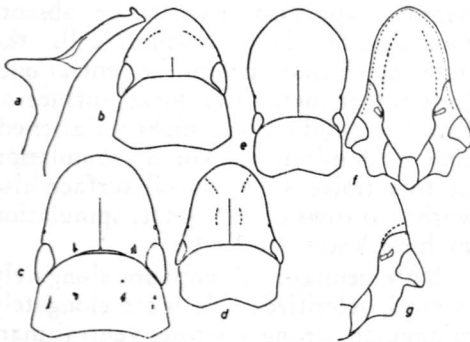


Fig. 5. *Glossocratus afzelii* (St.): a anterior tentorium branch; b head and pronotum of ♂ (type of *parvipictus* Dist.); c same of ♀ (type of *afzelii*); d same (type of *stenospatulatus* Ev.). — *G. ledrellus* (Ev.) (type): e same of ♀. — *G. benguellus* sp. n.: f face. — *G. pygmaeus* sp. n.: g right side of face (♀) (lateral frontal suture of *G. montanus* sp. n. indicated with a broken line).

Key to the species

- 1 (6) Macropterous 2
- 2 (3) Small species, length 5.75—7 mm. Crown ± triangular *pygmaeus* sp. n.
- 3 (2) Larger species. Crown parabolic 4
- 4 (5) ♂: stem of penis (Fig. 6b—d) gracile, dorsal surface smooth. ♀: lateral margins of crown (Fig. 5c—d) usually converging apicad right from base *afzelii* (St.)
- 5 (4) ♂: stem of penis (Fig. 6e—f) strongly broadening basad, dorsal surface with a pair of horn-shaped subbasal processes. ♀: lateral margins of crown (Fig. 5e) diverging slightly apicad in basal part, crown widest subapically *ledrellus* (Ev.)
- 6 (1) Brachypterous 7
- 7 (8) Hind margin of 7th sternite (♀) (Fig. 7b) insinuated medially *montanus* sp. n.
- 8 (7) Hind margin of 7th sternite (♀) produced medially 9

- 9 (10) Hind margin of 7th sternite (♀) (Fig. 7c) with a ligulate median lobe. Lateral frontal sutures strongly bent laterad in upper margin of head (Fig. 5g), ocelli moderately far from eyes. Coronar suture indistinctly carinate *pygmaeus* sp. n.
- 10 (9) Hind margin of 7th sternite (♀) (Fig. 7d) broadly produced medially. Lateral frontal sutures regularly diverging upwardly (Fig. 5f), ocelli very far from eyes. Coronar suture strongly carinate *benguellus* sp. n.

1. *G. afzelii* (Stål)

Petaloccephala afzelii STÅL 1854: 251.
Acocephalus foliaticeps STÅL 1858: 954.
Acocephalus madagascariensis SIGNORET 1860: 205, syn.n.
Hecalus durbanensis DISTANT 1910: 238, syn.n.
Hecalus scutellatus DISTANT 1910: 238, syn.n.
Hecalus grandis DISTANT 1910: 239, syn.n.
Hecalus alienus MELICHAR 1912: 114, syn.n.
Hecalus parvipictus DISTANT 1917: 191, syn.n.
Hecalus stenospatulatus EVANS 1955 a: 9, syn.n.
Chelusa micheli EVANS 1954: 94, syn.n.

Fig. 5b—d. Length 7—9 mm ♂, 10—13 mm ♀. Ochraceous. Crown, pronotum and face minutely dotted with dark brown, often also with a few larger dark dots as in Fig. 5c. Scutellum and elytra pale ochraceous, veins pale, cells with faint dark shadows, a dark spot at base of appendix. Sides of thorax with conspicuous dark brown spots. Venter and legs pale ochraceous, the latter with dark markings.

Variability in colouring: usually pale coloured, as described above. Two aberrant colour forms exist in the females, the *scutellatus* form, with conspicuous black basal triangles on the scutellum, and the *grandis* form, unicoloured pale with a black longitudinal band on the elytra. Both patterns can occur together. *F. scutellatus* is relatively common, f.

grandis apparently rare. Some completely dark brown specimens with a pale sparse irroration on the head and thorax also exist (*f. umbrina* f. n.). This variety is found in both sexes and is connected by intermediates with the pale nominate form.

Shape of crown very variable: in ♂ always roundedly parabolic, 0.9—1.1 × as long as median length of pronotum, in ♀ ± longer, parabolic, usually tapering apicad right from base, but sometimes nearly parallel-sided in basal part and broadly rounded apically, in this case difficult to separate from the following species. Elytra as long as abdomen (♂♀), in ♀ often shorter, leaving tip of abdomen uncovered, length of apical cells variable.

Male genitalia in Figs. 4g and 6a—d. Stem of penis gracile, dorsal surface smooth. Hind margin of 7th sternite (♀) with a ligulate median lobe as in Fig. 7c.

Range: Very common throughout Africa south of the Sahara, also known from Madagascar.

Material studied: numerous specimens from the following localities: Senegal: Senegal, coll.

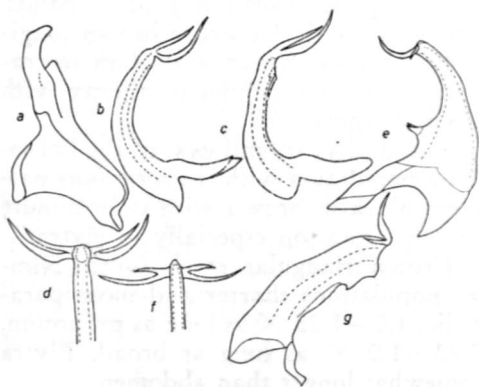


FIG. 6. *Glossocratus afzelii* (St.): a stylus; b penis, lateral aspect (Nimba); c same (Worcester); d apex of same, ventral aspect. — *G. ledrellii* (Ev.): e penis, lateral aspect; f apex of same ventral aspect. — *G. pygmaeus* sp. n. g penis, lateral aspect.

unknown. Sierra Leone: Sierra Leone, 1 ♂, type of *afzelii*, Afzelius, Mus. Stockholm; Njala, 4.XII.1935, Van Zwaluwenburg & Mc Gough. Guinea: Guinea, 1 ex.; Nimba, VII—XII, 1951, Lamotte & Roy. Liberia: Mt.Coffee, III.1897, R.P. Currie; Suakoko, 10—20.III.1952, C. Blickenstaff. Ivory Coast: Adiopodoumé, II.1957, P. Dessart; Lamto, 15.IV.1962, R. Vuattoux; French Sudan: Dogo, 7.X.1950, G. Remaudière. Nigeria: Ile-Ife, 26.II.1970, J. Medler; N. Bussa, 12.I.1970, J. Medler; Oloke-meji, coll. unknown. Chad: Bas-Chari, J. Gruvel; confl. du Chari et du Cameroun, VII—VIII.1958, P. Renaud; Distr. de Kanem, N'Gouri, VIII.1958, P. Renaud. Central African Republic: Fort Crampel, Breuning. Sudan: Upper Nile, Sobat River, 1 ♂, type of *parvipictus*, Zaphiro, British Museum, Blue Nile; Abu Hashim-Galegu, 23—24.XI.1962; Damazin, 17—22.XI.1962; Ingersana Mts., 18—22.XI.1962; Singa-Damazin, 15—17.XI.1962; Umm Banein, 14.IX.1962; Wad Medani, 11—12.XI.1962. Upper Nile: Malakal, 5—20.I.1963. Kordofan: Lake Keilak, 8—11.II.1963. Bahr el Ghazal: R. Malmul, 18—22.II.1963; Wau, 19.II.1963. Equatoria: Ibba-Yambio, 16.IV.1963; Loka forest, 8—10.IV.1963; Nimule, 11—13.III.1963; Yambio, 17—25.IV.1963; Yei-Maridi, 13—15.IV.1963, Linnavuori. Eritrea: Asmara-Cheren, coll. Schouteden. Ethiopia: Auash, 900 m, IX.1957 and Kaffa, Gembu, 1550 m, XI.1957, F. Schäufler. Somalia: Hargeisa, 23—28.IV.1963, Linnavuori. Republic of Congo: Odzala, X.1963 and Sibiti, XI.1963, A. Descarpentries & A. Villiers. Zaire: Abushie, 7.VII.1921, H. Schouteden; Albertville, 20.X.1925, H. Schouteden; Aruwimi, Panga, VI.1926, E. Bock; Bamania, IX.1936, R. Hulstaert; Bamba, 24.XI.1932, J. Vrydagh; Bassin Lukuga, 1934, De Saeger; Boma, XI—XII.1924, H. Schouteden; Bumba, 1939, De Saeger; Buta, 1949, R. Hutsebaut; Eala, I.1936, J. Ghesquiere; Elisabethville, XII.1923, C. Seydel; Equateur, Bokuma, VII.1952, R. Lootens, Ifoma, 4.XI.1934, R. Hulstaert, Flandria, 19.X.1930, R. Hulstaert; Ituri, Atshion, 2.III.1929, A. Collart; Haut-Uele, Moto, 1924, L. Burgeon; Haut-Uele, Yebo-Moto, IV.1926, L. Burgeon; Kabalo, 11.IV.1931, H. Brédo; Katanga, Kengele, 4.IV.1925, C. Seydel, Miketi, 27.IV.1925, C. Seydel, Mupabwere, IV.1931, H. Brédo, Mwashia, 21.IV.1925, C. Seydel, Mwema, VII.1927, A. Bayet, Nyonga, V.1925, De Witte; Kisantu, 1932, P. Vanderyst; Kivu, Ibanda, 1952, M. Vandellanotte, Plaine de la Sanghe, 1950, H. Bomans, Kavimvira, XII.1954, G. Marlier, Kwawa, 4.XI.1922, A. Collart; Leopoldville, I.1947, D. Darteville; Leverville, 1920, P. Vanderijst; Libenge, I.1937, Leontovitch; Lokandu, 1939, Lt.Vissers; Lomami, Kaniama,

1932, R. Massart; Lualaba, Kolwezi, 26.II.1952, Mme Gilbert; Lulua, Kapanga, X.1932, F. Overlaet; Mahagi-Niarembe, 1935, C. Scops; Malela, I.1914, L. Burgeon; Mayidi, 1942, P. van Eyen; Mayumbe, 1925, A. Collart; Mutembo, 9.V.1931, H. Brédo; Nyangwe, 30.III.1918, R. Mayné; Parc Nat. Upemba, Kaswabilenga, 700 m, 3—8.XII.1947, Kaziba, 1140 m, 1 ♀, type of *stenospatulatus*, Mus. Brussels, Kilwezi, 750 m, 16—21.VIII.1948, Lusinga, Mukana, 28.V.1945, Lupiala, 850 m, 24.X.1947, Mukana, 1810 m, 22—23.IV.1949, Lac Kibuga, S. Rutshuru, 27.VII.1935, S. L. Edouard, Kitembo, 925 m, 3.IV.1936, Miss. de Witte; Rutshuru, Fuku, 15.IV.1936, L. Lippens; Sandoa, 15.IV.1918, G. Overlaet; Sankuru, Komi, VII.1929, J. Ghesquiere; Tanganyika, Moba, IV.1953, H. Bomans, Mpala, XII.1953, H. Bomans, Musosa, XI.1953, H. Bomans; Tolo, XII.1913, J. Maes, Tshuapa, Bokuma, VI.1952, R. Lootens, Ikela, 1956, R. Lootens; Tshikay, Baname, VII.1949, A. Marée; Tumbalunga, 8.IX.1930, de Witte; Stanleyville, IV. 1926, J. Ghesquiere; Ubangi, Nouvelle Anvers, 9.XII.1952, P. Basilewsky; Uele, Bayanga, 13.X.1956, R. Castelan, La Kulu, 21.XI.1930, J. Vrydagh, Niangara, 24.XII.1913, D. Lance; Uvira, X.1927, C. Seydel. Ruanda: Bugerama, 29.X.1925, H. Schouteden; Gabiru, IV.1933, A. Becquet; Kibungu, 1937, R. Verhulst. Urundi: Makoronkwe, 12.XII.1953, P. Basilewsky; Rumonge, 1934, A. Lastrade, East Africa: Inter Mafti et Arusha, Katona; Kware near Moshi, 27.XII.1952, D.O. Afr. Exp.; Livingstone, 16.V.1951, P. Brinck & G. Rudebeck, 16—20.XI.1958, Lindner; Ngoro-Ngoro, S.Tang.Terr., 2700 m, 2.IV.1934, L. Kohl-Larsen; Tanga, 2 ♀♀ (with *scutellatus* pattern), types of *alienus*, 12.X.1905, Mus. Brno, Karasek; Tang.Terr., Ukerewe I., Father Conrads. Rhodesia: Victoria Falls, 16—17.V.1951, P. Brinck & G. Rudebeck. Angola: Alto Cuilo, River marais Tshifuka, 5.VI.1954, A. Luna; Cuango, Cafungo, IX—X.1969, S. Peles. South Africa: Cape Prov., Worcester, 11.II.1951, Transvaal, Pienaars River, 13 miles E of Pretoria, 12.IX.1954, P. Brinck & G. Rudebeck. Madagascar: Antongil B., Mocquerys; Antsiraba, II.1942, A. Seyrig.

2. *G. ledrellus* (Evans), comb. n. *Hecalus ledrellus* EVANS 1955b:5.

Fig 5e. ♂. Length 7—9 mm, like the preceding species, but crown usually shorter than median length of pronotum (0.62—0.9 ×). Penis (Fig. 6e—f) with stem broadening basad, dorsal surface with two horn-shaped subbasal proces-

ses. ♀. Robuster than *afzelii*, length 12—14 mm. Crown longer, 1.58—1.87 × as long as median length of pronotum, lateral margins parallel or slightly diverging apicad in basal part, apex of crown broadly rounded.

Variability: colouring and shape of crown apparently varying as in *afzelii*. One of the males studied had a *scutellatus* pattern, and the *umbrinus* pattern also exists.

Range: Eastern Zaire.

Material studied: Zaire: several exx. from the following localities: Elisabethville, 1951, C. Seydel; Haut-Uele, Abimya, 1925, Moto, 1926, and Watsa, 1922, L. Burgeon; Kasenyi, 19.VIII.1937, H. Brédo; Katanga, Kakyelo, 9.XI.1930, de Witte; Kibali-Ituri, Getl, 1935, C. Scops; Kivu, Kavimvira, XII.1954, G. Marlier; N. Lac Kivu, Rwankwi, VIII.1951, J. Leroy; Mahagi-Niarembe, V.1935, C. Scops; Parc Nat. Albert, Ruwenzori-Mutwanga, 1000—1300 m, 1 ♀, type, II—III.1937, Miss. de Witte, Mus. Brussels; Rusthuru, 1937, Miss. Prophylactique; Vista, 5.IV.1940, Vleeshouwers.

3. *G. pygmaeus* sp. n.

Length (♂, f. macr.) 5.50—7 mm. Colouring as in *afzelii*. Brownish with minute dark or reddish irroration. Crown with two black apical spots and two irregular brownish median bands. Pronotum with 4 obscure brown longitudinal bands. Elytra with dark irroration along veins. Sides or thorax with blackish spots.

Variability: several exx. of the Lalyo-Juba population with the *umbrinus* pattern: blackish brown with only minute brown irroration especially in elytra.

Crown triangular, rarely (in the Nimba population) shorter and more parabolic, 1.0—1.25 × as long as pronotum, 0.73—1.0 × as long as broad. Elytra somewhat longer than abdomen.

Male genitalia of the usual type, but penis (Figs. 6g and 7a) with stem short and nearly straight, lamellate.

♀. f. brach. (probably of this species). Length 8.25—8.75 mm. Opaque. Yel-

lowish brown with sparse dark markings (the most distinct ones two apical spots on crown and \pm large dark spots on meso- and metapleurae) or dark brown with minute pale irroration. Pale specimens sometimes with minute reddish dotting.

Elongately pear-shaped, broadest at middle of abdomen. With short pale scale-like hairs directed caudad, those on abdomen the most distinct. Crown strongly produced, elongately parabolic, $1.75-1.8 \times$ as long as pronotum, $1.2 \times$ as long as broad, lateral margins moderately converging apicad, disk flattish, coronal suture \pm elevated. Lateral frontal sutures (Fig. 5g) strongly bent laterad above antennal pits, ocelli rather far from eyes. Lateral margins of pronotum subparallel or diverging caudad. Elytra extending to 5th or 6th tergite, about $1.65 \times$ as long as broad, rounded apically, longitudinal veins raised, apical cells reduced. Hind margin of 7th sternite (Fig. 7c) with a ligulate median process.

Range: North-Sudanese extending from Guinea to the Sudan.

Material studied: Guinea: Nimba, 5 paratypes, Lamotte & Roy. Ivory Coast: Lamto, 1 paratype, R. Vuattoux. Sudan: Blue Nile: near Damazin, 2 paratypes, 17-22.XI.1962; Bahr el Ghazal: R. Pongo, 1 paratype, 18.II.1963, near Wau, 1 paratype, 19.II.1963; Equatoria: Juba-Terakeka, 1 σ , type, 2-6.III.1963, Lalyo-Juba, 12 paratypes, 26-27.III.1963, Nimule, 2 paratypes, 11-13.III.1963, Tambura-Wau road, 1 paratype, 25-26.IV.1963, Linnavuori. Types in my collection, paratypes also in Mus. Paris. Females (not labelled as paratypes): Senegal: M'Bambey, 2 exx., 26.V-13.VI.1939, M. Risbec, Mus. Tervuren. Ivory Coast: Lamto, several exx., 1964-1967, D. Gillon, in my collection.

4. *G. montanus* sp. n.

σ f. brach. Length 7-7.75 mm. Dirty ochraceous with only indistinct dark markings. Elytral veins bordered with minute dark irroration. Abdomen

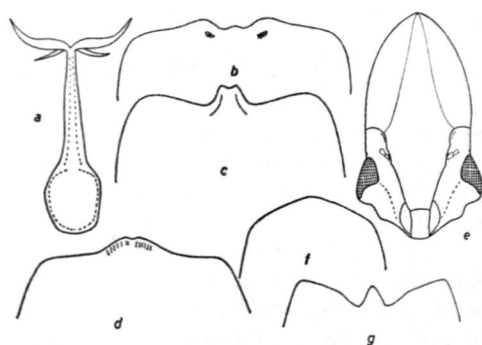


FIG. 7. *Glossocratus pygmaeus* sp. n.: a penis, ventral aspect; c 7th sternite (σ). — *G. montanus* sp. n.: b same. — *G. benguellus* sp. n.: d same. — *Parabolocralalis platalis* Ev. (σ): e face. — *P. distans* sp. n.: f 7th sternite (σ). — *P. lusingae* Ev.: g same.

laterally slightly darkened, a faint pale median band thus present.

Parallel-sided. Hair covering as in the preceding species. Crown $2 \times$ as long as pronotum, $1.1 \times$ as long as broad, broadly parabolic, lateral margins distinctly converging apicad right from base; disk slightly concave, apically rugose, coronal suture moderately elevated. Lateral frontal sutures (Fig. 5g) less strongly bent laterad in front of eyes than in the preceding species, ocelli therefore farther from eyes than in *pygmaeus*. Pronotum parallel-sided. Elytra extending only to middle of 3rd tergite, $1.14 \times$ as long as broad, roundedly truncate apically, longitudinal veins elevated. 7th sternite (Fig. 7b): hind margin with a median insinuation.

Biology: Among wet detritus and at roots of grass tussocks in alpine meadows.

Material studied: Cameroon: Mt. Cameroon, 3500 m, 1 σ , type, 3 σ paratypes and several larvae, 16-18.VI.1973, Linnavuori. Types in my collection.

5. *G. benguellus* sp. n.

σ f. brach. Length 9.75 mm. Opaque. Dirty ochraceous with scanty dark markings: upper part of face with dark

brown submarginal band; base of crown and disk of pronotum with two small dark brown dots; dorsum of abdomen with 7 indistinct longitudinal darkish bands; sides of thorax with blackish markings, parasternites with intense dark irroration; femora with dark rings and stripes.

Larger and more broadly pear-shaped than the other species, broadest at middle of abdomen. Hair covering as in the preceding species. Crown strongly produced, elongately parabolic with lateral margins distinctly converging apicad right from base, $1.7 \times$ as long as pronotum, $1.2 \times$ as long as broad; coronal suture strongly carinate extending to apex of head, disk sloping laterad on either side. Lateral frontal sutures (Fig. 5f) regularly diverging apicad, the very reduced ocelli therefore very far from eyes. Lateral margins of pronotum diverging caudad. Elytra extending to 5th tergite, $1.25 \times$ as long as broad, apical margin rounded, venation as in the other species. 7th sternite as in Fig. 7d.

Possibly the brachypterous form of *G. afzelii*, although the 7th sternite dissimilar.

Material studied: Angola: Benguela, 1 ♀, type, Wellmann, Mus. Tervuren.

Neohecalus gen. n.

Hecalus OMAN 1949:32 nec STÅL 1864:65.

Glossocratus OMAN 1949:52 nec FIEBER 1866:502.

Differing from *Glossocratus* in the absence of the primitive characters of that genus. Belonging to the *Hecalus* group and distinguished from the other genera by the characters mentioned in Oman's complete description, not repeated here.

Type: *Glossocratus lineatus* Uhl.

Range: Nearctic.

Besides the generotype, the genus also contains *N. apicalis* (V. Dz.).

Parabolocratalis Evan

Parabolocratalis EVANS 1955a:10. Type: *P. viridis* Ev.

Like *Hecalus*, but 1) body remarkably long and narrow, 2) crown much longer than pronotum, with margins very broadly foliaceous in both sexes, 3) postclypeus (Fig. 7e) very strongly tapering upwardly, its apical part therefore very narrow and 4) penis shorter.

Spinulation of fore tibiae 1+4, of hind knees 2+2+1.

Range: East-Sudanese, stretching from the *Acacia*-short grass zone of the Sudan to Transvaal. Most species occur in the eastern savannah area of Zaire. All species seem to be rare.

The species from Zaire and the Sudan are closely related and undoubtedly recently evolved from a common ancestor. *P. foliiceps* differs greatly from the others in the aedeagal structure and is derived from early immigrants from Central Africa into the South. The other South African species, *P. apicalis*, which differs from the other species in the abundance of dark pigment and the presence of subapical processes on the ventral surface of the penis, is a more recent derivative of the *viridis* group, recognized by the dark longitudinal bands on the crown and pronotum in the male.

Biology: grass-feeders like *Hecalus*.

Key to the species

- | | | |
|-------|---|------------------------|
| 1 (8) | Males | 2 |
| 2 (3) | Elytra with blackish contrasting apex | <i>apicalis</i> sp. n. |
| 3 (2) | Elytra uniformly green, apex at most slightly infumed | 4 |
| 4 (5) | Crown and pronotum with longitudinal dark stripes | <i>viridis</i> Ev. |
| 5 (4) | Uniformly green species | 6 |
| 6 (7) | Crown sharply triangular | <i>foliiceps</i> (Lv.) |

- 7 (6) Crown parabolic .. *platalis* Ev.
- 8 (1) Females 9
- 9 (10) Length 13—15 mm. Crown 3.4
× as long as pronotum. Elytra
extending only to 6th tergite ..
..... *elongatus* Ev.
- 10 (9) Length at most 13 mm. Crown
less than 3 × as long as pro-
notum. Elytra only slightly
shorter than abdomen 11
- 11 (12) Lateral margins of crown dis-
tinctly curved, crown broadest
at middle, about 1.26 × as
long as its greatest width
..... *viridis* Ev.
- 12 (11) Lateral margins of crown sub-
parallel, crown therefore much
narrower 13
- 13 (14) Body relatively robust. Crown
about 2 × as long as pronotum,
1.3 × as long as its greatest
width *platalis* Ev.
- 14 (13) Body gracile. Crown longer and
narrower 15
- 15 (16) Crown 2.44 × as long as pro-
notum, 1.52 × as long as its
greatest width, shiny, apically
and laterally distinctly rugose.
Hind margin of 7th sternite
broadly rounded *distans* sp. n.
- 16 (15) Crown about 2.9 × as long as
pronotum, 1.8 × as long as
greatest width, opaque, only in-
distinctly rugose. Hind margin
of 7th sternite subtruncate with
a ligulate median lobe
..... *lusingae* Ev.

without extra subapical cross veins in costal margin.

Male genitalia: Penis as in Fig. 8 a—b, stem with two long appendages directed apicad in the middle of ventral surface, apical appendages simple, falcate; gonopore very large on the ventral surface. Other genitalia as in the genus *Hecalus*.

Range: South Africa.

Material studied: South Africa: Transvaal, Pretoria, 1 ♂, type, 27.III.1954, G. Rudebeck, Mus. Lund.

2. *P. apicalis* sp. n.

♂. Length 6 mm. Opaque. Greenish. Crown with 6, pronotum with 8 and scutellum with 4 narrow longitudinal fuscous stripes. Elytra coriaceous, yellowish green, apical part beyond tip of clavus blackish brown. Flying wings dark brown, veins pale. Dorsum of abdomen, excluding sides, black. Under surface marked with fuscous in the middle. Legs blackish brown, dorsal surface of tibiae and spines pale.

Elongate. Crown narrowly parabolic, broadest in front of eyes, 1.4 × as long as pronotum, 1.2 × as long as greatest width.

Male genitalia in Fig. 8c—e and Fig. 9a. Penis with apical appendages bira-

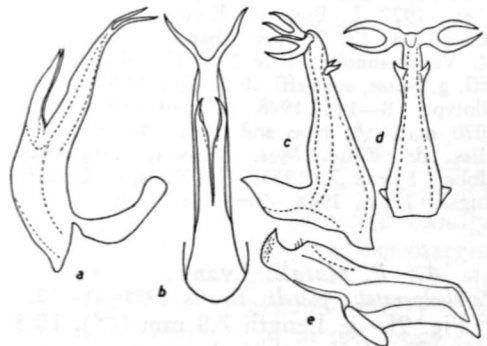


FIG. 8. *Parabolocratialis foliaticeps* (Lv.): a penis, lateral aspect; b same, ventral aspect. — *P. apicalis* sp. n.: c—d same; e stylus.

1. *P. foliaticeps* (Linnavuori),
comb. n.

Parabolitus foliaticeps LINNAVUORI 1961:462.

♂. Length 8 mm. Uniformly yellowish brown, probably green in life.

Elongate, tapering both apicad and caudad. Crown sharply triangular, 1.48 × as long as pronotum, margins broadly foliaceous. Elytra as long as abdomen,

mose, ventral surface of stem with a pair of claw-like subapical processes; gonopore small, subapical on ventral surface.

Material studied: South Africa: N Transvaal, Louis Trichardt, 1 ♂, type, 20—30.XIII.1956, A. Capener, in my collection.

3. *P. viridis* Evans

Parabolocratialis viridis EVANS 1955a:10—11.

Fig. 9b—c. Length ♂ 7 mm, ♀ 11 mm. ♂. Pale green. Crown with a dark submarginal band and with 6 narrow fuscous longitudinal bands continuing on to pronotum. Scutellum with 4 fuscous stripes. Elytra faintly infuscate apically. Flying wings smoky. Dorsum of abdomen partly infumed. Upper margin of face narrowly bordered with fuscous, the flattened sides of face with two fuscous stripes. Venter, excluding segmental margins, infuscate. Legs pale. ♀. Uniformly pale green.

The most robust species. Lateral margins of crown distinctly curved, crown therefore broadest at middle, 2.17 (♂) or 2.38 (♀) × as long as pronotum, 1.18 (♂) or 1.26 (♀) × as long as its greatest width. Elytra slightly longer (♂) or shorter (♀) than abdomen.

Male genitalia: Penis as in Fig. 9d—e. 7th sternite (♀) as in Fig. 7g.

Range: Eastern Zaire and the adjacent parts of East Africa.

Material studied: Zaire: Haut Uele, Moto, 1 ex., 1922, L. Burgeon; Kivu, Bwito, 2 exx., 26.VI.1934, Lt. Marlier, Ibanda, 1 ex., 1952, M. Vandellannoite; Parc Nat. Upemba, Kaziba, affl. g. Senze, sous-affl. dr. Lufira, 1140 m, 1 ♀, allotype, 8—14.II.1948, Kiamokoto-Kiwakishi, 1070 m, 1 ♂, type and 1 ex., 4—16.X.1948, Miss. de Witte, Mus. Brussels; Tanganjika, Moba, 1 exx., XI.1953, H. Bomans. Urundi: Rugari, 1 ex., 1948, dames de Marie.

4. *P. platalis* Evans

Parabolocratialis platalis EVANS 1955a:11—12.

Fig. 9f—g. Length 7.8 mm (♂), 10.3 mm (♀). Uniformly pale green.

Narrow. Crown in ♂ parabolic, tapering apicad right from base, in ♀

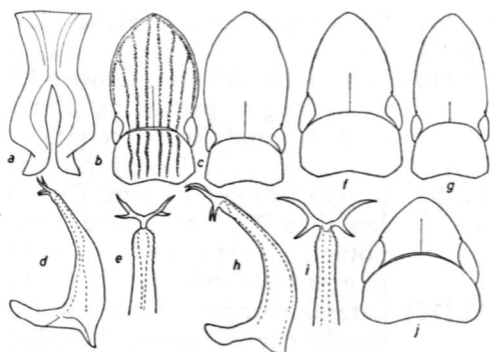


FIG. 9. *Parabolocratialis apicalis* sp. n.: a connective. — *P. viridis* Ev.: b head and pronotum of ♂ (type); c same of ♀ (allotype); d penis, lateral aspect; e apex of same, ventral aspect. — *P. platalis* Ev.: f head and pronotum of ♂ (allotype); g same of ♀ (type); h penis, lateral aspect; i apex of same, ventral aspect. — *Lualabanus curticeps* sp. n.: j head and pronotum (♂).

nearly parallel-sided in basal part, 1.6 (♂) or 2 (♀) × as long as pronotum, 1.0 (♂) or 1.3 (♀) × as long as its greatest width. Elytra a little longer (♂) or shorter (♀) than abdomen.

Male genitalia in Fig. 9h—i. 7th sternite (♀) as in Fig. 7g.

Range: Eastern Zaire.

Material studied: Zaire: de Tenke à Dilolo, 1 ex., IV.1932, Ritschard; Parc Nat. Upemba, several exx. from Kabwekanono, 1815 m, 8.III.1948, Kafwi af. dr. Lufwa, 1780 m, 5.III.1948, Kamitangulu, 1700 m, 3.IV.1947, Kenia, 1700 m, 28.III.1947, Lubanga af. Senzo, 1750 m, 5.IV.1948, Lusinga, 1760 m, 1 ♀, type and 1 ♂ allotype, 18.IV.1949, Mus. Brussels, Mbye-Bala, 1750 m, 25—31.III.1948, Mukana (Lusinga), 1810 m, 6.III.1948, Miss. de Witte.

5. *P. distans* sp. n.

♀. Length 10.5 mm. Rather shiny. Yellowish green. Head pale ochraceous. Eyes greyish brown.

Narrow. Crown 2.44 × as long as pronotum, 1.52 × as long as its greatest width, lateral margins subparallel; disk concave, shiny, distinctly rugose except basally and medially (opaque and only indistinctly rugose in the other species).

Material studied: Sudan: Equatoria, near Gilo, 1 ♂, type, 18—24.III.1963, Linnavuori, Zaire: Parc Nat. Upemba, Lusinga, 1760 m, 1 ♂, paratype, 27—30.IV.1948, Miss. de Witte, Mus. Brussels.

2. *L. curticeps* sp. n.

Length 7 mm. Opaque. Pale green or greenish yellow. Head pale ochraceous, anterior margin white, narrowly bordered with black both above and below.

Relatively robust. Crown (Fig. 9j) roundedly parabolic, 0.9 (♂) or 1.15 (♀) × as long as pronotum, 0.72—0.77 × as long as broad, slightly sloping apicad; disk somewhat concave, basally finely shagreened, shagreening of frontal region stronger, postfrontal suture obscure. Anterior margin of head rounded to face, frontoclypeus relatively tumid, broadening upwardly; ocellular area broad, antennal pits deep; ocelli close to eyes. Pronotum with lateral margins subparallel, disk finely shagreened, basal part faintly transversely wrinkled. Elytra slightly longer than

abdomen, hyaline, veins thin, subapical area of costal margin without extra cross veins.

Male genitalia: Penis as in Fig. 10 d—e. Hind margin of 7th sternite (♀) with a small ligulate median lobe.

Material studied: Zaire: Paro Nat. Upemba, Kalumengongo (tête de s.) affl. dr. Lualaba, 1830 m, 1 ♂, type and 2 paratypes, 21.I.1948, Kenia, 1700 m, 2 paratypes, 28.III.1947, Lusinga, 1760 m, 1 paratype, 10.IV.1947, Mukana, 1810 m, 1 paratype, 22—23.IV.1947, Miss. de Witte. Types in Mus. Brussels, paratypes also in my collection.

3. *L. ornaticeps* sp. n.

Fig. 10h. Length 7 mm. Golden ochraceous. Crown golden brown, apically and basally somewhat paler, eyes reddish brown; the very anterior margin of head whitish, bordered with a black band both above and below, the upper band on anterior margin of crown narrow, the lower band, lying on upper part of face, very broad and polished. Elytra subcoriaceous, yellowish, veins faintly bordered with golden brown. Under surface and legs uniformly ochraceous.

Relatively robust. Crown broadly roundedly triangular, shorter than pronotum (22:25), 0.7 × as long as broad, flattish, entirely minutely shagreened, postfrontal suture faint; anterior margin of head broadly rounded to face; frontoclypeus broad, rather tumid. Lateral margins of pronotum curved, slightly diverging caudad; anterior part of disk densely shagreened, base rather strongly transversely wrinkled. Elytra nearly as long as abdomen, veins strong, 5th apical cell with a few extra cross veins. Hind margin of 7th sternite (♀) truncate with a small triangular median lobe.

Biology: At lamp in an *Acacia*-short grass savannah in a sandy locality.

Material studied: Sudan: 50 km E of Khar-toum, 1 ♀, type, 28.IX.1962, Linnavuori, in my collection.

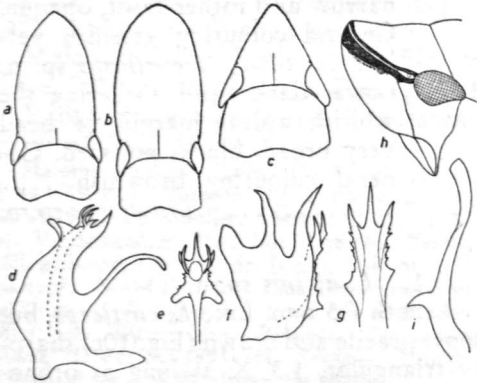


FIG. 10. *Parabolocratalis lusingae* Ev.: a head and pronotum of ♀ (type). — *P. elongatus* Ev.: b same of ♀ (type). — *Lualabanus curticeps* gen. et sp. n.: d penis, lateral aspect; e apex of same, ventral aspect. — *L. affinis* sp. n.: c head and pronotum (♂); f penis, lateral aspect; g apex of same, ventral aspect. — *L. ornaticeps* sp. n.: h head (♀) in profile. — *Bordesia mitrata* Bgv.: i anterior tentorium branch.

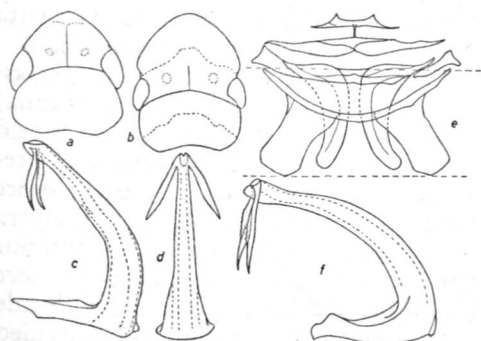


FIG. 11. *Bordesia mitrata* Bgv.: a head and pronotum (♂); b same (♀); c penis, lateral aspect; d same, ventral aspect. — *Hecalus glaucescens* (Fb.): e 1st and 2nd abdominal segments (♂). — *H. paykulli* St.: f penis, lateral aspect (Wad es Zaki).

Bordesia Bergevin

Bordesia BERGEVIN 1929:7. Type: *B. mitrata* Bgv.

Differing from *Hecalus* only in the cephalic structure: anterior margin of head in ♂ completely rounded (acute in *Hecalus*); in ♀ anterior two-thirds of crown strongly vermiculately rugose, also upper margin of face above epistomal suture rugose.

Range: Eremian.

Biology: The only known species, *B. mitrata*, lives on *Panicum turgidum* in inland dunes.

1. *B. mitrata* Bergevin

Bordesia mitrata BERGEVIN 1929:9.

Parabolocratrus monodi VILLIERS 1956:836, syn. n.

Fig. 11a—b. Length ♂ 6.5—7.5 mm, ♀ 8.25—8.75 mm. Opaque. Uicoloured pale stramineous.

Sexually dimorphic in the cephalic structure: ♂. Crown 0.95—1.0 × as long as pronotum, 0.83—0.84 × as long as broad, anterior margin broadly rounded; disk finely shagreened, slightly convex, a slight subapical depression at postfrontal suture, a roundish rather shiny shallow basal depression on either

side of coronal suture. Anterior margin of head rounded to face. Face slightly convex; anteclypeus parallel-sided; postclypeus broad, convex, with fine transverse lateral striae, epistomal suture visible as a faint depression near upper margin of face; lora small, genae broad, strongly notched near eyes, ocellocular area broad, ocelli close to eyes. ♀. Head large, resembling a mitre. Crown 1.3—1.5 × as long as pronotum, about as long as broad, anterior margin acute, narrowly foliaceous; anterior two-thirds of disk strongly and densely vermiculately rugose, base more even, shagreened, only slightly rugose. Face flattish in profile, sclerites as in ♂, but postclypeus flatter, frons in upper margin of face broader, depressed, shiny and wrinkled. Pronotum in both sexes parallel-sided, convex, apical part shagreened, basal part densely transversely wrinkled. Elytra slightly longer (♂) or shorter (♀) than abdomen, venation of the common type. Spinulation of fore tibiae irregular, about 1+7, of hind knees 2+2+1.

Male genitalia as in *Hecalus*. Penis in Fig. 11c—d. Hind margin of 7th sternite (♀) truncate.

Range: Eremian and Sahelian subregions. Previously known from Morocco, Mauritania, Algeria and Egypt.

Biology: Monophagous on *Panicum turgidum*.

Material studied: Sudan: numerous exx. from the following localities: Northern Province, Ed Damer, 5—10.VII.1961; 50 km E of Khartoum, 28.XI.1962; Kassala, Erkowit, 5—10.VII.1961, Kassala-Haiya, 1—3.XII.1962, Suakin, 5.XII.1962; Blue Nile, Wad es Zaki, 10.V.1963, Linnavuori.

Hecalus Stål

Hecalus STÅL 1864:65. Type: *H. paykulli* St. *Parabolocratrus* FIEBER 1866:502. Type: *P. glaucescens* Fb.

Medium-sized or large, sexually dimorphic, green leafhoppers.

Body elongate. Head about as broad as pronotum, anterior margin acute or foliaceous. Face elongate, in lower part roundedly bluntly angular in outline; anteclypeus parallel-sided; frontoclypeus broadening upwardly, moderately convex or flattish, or, if anterior margin of head foliaceous, postclypeal part convex and frontal part suddenly depressed; lora relatively small; genae broad, shallowly insinuated near eyes; ocellular area broad, antennal pits shallow, antennae short. Crown parabolic, in ♂ usually shorter than in ♀, slightly concave; frontal region finely shagreened or rugose, discal region smoother, post-frontal suture \pm obscure, coronal suture long; ocelli near eyes. Pronotum with lateral margins long and parallel, carinate, anterior part of disk shagreened, base transversely rugose. Elytra narrow, a little longer or shorter than abdomen, appendix narrow, 2 long closed subapical cells, apical part of costal margin often with extra cross veins. Fore and middle tibiae gracile, dorsal surface rounded; spinulation of fore tibiae 1+4—1+6, of hind knees 2+2+1.

Male genitalia: Pygophore not insinuated dorsally, elongately conical; side lobes long, sharply triangular, with numerous long macrosetae. Anal tube small, parallel-sided. Valve short, triangular. Genital plates sharply triangular, ending in a delicate weakly sclerified apical part, lateral margins insinuated and provided with a few macrosetae. Styli with apophysis short, digitate, preapical angle prominent, basal part broad. Connective short, robust, Y-shaped, arms subparallel. Penis symmetrical, stem long, \pm tubular, arising from ventral part of socle, provided with apical appendages and often with longitudinal lamellae; gonopore subapical on ventral surface. Genital segment of ♀ elongate, ovipositor sheath extending far beyond tip of abdomen; 7th

sternite large, hind margin truncate with a small triangular median expansion.

Certain Nearctic species (*H. nigrasfasciatus* (Beam.) and *H. hepneri* (Beam.) were studied) differ from the Old World ones in a number of characters: 1) presence of dark pigment, 2) ocelli more reduced and farther from eyes, 3) elytra of ♀ shorter, 4) 2 or 3 spines in anterior row on fore tibiae and 5) pygophore (♂) short and broadly conical with side lobes bluntly triangular and provided with short and less abundant macrosetae and apical part of genital plates somewhat broader and more sclerified. A revision of the Nearctic species is needed to ascertain to which genus they should be referred.

Biology: On grasses in steppes and savannahs. Often at lamps.

Range: In the Old World two groups of species exist: the *paykulli* group and the *macilentus* group. The former consists of recently evolved species with relatively vague distinguishing characters; the male genitalia, for instance, are often similar. Its range stretches from Africa to the steppe and semidesert zones of the Palearctic region, as far as China and Japan. Apparently some of the Nearctic species belong to the group too. The *macilentus* group seems to be African and live in more mesic savannah biotopes than the *paykulli* group. The genus has also been recorded from the Oriental region and Australia. These records are in need of revision.

Key to the species

- 1 (26) Anterior margin of crown unicoloured or at most indistinctly bordered with fuscous both above and below, often \pm foliaceous 2
- 2 (7) Anterior margin of head \pm foliaceous 3

- 3 (6) Stem of penis slender, distinctly recurved dorsad, apical appendages long, falcate (Figs. 11f and 12a—b) 4
- 4 (5) ♂: Crown 0.95—1.03 × as long as broad. Body robust. Elytra about 3.2—3.3 × as long as broad. ♀: Body robust. Crown broadly parabolic, anterior margin broadly foliaceous. Elytra broadish, about 2.8—3 × as long as broad, usually extending to 8th or 9th tergite, apex of abdomen visible. Range: northern Sudan
..... *glaucescens* (Fb.)
- 5 (4) ♂ (ssp. *unicolor*): Crown 1.04—1.24 × as long as broad. Body more elongate. Elytra about 3.4—3.7 × as long as broad. ♀: Elongate. Crown usually ± elongately parabolic; anterior margin of head narrowly (nomininate form) or broadly (ssp. *unicolor*) foliaceous. Elytra narrowish, 3.3—3.6 × as long as broad, extending to tip of pygophore. Range: savannah areas of the Ethiopian region ..
..... *paykulli* St.
- 6 (3) Stem of penis straight, with a pair of roundedly triangular subapical lamellae, apical appendages rather short and broad (Fig. 13e—f). ♀: Robust. Crown broadly parabolic, short (Fig. 13d), anterior margin of head narrowly foliaceous. Range: East-African
..... *lippensi* (Ev.)
- 7 (2) Anterior margin of head not foliaceous (rarely upper margin of face slightly depressed) 8
- 8 (9) Anterior margin of head faintly bordered with fuscous both above and below. Penis as in Fig. 15a—b, gonopore long and narrow *bahrabiad* sp. n.
- 9 (8) Anterior margin of head unicoloured (very rarely with faint fuscous bands in *paykulli*). Penis different 10
- 10 (11) Venation of apical and subapical area of elytra reticulate (Fig. 12e). Range: Israel.
..... *reticulatus* (Lv.)
- 11 (10) Elytra with extra cross veins only in subapical area of costal margin 12
- 12 (15) Apical appendages of penis short and broad, blade-shaped 13
- 13 (14) Reddish. Face flat. Stem of penis not suddenly constricted in apical part (Fig. 14g)
..... *ferrugineus* (Mel.)
- 14 (13) Greenish. Face convex. Stem of penis suddenly constricted in apical quarter (Fig. 14h)
..... *plagiatus* sp. n.
- 15 (12) Appendages of penis gracile, falcate 16
- 16 (19) Stem of penis straight, robust (Fig. 14e—f), apical appendages directed laterad 17
- 17 (18) Green. Crown 0.92—1.05 (♂) or 1.0—1.14 (♀) × as long as pronotum *dubius* Mel.
- 18 (17) Whitish green. Crown (♂) 0.82 × as long as pronotum
..... *lacteus* (Mel.)
- 19 (16) Stem of penis gracile, distinctly recurved dorsad, apical appendages recurved dorsad .. 20
- 20 (21) Crown remarkably short and blunt. 0.72—0.93 (♂) or 0.95—1.09 (♀) × as long as pronotum. 0.70—0.78 (♂) or 0.74—0.77 (♀) × as long as broad. Face tumid. Penis as in Fig. 14 a—d, length 0.45—0.51 mm, apical appendages rather short. Genital segment of ♀ of normal shape *virescens* (Dist.)
- 21 (20) Crown longer. Appendages of penis long, falcate 22

- 22 (23) Opaque, pale straw-coloured species. Crown 0.94 (♂) or 1.0 1.1 (♀) × as long as pronotum, 0.84—0.89 (♂) or 0.80—0.84 (♀) × as long as broad. Length of penis 0.48 mm. Abdomen of ♀ strongly prolonged and tapering apicad, ovipositor sheath extending far beyond tip of abdomen (Fig. 13b). Range: SW Arabia *longicauda* sp. n.
- 23 (22) Shiny green species. Crown longer. Abdomen of ♀ broader, ovipositor sheath extending only moderate distance beyond tip of abdomen (Fig. 13a) 24
- 24 (25) ♂: Crown 1.14—1.35 × as long as pronotum, triangularly parabolic. Length of penis > 0.60 mm. ♀: Anterior margin of head narrowly foliaceous. Range: savannahs of the Ethiopian region. *paykulli* (nominate form)
- 25 (24) ♂: Crown 1.0—1.12 × as long as pronotum, roundedly bluntly triangular. Length of penis 0.56—0.60 mm. ♀: Anterior margin of head not foliaceous. Range: Eremian *eximius* (Kb.)
- 26 (1) Anterior margin of head white, bordered with fuscous both above and below, never foliaceous (see also *paykulli* and *babrahiad*) 27
- 27 (28) Stem of penis (Fig. 15d—e) long, gracile and tubular, provided with a pair of long apical appendages *aurora* sp. n.
- 28 (27) Penis different 29
- 29 (30) Stem of penis with a strong longitudinal ventral keel, scored medially (Figs. 15f and 16a) *carinatus* sp. n.
- 30 (29) Not as above 31
- 31 (32) Appendages of penis strongly reflexed basally, with apical part nearly semicircular (Fig. 16e—f) *macilentus* sp. n.
- 32 (31) Aedeagal appendages falcate 33
- 33 (34) Stem of penis in lateral aspect strongly tapering apicad, short; apex in ventral aspect roundedly expanded, smooth (Fig. 16 g—h) *atreus* sp. n.
- 34 (33) Stem of penis in lateral aspect not tapering apicad 35
- 35 (40) Apical part of penis in ventral aspect distinctly expanded, ± spoon-shaped, with a marginally serrate lamella on either side, apical appendages rather short 36
- 36 (37) Lateral lamellae of penis long and narrow, recurved ventrad, apical part of stem in ventral aspect elongately spoon-shaped (Figs. 17c—g and 18a—b) *adnexus* sp. n.
- 37 (36) Lateral lamellae of penis short, ± broad and horizontal, apical "spoon" short 38
- 38 (39) Lateral lamellae of penis forming a rounded lobe (Fig. 18d—f) *aither* sp. n.
- 39 (38) Lateral lamellae of penis strongly prominent, ligulate (Fig. 19 b—e) *kengeanus* sp. n.
- 40 (35) Stem of penis in ventral aspect not distinctly expanding apicad, apical part not spoon-shaped, appendages gracile 41
- 41 (42) Penis flattened, in lateral aspect remarkably short, apex broadly truncate, appendages recurved apicad (Figs. 20e—f and 21 a—c) *ribauti* Vill.
- 42 (41) Penis ± tubular, longer, apex in lateral aspect obtusely pointed, appendages recurved ± dorsad (Figs. 19f and 20a—d) *imitans* sp. n.

The *glaucescens* group

Anterior margin of head usually uni-

coloured, often \pm foliaceous. Crown \pm parabolic. Elytra often with extra cross veins in subapical part of costal margin. Penis with a long tubular stem, longitudinal lamellae weakly developed.

1. *H. glaucescens* (Fieber)

Parabolocratus glaucescens FIEBER 1866:513.

Parabolocratus aegyptiacus SIGNORET 1879:277.

Parabolocratus arenarius HORVATH 1897:627.

Length σ 5.25—6.75 mm, ♀ 8—12 mm. Relatively shiny. Pale green, dead specimens often yellowish. Elytra greenish hyaline, sometimes slightly infumed apically; veins green, sometimes slightly bordered with fuscous; a dark spot at base of appendix.

Variability: colouring constant. Only one aberrant male (Cairo, 13.VI.1936, Priesner) was observed: with abundant dark markings; head, pronotum and scutellum with 3 broadish rather faint longitudinal fuscous bands; face and legs fuscous; thorax, venter and dorsum of abdomen with abundant fuscous markings.

Strong sexual dimorphism. σ small. Crown triangularly parabolic 1.21—1.47 \times as long as pronotum, 0.95—1.03 \times as long as broad. Anterior margin of head narrowly but distinctly foliaceous, face flat in profile. Elytra slightly longer than abdomen, about 3.2—3.3 \times as long as broad, costal margin with a few extra subapical cross veins. ♀ robust,

broad. Crown spatulate, usually broadly parabolic, 1.3—2.04 \times as long as pronotum, 0.92—1.26 \times as long as broad. Anterior margin of head broadly foliaceous, frontoclypeus flattish or moderately convex. Elytra broadish, about 2.8—3 \times as long as broad, usually extending to 8th or 9th tergite, apex of abdomen therefore visible.

It seems that the crown in both sexes is relatively short and blunt in populations from Israel and West and Pontomediterranean countries, while it has a tendency to become longer and sharper southwards along the Nile Valley. The latter populations possibly represent a separate race, ssp. *aegyptiacus* (Sgn.).

Male genitalia as in the following species.

Biology: On grasses in steppes and cultivated biotopes.

Range: Pontomediterranean.

African material studied: Sudan: Northern Province, Abka, 2 exx., 29.III.1964 and Artinassi Is., 3 exx., 2.IV.1964, J. Kaisila; Atbara, 1 ex., 19.X.1962 and Dibeira, 1 ex., 30.IX.1964, S. Panelius; Ed Damer, 3 exx., 5—10.VII.1961, Linnavuori.

Other material studied: South Yemen: near Lahej, 1 ex., 9—15.VII.1963, Linnavuori.

2. *H. paykulli* Stål

Hecalus paykulli STÅL 1854:252.

Parabolocratus unicolor JACOBI 1910:124, syn. n.

Parabolocratus striipennis LINDBERG 1958:188—190.

Fig. 13 c. Length σ 6.0—6.5 mm

TABLE 1. Variability in the shape of the crown of *Hecalus glaucescens* Fb.

	ratio between		ratio between	
	length of crown and σ	pronotum and ♀	length of crown and σ	breadth of crown and ♀
Israel and Greece	1.21—1.35	1.56—1.62 (1 ex. 1.96)	0.95—0.96	0.92—1.03 (1 ex. 1.13)
Egypt	1.47	1.4—1.9	1.03	1.03—1.09
Sudan	1.31—1.5	1.8—2.04	1.0—1.07	1.16—1.26
South Yemen	1.3		0.96	
Algeria		1.3		0.94

(Senegal populations 6.5—7.5 mm), ♀ 7.5—10.5 mm.

Like *H. glaucescens*, but fuscous longitudinal lines on crown and thorax commoner and veins of elytra often \pm distinctly bordered with fuscous. Anterior margin of crown very rarely faintly bordered with fuscous. Body more elongate. Elytra longer and narrower, in ♂ about 3.4—3.7 \times as long as broad and slightly longer than abdomen, in ♀ about 3.3—3.6 \times as long as broad and extending to tip of abdomen, leaving only the protruding apex of ovipositor sheath visible.

Variability of crown: ♂. a) nominate form: Crown triangularly parabolic, 1.14—1.35 (in Senegal populations 1.0—1.16) \times as long as pronotum, 0.89—1.09 (in Senegal populations 0.83—0.91) \times as long as broad. Anterior margin of head not foliaceous, upper margin of face at most slightly depressed, face \pm evenly convex in profile. b) *unicolor* form: Crown 1.25—1.55 \times as long as pronotum, 1.04—1.24 \times as long as broad. Anterior margin of head distinctly foliaceous, face flat as in *H. glaucescens*. ♀. a) nominate form: Crown very variable in shape, 1.21—1.62 \times as long as pronotum, 0.86—1.13 \times as long as broad. Anterior margin of head only slightly foliaceous, frontoclypeus convex. b) *unicolor* form: Crown 1.46—2.16 \times as long as pronotum, 1.09—1.5 \times as long as broad. Anterior margin of head broadly foliaceous, frontoclypeus flat as in *H. glaucescens*. The two forms are connected by intermediates. The nominate form is predominantly West-African. In a large series of specimens from the Cape Verde Islands, only the nominate form is found. It is also clearly dominant in populations from the Blue Nile Province in the Sudan. In populations from the Upper Nile Province, about 50 % of the females and the majority of the males belong to the *unicolor*

form, and this form is dominant in both sexes in the southern Sudan and in populations from East and South Africa. However, the nominate form occurs in certain populations in this area too (e.g. in the Belleta forest and Lotti populations). On the other hand, the *unicolor* form (only females) alone was found in the Senegal populations. The *unicolor* form corresponds to the *aegyptiacus* form of *H. glaucescens* and may represent a southern subspecies of *paykulli*.

Male genitalia: Penis (Figs. 11f and 12a—b), length 0.62—0.66 mm, stem long and relatively gracile, distinctly recurved dorsad; appendages long, falcate, directed dorsad.

Biology: On grasses in savannahs, often in rather mesic localities. Also in mountain meadows. Often at lamps.

Range: Widespread in the savannah areas of the Ethiopian Region. Also in the Cape Verde Islands.

Material studied: Numerous exx. from the following localities: Senegal, 1 ♀ (fragmentary), type of *paykulli*, Mus. Stockholm. Ivory Coast: Foro-Foro, 8—10.V.1972, A. Pollet. Chad: N'Goumi, Distr. Kanem, X—XI.1958, P. Renard. Sudan: Blue Nile: near Damazin, 17—22.XI.1962; Singa-Damazin, 15—17.XI.1962, Umm Banein, 14.XI.1962; Wad Medani, 26—28.VI.1961. Upper Nile: Malakal, 5—20.I.1963; Renk-Malakal, 3—5.I.1963. Kordofan: Selima, 24.I.1963. Bahr el Ghazal: R. Pongo, 18.II.1963; Wau, 19.II.1963. Equatoria: Juba, 27.II.—2.III.1963; Kapoeta-Boma, 26—27.III.1963; Lotti forest, 14—17.III.1963; Tambura-Wau road, 25—26.IV.1963; Yei-Iwatoka, 12—13.IV.1963. Linnavuori. Ethiopia: Belleta forest, 13—14.VI.1963, Linnavuori. Zaire: Kivu, Kavimvira (Uvira), XII.1954, G. Marlier; Tanganjika, Moba, XI.1953, H. Bomans. Ruanda: Lac Mohasi, IV.1934, H. Hegh. East Africa: Abrona, Kiboteni and Tanga, coll. Melichar; Mto-ja-Kifaru, Katona; Nairobi, VIII.1935, A. Gedye; Nieder, Meru, 1 ♀, type of *unicolor*, Sjöstedt, Mus. Stockholm; N. Rhodesia, Livingstone, 16.V.1951, P. Brinck & G. Rudebeck; Tang. Terr., Ukerewe I., Father Contrads. South Africa: Karino, E. Transvaal, Letaba Valley, Transvaal and Pilansburg, N. Transvaal, A. Capener; Kaokoweld, Omutati, 70 miles WSW of Ohopoho, 5.VI.1951, P. Brinck & G. Rudebeck.

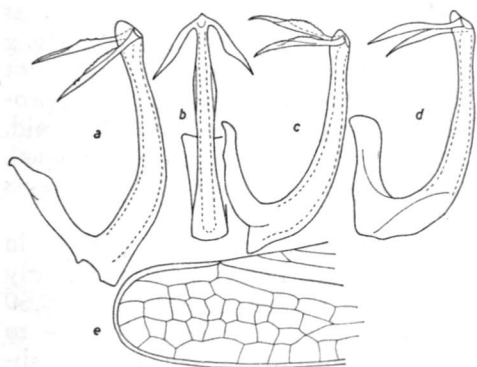


FIG. 12. *Hecalus paykulli* St.: a penis, lateral aspect (Senegal); b same, ventral aspect. — *H. eximius* (Kb.): c penis, lateral aspect (Revivim, Israel). — *H. longicauda* sp. n.: d same. — *E. reticulatus* (Lv.): e apex of elytron (♀).

Aberrant populations:

The Senegal population (Senegal, Richard-Toll, several exx., 1948—1967, A. Villiers): unusually robust specimens. The crown is unusually short in the males. The females resemble *H. glaucescens* in the robust body and broad crown. The colouring in all specimens is uniformly green; not even the elytral veins are bordered with fuscous. On the other hand, in some specimens the anterior margin of the head is faintly bordered with brown.

The Wad es Zaki population (Sudan, Blue Nile, Wad es Zaki, several ♂♂, 10.V.1963, Linnavuori): uniformly pale ochraceous and rather robust specimens. Crown $1.33\text{--}1.35 \times$ as long as pronotum, $0.93\text{--}1.03 \times$ as long as broad. In one specimen the anterior margin of the head is distinctly foliaceous as in *H. glaucescens*, two are like typical *paykulli* and the others intermediates. The specimens were found on *Panicum turgidum* in inland dunes. Additional material from the area is needed to solve the taxonomic status of this population.

H. glaucescens and *H. paykulli* are sibling species. The former has evolved

from the latter by spreading northwards, apparently along the Nile Valley, and adapting to a different climate and environments. This complex also includes *H. storai* (Ldb.), inhabiting the Canary Islands and the West Mediterranean countries (Morocco, Algeria and France).

3. *H. lippensi* (Evans), comb. n.

Parabolocratus lippensi EVANS 1955b:6.

Fig. 13d. Length ♂ 6 mm, ♀ 8.5—9.5 mm. Uniformly pale green. Veins of elytra not bordered with fuscous (as they usually are in *H. paykulli*).

♂ resembling *H. paykulli unicolor* in the distinctly foliaceous anterior margin of head, but crown more broadly parabolic apically (\pm pointed in *unicolor*), $1.21 \times$ as long as pronotum, $0.96 \times$ as long as broad. ♀ like the nominate form of *H. paykulli* (anterior margin of head narrowly foliaceous, frontoclypeus distinctly convex), but body considerably broader and crown broadly spatulate and relatively short, $1.20\text{--}1.43 \times$ as long as pronotum, $0.88\text{--}0.96 \times$ as long as broad (in short-headed specimens of

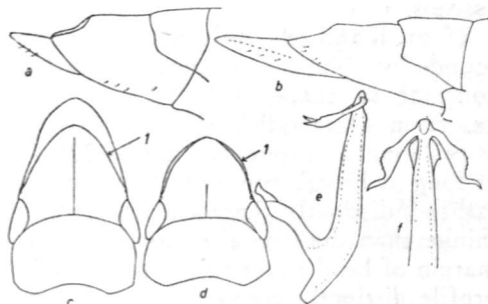


FIG. 13. *Hecalus eximius* (Kb.): a apex of abdomen (♀) from side. — *H. longicauda* sp. n.: b same. — *H. paykulli unicolor* (Jac.) (type): c head and pronotum (♀) (←1 = outline of crown of an unusually short-headed ♀ of the nominate form from Juba). — *H. lippensi* (Ev.) (type): d same ♀ (←1 = outline of crown of another ex. from Rutshuru); e penis, lateral aspect; f same, ventral aspect.

paykulli the crown is narrower (Fig. 13c), it is also usually much longer).

Male genitalia: Penis (Fig. 13e—f) 0.57 mm long, stem straight, provided with a pair of roundish subapical lamellae, appendages broader than in *paykulli*.

Range: East-African. Apparently a rare species.

Material studied: Zaire: Parc Nat. Albert, St. Eduard, Cp. Rwindi, 1000 m, 1 ♀, type, 25.IV.1936, L. Lippens and Rwindi, 1000 m, 1 ♀ paratype, 26.XI.1934, Miss. de Witte, Mus. Brussels; Ituri-Nioka, 1 ex., XI.1952, J. Heq; Kivu, Katana, 1 ex., 1933, de Wulf, Tshampu, 1 ex., 22.VI.1938, L. Hendrickx; Rutshuru, 1 ex., IX—X.1936, Delville; E. Rutshuru, Kibirizi, 1 ex., 6.II.1936, L. Lippens. Ruanda: Kibungu, 2 exx., XII.1937, R. Verhulst. East Africa: Tang. Terr., Ukerewe I., 1 ex., Father Conrads.

4. *H. eximius* (Kirschbaum)

Jassus (*Deltocephalus*) *eximius* KIRSCHBAUM 1868:128.

Length ♂ 5—6 mm, ♀ 7.5—9 mm. Remarkably opaque. Pale green, often with a whitish tinge. Crown and pronotum very rarely with traces of longitudinal dark bands. Elytra whitish, veins green, only indistinctly bordered with fuscous.

♂ small and relatively robust. Crown roundedly bluntly triangular, rather constant in shape, 1.0—1.12 (in one ex. from Daragodleh slightly shorter) × as long as pronotum, 0.86—0.9 × as long as broad, concave, discal region rather indistinctly shagreened, generally shinier than the frontal region. Anterior margin of head never foliaceous, face in profile distinctly convex, frontoclypeus broader and more convex than in *H. paykulli*. Elytra slightly longer than abdomen. ♀ robust, resembling *H. glaucescens* but smaller. Crown broadly parabolic, somewhat variable in length: usually (exx. from Israel, Egypt, Wadi Halfa and Somalia) 1.25—1.4 × (in exx. from Ed Damer 1.2—1.28 × and

in one ex. from Cyprus 1.14 ×) as long as pronotum, 0.89—1.0 × as long as broad. Anterior margin of head not foliaceous, face distinctly convex in profile, frontoclypeus broad and ± tumid. Elytra slightly shorter than abdomen, costal margin with extra subapical cross veins.

Male genitalia: Penis (Fig. 12c) as in *H. glaucescens*, but stem often slightly shorter and thicker, length 0.56—0.60 mm, appendages parallel, ± close to each other, directed dorsad. Apex of abdomen (♀) in Fig. 13a.

Biology: On grasses such as *Panicum turgidum*, in sandy arid localities.

Range: Eremian (NE Africa, Israel, Iran, Cyprus, Sicily; records from Spain probably refer to *H. storai*). Common in Israel, Egypt and the adjacent parts of the Sudan.

Material studied from the Ethiopian Region: Sudan: several exx. from the following localities: Northern Province: Atbara, 20.X.1962, and Dibeira, 29.IX.1962, S. Panellius; Abu Hamed-Abidiya, 18—20.X.1962, Ed Damer, 5—10.VII.1961, Shendi, 2.V.1962 and Wadi Halfa, 21—24.VII.1961, Linnavuori. Kassala: Kassala-Haiya, 1—3.XII.1962, Linnavuori; Khor Hanoieit, 111.1926, H. Johnston; Port Sudan, 25.X.1962, S. Panellius. Blue Nile: Wad Medani, in British Museum. Eritrea: Ailet, 1 ex., 30—31.V.1963, Linnavuori. Somalia: Borama, 1 ex., 29.VI.1963 and Daragodleh, 3 exx., 25.VI.1963, Linnavuori. South Yemen: Lahej-Dhala road, 1 ex., 13—14.VII.1963, Linnavuori.

5. *H. reticulatus* (Linnavuori), comb. n.

Parabolocratus eximus f. *reticulatus* LINNAVUORI 1962:58—59.

Length ♂ 5.25 mm, ♀ 7—7.5 mm. Like *H. eximius*, but slightly smaller. Crown blunter and somewhat shorter, 1.0 (♂) or 1.09—1.23 (♀) × as long as pronotum, 0.81 (♂) or 0.83—0.84 (♀) × as long as broad. Elytra (Fig. 12e) with numerous extra cross veins in apical area. Male genitalia as in *H. eximius*.

Biology: Swept from luxuriant vegetation (*Junctus acutus* and grasses) at a

hot sulphur spring on the shore of the Dead Sea.

Range: The Dead Sea Valley.

Material studied: the type series from Israel (Ein Gedi, Ein Husb and Sedom, LINNAVUORI 1962:59) in coll. Linnavuori.

6. *H. longicauda* sp. n.

Length ♂ 5.25—6 mm, ♀ 7.75—8.5 mm. Opaque. Unicoloured pale stramineous. Elytra subcoriaceous, cells and veins pale straw-coloured.

Resembling *H. eximius*, but more gracile. Crown 0.94 (♂) or 1.0—1.1 (♀) × as long as pronotum, 0.84—0.89 (♂) or 0.80—0.84 (♀) × as long as broad, blunter than in *H. eximius*, disk slightly convex, densely and distinctly shagreened throughout, base with two ± developed round more sparsely shagreened spots. Face more convex than in *H. eximius*. Elytra as in *H. eximius*.

Male genitalia as in *H. eximius*, but penis (Fig. 12d) somewhat shorter, length 0.48 mm. Female genitalia (Fig. 13b) distinctive: abdomen strongly prolonged and narrowing apicad, ovipositor sheath extending far beyond tip of abdomen.

Biology: On *Aeluropus littoralis* in inland dunes.

Material studied: South Yemen: Lahej-Dhala road, 1 ♂, type, 5 paratypes and 2 larvae, 13—14.VII.1963, Linnavuori, my collection.

7. *H. virescens* (Distant)

Parabolocratius virescens DISTANT 1910a:239.

Length ♂ 5.25—6 mm, ♀ 7—8 mm. Rather shiny. Pale or yellowish green. Elytra hyaline, veins pale green, only indistinctly bordered with fuscous.

Resembling *H. eximius*, but somewhat more gracile. Crown shorter and blunter (in South African and Angolan specimens slightly more angulate than in Central African ones), 0.72—0.93 (♂) or 0.95—1.09 (♀) × as long as pronotum, 0.70—0.78 (♂♀) × as long as

broad. Face more tumid. Elytra slightly longer than (♂) or as long as (♀) abdomen, costal margin with extra subapical cross veins.

Genitalia as in *H. eximius*. Length of penis (Fig. 14a—d) 0.45—0.51 mm. Stem of penis robuster in South African specimens than in the others.

Biology: In mesic savannahs. Often at lamps.

Range: Widespread in savannahs of Southern and East Africa and the adjacent parts of Zaire and the Sudan. Also recorded from Madagascar (METCALF 1963:44). Common in the Sudan.

Material studied: Chad: N'Gouri, distr. de Kanem, several exx., VIII.1958, P. Renard. Sudan: numerous exx. from Blue Nile: Ingesana Mts., 18—22.XI.1962; Singa-Damazin, 15—17.XI.1962; Umm Banein, 14.XI.1962. Bahr el Ghazal: R. Pongo, 18.II.1963; Wau, 19.II.1963. Equatoria: Juba, 27.II.—2.III.1963; Tambura-Wau road, 25—26.IV.1963, Linnavuori. Zaire: Banana, 1 ex., 2.VIII.1920, H. Schouteden; Boma, 2 exx., V—VI.1947, E. Darteville; Elisabethville, several exx., III.1926, H. Schouteden; Kivu, Kavimvira (Uvira), 1 ex., IX.1954, G. Marlier, Sanghe, Pl. Ruzizi, 1 ex., XII.1951, H. Bomans; Parc Nat. Upemba, several exx. from Kankunda, 1300 m, 22—24.XI.1947, Kanonga, affl. dr. Fungwe, 700 m, 17—22.II.1949 and Kaswabilenga, 700 m, 3—4.XI.1947, Miss. de Witte; Tanganika, Musosa, 3 exx., XI.1953, H. Bomans. Angola: Cuango, Cafundo, several exx., IX—X.1969, S. Peles. South Africa: Cape Prov.: Tweede Rivieren, Kalahari Gemsbok Park, 2 exx., 16.XI.1950; Worcester, 2 exx., 11.II.1951. Transvaal: Pretoria, 2 exx., 15.X.1954. SW Africa: Kaokoweld, Omutati, 70 miles WSW of Ohopoho, 5 exx., 5.VI.1951, P. Brinck & G. Rudebeck; Farm Okaundua, 15 km SW of Okahandja, 1 ex., 23.III—13.IV.1936, W. Krig; Windhuk, 1 ex., 29.IV—8.V.1911, Mus. Hamburg.

8. *H. dubius* Melichar

Hecalus dubius MELICHAR 1904:36.

Length ♂ 5.0—5.75 mm, ♀ 6.5—7.0 mm. Like *H. virescens*, but crown longer and more angulate, in ♂ 0.92—0.94 (Ethiopian populations) or 1.0—1.05 ×, in ♀ 1.0—1.14 × as long as pronotum, 0.8—0.9 (♂) or 0.77—0.89 (♀) × as long as broad.

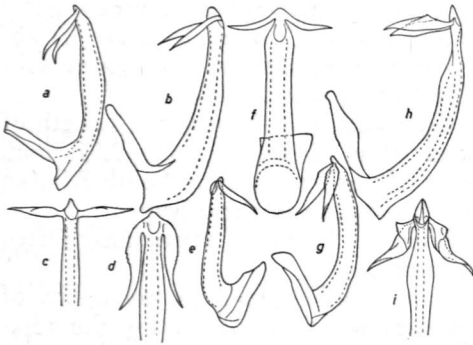


FIG. 14. *Hecalus virescens* (Dist.): a penis, lateral aspect (Pretoria); b same (Kaswabilenga); c apex of same, ventral aspect (Wau); d same (Kaokoweld, Omtali). — *H. dubius* Mel.: e penis, lateral aspect; f same, ventral aspect. — *H. ferrugineus* (Mel.): g penis, lateral aspect. — *H. plagiatus* sp. n.: h penis, lateral aspect; i apex of same, ventral aspect.

Male genitalia: Penis (Fig. 14e—f), length 0.40—0.42 mm, stem short, thick and straight, appendages directed laterad.

Biology: In rather moist savannahs and shore meadows.

Range: East-African. Relatively rare.

Material studied: Sudan: Blue Nile: Ingesana Mts., 1 ex., 18—22.XI.1962; Singa-Damazin, 1 ex., 15—17.XI.1962; Umm Banein, 1 ex., 14.XI.1962. Upper Nile: Malakal, 2 exx., 5—21.I.1963. Equatoria: Juba, 3 exx., 27.II—2.III.1963; Juba-Nimule, 1 ex., 10—11.III.1963; Kapoeta-Boma, 3 exx., 26—27.III.1963; Tera-keka, 3 exx., 2—6.III.1963; Yambio, 2 exx., 17—25.IV.1963, Linnavuori. Ethiopia: Aouash, 900 m, 4 exx., IX.1957 and Kalaffo (Ogaden), 1 ex., XII.1960, F. Schäuuffele; Konso, 1610 m, 3 exx., 17—23.II.1960, W. Richter; Nazareth, 1 ex., 20—21.VI.1963, Linnavuori. Somalia: Hargeisa, 1 ex., 21—28.VI.1963, Linnavuori; Haro-Bussar, 1 ♂, type, 21.V.1901, coll. Melichar, Mus. Brno. Zaire: Parc Nat. Upemba, Kaswabilenga, 700 m, 1 ex., 17.X.1947, Miss. de Witte. East Africa: Kumbulu, 1 ex., Tanga, 2 exx. and Usambara, 4 exx., coll. Melichar. Angola: Cuango, Cafundo, 1 ex., IX—X.1969, S. Peles.

9. *H. lacteus* (Melichar), comb. n.

Parabolocratrus lacteus MELICHAR 1922:302.

♂. Length 5 mm. Like *H. dubius*, but

paler, crown somewhat shorter, $0.82 \times$ as long as pronotum, face more convex and penis slightly longer, length 0.45 mm.

Range: Ethiopia.

Probably identical with *H. dubius*, which occurs in Ethiopia, its populations there being unusually short-headed.

Material studied: Ethiopia: Katchinoa, 1 ♂, type, 1905, Rothschild, coll. Melichar, Mus. Brno.

10. *H. ferrugineus* (Melichar), comb. n.

Parabolocratrus ferrugineus MELICHAR 1914:7.

♂. Length 5 mm. Uniformly reddish. Elytra slightly smoky apically. Dorsum of abdomen fuscous.

Crown parabolic, $1.1 \times$ as long as pronotum. Face flattish. Elytra about as long as abdomen.

Male genitalia: Penis in Fig. 14g, stem tubular, slightly recurved dorsad, in lateral aspect of uniform width; appendages broad, blade-shaped.

Range: East African.

Material studied: East Africa: Kumbulu, 1 ♂, type, in coll. Melichar, Mus. Brno.

11. *H. plagiatus* sp. n.

Length 5 mm. Shiny. Yellowish green with a golden tinge. Elytra hyaline, strongly shiny, slightly tinged with gold, apical part faintly smoky, veins pale greenish, not bordered with fuscous.

Like *H. eximius*. Crown rather acutely triangular, $0.94 \times$ as long as pronotum, $0.84 \times$ as long as broad, disk shallowly concave, discal region only indistinctly shagreened. Face distinctly convex. Elytra slightly longer than abdomen, costal margin with a few extra subapical cross veins.

Male genitalia: Penis (Fig. 14h—i), length 0.51 mm, stem robust, suddenly narrowed in apical quarter; appendages broad, blade-shaped.

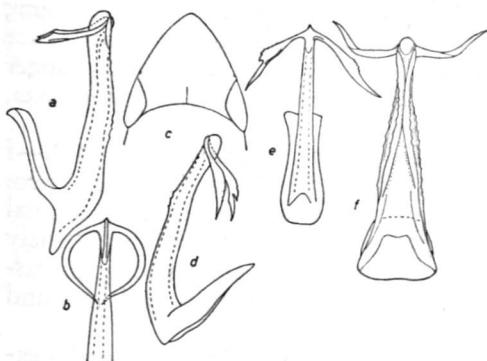


FIG. 15. *Hecalus bahrabiad* sp. n.: a penis, lateral aspect; b apex of same, ventral aspect. — *H. aurora* sp. n.: c head (σ); d penis, lateral aspect; e same, ventral aspect. — *H. carinatus* sp. n.: f same.

Biology: Swept from a dryish savannah.

Material studied: Sudan: Equatoria, Torit-Kapoeta, 1 σ , type, 26.III.1963, Linnavuori, in my collection.

12. *H. bahrabiad* sp. n.

Length σ 5.0—5.25 mm, ♀ 6.5—7.25 mm. Like *H. dubius*, but colouring, at least in dead specimens, pale ochraceous. Anterior margin whitish, indistinctly bordered with fuscous both above and below.

Crown 0.95—1.0 (σ) or 1.0—1.13 (♀) \times as long as pronotum, 0.73—0.80 (σ / ♀) \times as long as broad.

Male genitalia: Penis (Fig. 15a—b), length 0.66 mm, stem straight, in lateral aspect broad; appendages nearly semi-circularly recurved dorsad; gonopore unusually long.

Biology: In wet shore meadows of the Nile.

Material studied: Sudan: Equatoria, Tera-keka, 1 σ , type, 3 σ and 1 ♀ paratypes, 2—6.III.1963. Bahr el Ghazal; Wau, 1 ♀ probably of this species 19.II.1963, Linnavuori, in my collection.

13. *H. aurora* sp. n.

Fig. 15c. Length 5.5 mm. Yellowish,

probably green in life. Anterior margin of head whitish, narrowly bordered with fuscous both above and below. Elytra yellowish hyaline, veins thin.

Resembling *H. eximius*. Crown triangularly produced, 1.05 \times as long as pronotum, nearly 0.9 \times as long as broad. Face flattish. Elytra slightly longer than abdomen, subapical part of costal margin with only a few extra cross veins.

Male genitalia: Penis (Fig. 15d—e), length 0.60 mm, stem rather slender, slightly recurved dorsad; appendages long and gracile.

Material studied: Zaire: Kivu, Kavimvira (Uvira), 1 σ , type, Mus. Tervuren, 1 σ , paratype, my collection, IX—X.1954, G. Marlier.

the *macilentus* group

Body generally gracile. Anterior margin of head white, bordered with black both above and below, never foliaceous. Crown \pm triangularly produced. Elytra without extra cross veins. Stem of penis \pm robust, provided with distinct longitudinal lamellae.

H. aurora and *H. carinatus* are intermediates between the two groups.

14. *H. carinatus* sp. n.

Length σ 5.5—6.5 mm, ♀ 8 mm. Like *H. macilentus*, but colouring, especially in male, often pale ochraceous.

Crown robuster than in the other species of the group, more broadly parabolic, 0.95—1.11 (σ) or 1.12—1.13 (♀) \times as long as pronotum, 0.70—0.86 (σ / ♀) \times as long as broad.

Male genitalia: Penis (Figs. 15f and 16a), length 0.48 mm, stem flattened, with a strong medially scored ventral carina; appendages thin, recurved latero-dorsad.

Biology: Common in savannahs in the Blue Nile Province in the Sudan, be-

coming sparse towards the south (only 2 exx. known from Juba). Also adapted to arid environments in *Acacia*-short grass savannahs in sandy areas around Khartoum and in Kordofan.

Material studied: Sudan: 50 km E of Khartoum, 3 paratypes, 28.XI.1962. Blue Nile: Abu Hashim-Galegu, 1 ♂, type, 1 paratype, 23—24.XI.1962; near Damazin, 2 paratypes, 17—22.XI.1962; Singa-Damazin, several paratypes, 17—22.XI.1962; Umm Banein, 5 paratypes, 14.XI.1962. Upper Nile: Malakal, 1 paratype, 5—20.I.1963; Renk-Malakal, 1 paratype, 2—4.I.1963. Kordofan: Tendelti-Umm Ruwaba, 1 paratype, 23—28.I.1963. Equatoria: Juba, 2 paratypes, 27.II—2.III.1963, Linnavuori, my collection.

Other material: Sudan: Equatoria, Kapoeta-Boma, 4 ♀♀ probably of this species, 26—27.III.1963, Linnavuori.

15. *H. macilentus* sp. n.

Length ♂ 5.5—5.75 mm, ♀ 7.0—7.5 mm. Pale green, especially ♂ with a golden tinge on head and pronotum. Anterior margin of head white, narrowly bordered with black both above and below. Elytra greenish hyaline, veins gracile, green, base of appendix with the usual dark spot.

Body gracile. Crown triangular, 0.90—1.0 (♂) or 1.14—1.16 (♀) × as long

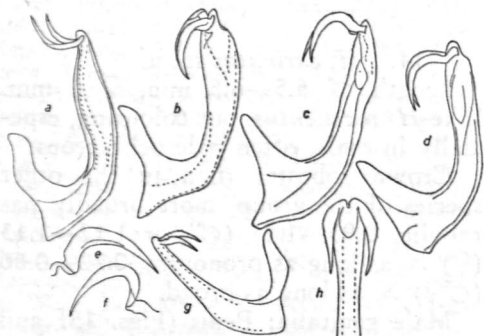


FIG. 16. *Hecalus carinatus* sp. n.: a penis, lateral aspect. — *H. macilentus* sp. n.: b penis lateral aspect (Kaswabilenga); c same (Imatong Mts.); d same (Imatong Mts., another ex.); e aedeagal process (Imatong Mts.); f same (Letaba Valley). — *H. atreus* sp. n.: g penis, lateral aspect; h apex of same, ventral aspect.

as pronotum, 0.7—0.8 (♂♀) × as long as broad, disk slightly concave. Face somewhat convex. Elytra slightly longer than (♂) or as long as (♀) abdomen, without extra cross veins.

Male genitalia: Penis (Figs. 16b—f and 17a), length 0.42—0.48 mm, stem relatively gracile, tubular, longitudinal subapical lamellae narrow and finely serrate; apical appendages long, incrassate, with base strongly reflexed and apex long and falcate.

Biology: On grasses in alpine meadows in the Imatong Mts.

Material studied: Sudan: Equatoria, Imatong Mts., near Gilo, 1 ♂, type and 1 ♂ paratype, 18—24.III.1963, Linnavuori. Zaire: Parc Nat. Upemba, several paratypes from Kaswabilenga, 700 m, 3—4.XI.1947; Kenia affl. dr. Lusinga, 1760 m, 9—18.IV.1949, Miss. de Witte. Angola: Dundo, 4 paratypes, III.1954, A. Machado. South Africa: Transvaal, Letaba Valley, 2 paratypes, A. Capener. Type and paratypes in my collection, paratypes also in Mus. Brussels and Mus. Dundo.

16. *H. atreus* sp. n.

Length 5—6 mm. Like *H. macilentus*, but crown shorter, 0.8—0.9 × as long as pronotum, 0.73—0.8 × as long as broad.

Male genitalia: Penis (Figs. 16g—h and 17b), length 0.38 mm, stem tubular, rather short and gracile, distinctly tapering apicad, apex in ventral aspect roundedly expanded, smooth; appendages short, recurved dorso-basad.

Material studied: Ivory Coast: Lamto, 1 ♂, type, 14.VIII.1964, D. Gillon, 2 ♂♂ paratypes, 1962, P. Planquette & R. Vuattoux. Zaire: Lusambo, 1 ♂ paratype, 1925, J. Ghesquière. Type and a paratype in my collection, paratypes in École Normal Sup., Paris and Mus. Tervuren.

17. *H. adnexus* sp. n.

Length ♂ 5.5—6.0 mm, ♀ 6.5—7.0 mm. Like *H. macilentus*. Crown 0.9—0.95 (♂) or 1.0—1.12 (♀) × as long as pronotum, 0.7—0.86 (♂♀) × as long as

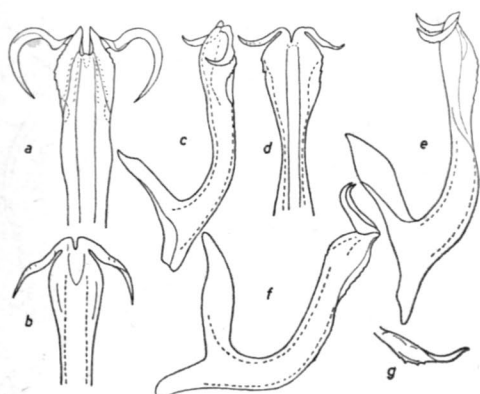


FIG. 17. *Hecalus macilentus* sp. n.: a apex of penis, ventral aspect (Kaswabilenga). — *H. atreus* sp. n.: b same (other ex. than in Fig. 16). — *H. adnexus* sp. n.: c penis, lateral aspect (Mujenje); d apex of same, ventral aspect; e penis, lateral aspect (Juba); f same (Kaziba); g aedeagal process.

broad, variable in shape, generally slightly blunter than in *macilentus*.

Male genitalia: Penis (Figs. 17c—g and 18a—b), length 0.51—0.57 mm, stem rather long and gracile, tubular; lateral lamellae finely serrate, long and narrow, \pm recurved ventrad, apical two-thirds of stem in ventral aspect expanded, elongately spoon-shaped; apical appendages short, finely serrate, recurved latero-dorsad.

Biology: On grasses in mesic savannah forests.

Material studied: Sudan: Equatoria: Juba, 1 ♂, type and several paratypes, 27.II—2.III.1963; Loka forest, 1 paratype, 8—10.IV.1963; Lalyo-Juba, 5 paratypes, 26—27.II.1963; Mundiri, 4 paratypes, 24.II.1963, Linnavuori. Zaire: Parc Nat. Upemba, Kaziba, 1140 m, several paratypes, 19.II.1948, Mbuye-Bala, 1750 m, 1 paratype, 1—7.IV.1948, Miss. de Witte; Katanga, Kiambi, 1 paratype, 1911, Dr. Valdonio. East Africa: Mujenje, 1 paratype, VIII.1913, Katona. Type and paratypes in my collection, paratypes in Mus. Brussels and Mus. Tervuren.

18. *H. aither* sp. n.

Length ♂ 5.5—5.75 mm, ♀ 6.5—7.0 mm. Externally like *H. adnexus*.

Male genitalia: Penis (Fig. 18c—f), length 0.50 mm, lateral lamellae short, forming a rounded, marginally roughly dentate subapical lobe on either side of stem, the spoon-shaped apical part of stem therefore much shorter than in *H. adnexus*; appendages as in *adnexus*.

Material studied: Ivory Coast: Lamto, 1 ♂, type, 14.VIII.1968, several paratypes, 1964—1965, D. Gillon, in my collection.

19. *H. kengeanus* sp. n.

Fig. 19a. Length ♂ 5.5 mm, ♀ 7 mm. Like the preceding species. Crown triangular, 1.0—1.6 (♂) \times as long as pronotum, 0.8—0.9 (♂♀) \times as long as broad.

Male genitalia: Penis (Fig. 19b—e), length 0.54 mm, stem in lateral aspect shallowly S-shaped, tubular, concave, apex in ventral aspect strongly triangularly expanded owing to prominent, \pm sharply triangular lateral lobes; appendages close to stem, directed ventrad.

H. kengeanus, *H. aither* and *H. adnexus* are possibly geographical races of a single widespread species.

Material studied: Zaire: Bas-Congo, Kenge, 1 ♂, type, 1 ♀ paratype, 1953, R. Close; Boma, 1 ♂ paratype, II—III.1937, E. Darteville. Type in Mus. Tervuren, paratypes in my collection.

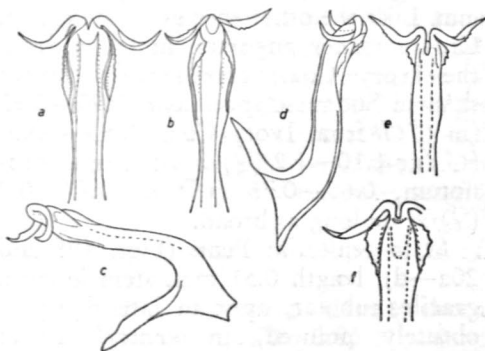


FIG. 18. *Hecalus adnexus* sp. n.: a apex of penis, ventral aspect (Kaziba); b same (Juba). — *H. aither* sp. n.: c—d penis, lateral aspect (of two exx.); e—f apex of same, ventral aspect.

20. *H. ribauti* Villiers*Hecalus ribauti* VILLIERS 1956:836.

Length ♂ 5.0—5.5 mm, ♀ 7.25—8.5 mm. Like the other species of the group. Crown variable in shape, usually ± produced and triangular, 0.86—1.10 (♂) or 1.08—1.23 (♀) × as long as pronotum, 0.70—0.95 (♂♀) × as long as broad.

Male genitalia: Penis (Figs. 20e—f and 21a—c), length 0.32—0.44 mm, rather short, stem ± laterally flattened, in lateral aspect broad with apex broadly truncate, in ventral aspect narrowish and of ± uniform breadth, lateral lamellae narrow and upturned; appendages slender, recurved apicad.

Biology: On grasses in mesic savannahs.

Range: Sudanese (Mauretania (type locality) — Sudan).

Identification tentative until topotypic males from Mauretania can be studied.

Material studied: Ivory Coast: Foro-Foro, several exx., 3.V.1972, A. Pollet; Lamto, numerous exx., 1963—1969, D. Gillon & A. Pollet. Sudan: Bahr el Ghazal: Wau, 6 exx., 19.II.1963. Equatoria: Lalyo-Juba, several exx., 26—27.II.1963; Tambura-Wau road, 1 ex., 25—26.IV.1963, Linnavuori.

21. *H. imitans* sp. n.

Length ♂ 5.5—6.0 mm, ♀ 7.5—8.0 mm. Like the other species of the group. Crown rather angulate, in males from the Ivory Coast considerably shorter than in Sudanese specimens, 0.90—0.95 (in ♂♂ from Ivory Coast 0.83—0.89) (♂) or 1.10—1.2 (♀) × as long as pronotum, 0.65—0.75 (♂) or 0.77—0.9 (♀) × as long as broad.

Male genitalia: Penis (Figs. 19f and 20a—d), length 0.51 mm, stem longish, gracile, tubular, apex in lateral aspect obtusely pointed, in ventral aspect slightly expanded in apical part, lateral lamellae narrow, coarsely dentate; appendages long, gracile, distinctly dentate, recurved dorsad.

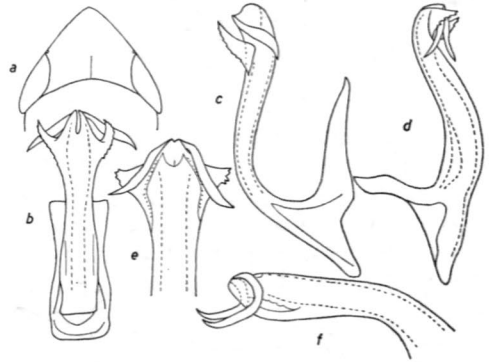


FIG. 19. *Hecalus kengeanus* sp. n.: a head (♂, type); b penis in ventral, c in lateral aspect (type); d—e same (*Boma*). — *H. imitans* sp. n.: f penis, lateral aspect (*Lamto*).

Biology: In mesic savannahs.

Material studied: Sudan: Equatoria, Lalyo-Juba, 2 paratypes, 26—27.II.1963; Tambura-Wau road, 1 ♂, type, several paratypes, 25—26.IV.1963, Linnavuori, in my collection.

Other material: Ivory Coast: Lamto, several exx., 14.IX.1963, D. Gillon, my collection.

Linnavuoriella Evans

Linnavuoriella EVANS 1966:134. Type: *Acocephalus arcuatus* Motsch.

Medium-sized green leafhoppers. Anterior margin of crown whitish, narrowly bordered with fuscous both above and below. Crown, pronotum and scutellum with fulvous bands. Apical part of elytra smoky with round milky spots, in pale specimens at least tips of some apical veins dark.

Resembling the *macilentus* group of the genus *Hecalus*, but sexual dimorphism less distinct and body broader. Head shorter and broader, crown broadly parabolic or triangular, facial sclerites broader. Elytra with outer subapical cell shorter and ± triangular. Spinulation of fore tibiae 1+4.

Male genitalia as in *Hecalus*, but pygophore shorter and broader, with side

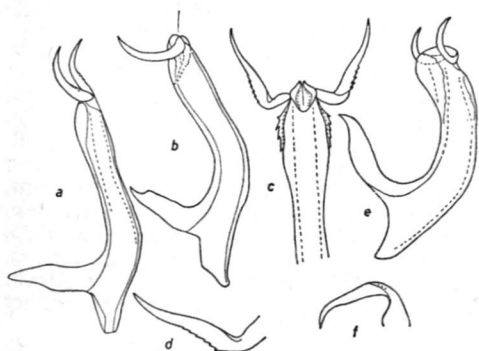


FIG. 20. *Hecalus imitans* sp. n.: a penis, lateral aspect (Lalyo-Juba); b same (Tambura-Wau); c apex of penis, ventral aspect (Tambura-Wau); d aedeagal process. — *H. ribauti* Vill.: e penis, lateral aspect (Wau); f aedeagal process.

lobes bluntly triangular. Anal tube larger and well sclerified, extending to apex of pygophore. Connective (Fig. 21g) longer. Stem of penis arising from dorsal part of socle. Female genitalia as in *Hecalus*.

Range: Palaeotropical, stretching from Africa via the Oriental Region to Australia. Penetration into Japan has led to the evolution of one species, *L. lineata* (Hv.).

Biology: On grasses in savannahs, savannah forests and swampy meadows. Often at lamps.

Key to the species

- 1 (2) Aedeagal appendages long, of equal length, strongly divergent, the middle appendages directed ventrad, the lateral ones laterobasid (Figs. 21e—f and 22a—b) *prominens* (Wk.)
- 2 (1) Penis different 3
- 3 (4) Middle appendages of penis directed apicad, outer ones laterad (Figs. 21h and 22c) *berenice* sp. n.

- 4 (3) Aedeagal appendages not directed apicad 5
- 5 (6) Stem of penis in lateral aspect short and broad, gonopore rather far from apex; appendages of nearly equal length, rather close to each other, directed laterad (Fig. 22f and h) *masombwensis* sp. n.
- 6 (5) Stem of penis longer and slenderer, gonopore near apex, appendages inequal in length 7
- 7 (8) Stem of penis (Fig. 22e and g) in lateral aspect broadish, not tapering apicad, shallowly S-shaped, appendages appearing short *brevispinosa* sp. n.
- 8 (7) Stem of penis (Fig. 22d and i) in lateral aspect gracile, tapering apicad, recurved dorsad; appendages longer .. *conformis* sp. n.

1. *L. prominens* (Walker), comb. n.

Acocephalus prominens WALKER 1858:261.

Parabolocratus albomaculatus EVANS 1904:708 syn. n.

Parabolocratus albomaculatus EVANS 1955b:6 nec DISTANT 1908:280.

Fig. 21d. Length 4.5—7 mm. Pale green. Anterior margin of crown white, narrowly bordered with fuscous both above and below. Crown with 4, pronotum with 6 and scutellum with 3 faint poorly delimited longitudinal orangish bands. Elytra greenish, apical part in ♂ brownish with round milky areolate spots, tips of veins of 1st and 5th apical cells dark, veins otherwise sometimes with fulvous tinge. Elytra in ♀ totally pale greenish, only tips of some apical veins dark. Dorsum of abdomen in ♂ broadly fuscous.

Body short, compact. Crown short, broadly parabolic, 0.70—0.83 × as long as pronotum, 0.54—0.70 × as long as broad. Elytra about as long as abdomen.

Male genitalia: Pygophore shorter and broader than in the other species, genital

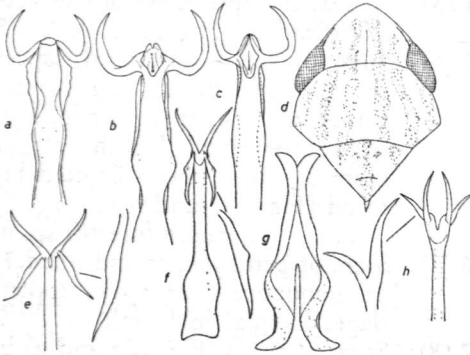


FIG. 21. *Hecalus ribauti* Vill.: a apex of penis, ventral aspect (Wau); b same (Lalyo-Juba); c same (Wau, another ex.). — *Linnavuoriella prominens* (Wk.): d head, pronotum and scutellum (♀); e apex of penis, ventral aspect (ex. from Cameroon) f same (Tang. Terr.); g connective. — *H. berenice* sp. n.: h apex of penis, ventral aspect.

plates extending near to tip of pygophore. Penis in Figs. 21e—f and 22a—b, stem straight, slender; appendages long, of equal length, strongly divergent, the middle appendages directed ventrad, the lateral ones latero-basad.

Biology: In savannah forests, shore and mountain meadows.

Range: Widespread, from the Guinean subregion to Ethiopia and East Africa.

Material studied: Gambia, 1 ♀, type of *prominens*, British Museum. Guinea: Nimba, several exx., VII—XII.1951, Lamotte & Roy. Liberia: Suakoko, several exx., 10—20.III.1952, C. Blickenstaff. Ivory Coast: Foro-Foro, 1 ex., 31.VII—2.VIII.1972, A. Pollet; Nimpleu near Danané, 1 ex., Condamin & Roy. Cameroon: Buea, 4 exx., 8.XI.1957, H. Knorr; Rés.Forest. Nyong, 4 exx., 1949—1950, J. Birket-Smith & J. Dahl. Sudan: several exx. from: Bahr el Ghazal: R. Pongo, 18.II.1963. Equatoria: Ibba-Yambio, 16.IV.1963; Yambio, 17—25.IV.1963; Tambura-Wau road, 25—26.IV.1964. Ethiopia: Gembi near Agaro, 1 ex., 15.VI.1963; Mt. Maigudo, 1 ex., 16—17.VI.1963, Linnavuori. Zaire: Parc Nat. Albert: Kivu, Kalondo, lac Ndaraga, Mokoto, 1750 m, 1 ex., 22—27.III.1934, Kivu, Rutshuru, 1285 m, 1 ex., 22.V—4.VI.1934, Uélé, Monga, riv. Bili, 450 m, 1 ex., 18.IV—8.V.1935, Miss. de Witte; numerous

exx. from Boma, II—III.1937, E. Dartevelle; Eala, XI.1934, J. Ghesquière; Elisabethville, V. 1950, C. Seydell; Equateur, Bamania, VII. 1958, P. Hulstaert; Kisantu, 1927. R. Vanderyst; W Kivu, Loashi, VIII.1937, J. Ghesquière; Lulua, Kapanga, II.1934, G. Overlaet; Maniema, Wamaza, 1952, C. de Puydt; Mayumbe, Eshiole, I.1925, A. Collart; Nyangwe, IV.1918, R. Mayné; Rutshuru, XII.1937, J. Ghesquière; Temwo, 6.III.1922, H. Schouteden; Tshuapa, Flandria, VII—IX.1946, P. Hulstaert; Uélé, Dingila, I.V.1933, H. Brédo; Wamba, XI.1935, Dr. Degotte. Ruanda: Nyabikenke, terr. Nyanza, 1 ex., 12.I.1953, P. Basilevsky. East Africa: Tang. Terr., Ukerewe I., several exx., Father Conrads.

2. *L. berenice* sp. n.

Length 5.75—7.0 mm. Like the preceding species, but apical part of elytra weakly smoky also in ♂. Body somewhat more elongate. Crown, especially in ♀, longer, 0.80—0.83 (♂) or 1.0 (♀) × as long as pronotum, 0.7 (♂) or 0.9 (♀) × as long as broad.

Male genitalia: Penis in Figs. 21h and 22c, shallowly S-shaped in lateral aspect, middle appendages directed apicad, outer ones laterad. Other genitalia as in *L. masombwensis*.

Material studied: Ivory Coast: Lamto, 1 ♂, type, 30.X.1968, A. Pollet, 8 paratypes, 1964—1968, D. Gillon, in my collection. East Africa: Mombo, 5 paratypes, in coll. Melichar, Mus. Brno. Zaire: Katanga, Kapolowe, 1 paratype, 30.III.1925, C. Seydel, Mus. Tervuren.

3. *L. conformis* sp. n.

Length 5.5 mm. Like the preceding species.

Male genitalia: Penis in Fig. 22d and i, stem gracile, tapering apicad, recurved dorsad, appendages long, directed ventrad.

Material studied: East Africa: Maberangulu, 1 ♂, type and 1 ♀ paratype, in coll. Melichar, Mus. Brno.

4. *L. brevispinosa* sp. n.

Length 5.5—7.5 mm. Like *L. promi-*

nens, but elytra less infumed apically also in ♂. Body more gracile, crown longer, 0.94 (♂) or 0.90—1.0 (♀) × as long as pronotum, 0.70—0.80 × as long as broad.

Male genitalia: Penis in Fig. 22e and g, stem in lateral aspect broadish, not tapering apicad, shallowly S-shaped, appendages apparently short. Other genitalia as in *L. masombwensis*.

Material studied: South Africa: N. Transvaal, Louis Trichardt, 1 ♂, type and 1 ♀ paratype, Letaba Valley, 1 ♀ probably of this species, A. Capener, in my collection.

5. *L. masombwensis* sp. n.

Length 5.75—7.0 mm. Like *L. prominens*, but elytra only weakly infumed apically. Dorsum of abdomen in ♂ only medially darkened. Body more elongate. Crown broadly parabolic, 0.8—0.9 × as long as pronotum, 0.60—0.74 × as long as broad.

Male genitalia: Pygophore rather elongate, genital plates considerably shorter than it. Penis in Fig. 22f and h, stem in lateral aspect short and broad; gonopore rather far from apex; appen-

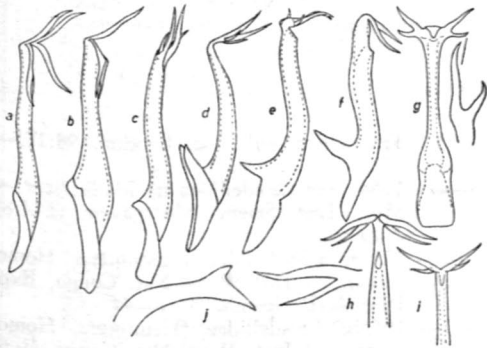


FIG. 22. Penis from side: a *Linnavuoriella prominens* (Wk.) (Cameroon), b same (Tang. Terr.), c *L. berenice* sp. n., d *L. conformis* sp. n., e *L. brevispinosa* sp. n. and f *L. masombwensis* sp. n. — *L. brevispinosa* sp. n.: g penis, ventral aspect. — *L. masombwensis* sp. n.: h apex of penis, ventral aspect. — *L. conformis* sp. n.: i same. — *Hecullus bracteatus* (Ball): j anterior tentorium branch.

dages of nearly equal length, rather close to each other, directed laterad.

Biology: In moist shore and swampy meadows and savannah forests. The commonest species of the genus.

Material studied: Central African Republic: Boukoko, 1 paratype, 7.XII.1968; Savane de Mbouma, 3 paratypes, 17.III.1968, M. Boulard. Sudan: numerous paratypes from: Bahr el Ghazal: R. Pongo, 18.II.1963; Wau, 19.II.1963. Equatoria: Ibba-Yambio, 16.IV.1963; Juba-Nimule, 10—11.III.1963; Lalyo-Juba, 26—27. II.1963; Loka forest, 8—10.IV.1963; Maridi-Ibba, 16.IV. 1963; Mundri, 24.II.1963; Nimule, 11—13.II.1963; Tambura-Wau road, 25—26.IV. 1963; Yei-Maridi, 1 ♂, type, 13—15.IV.1963, Linnavuori. Zaire: numerous paratypes from: Parc Nat. Upemba: Buye-Bala af. g. Muye (af. dr. Lufira), 1750 m, 25—31.III.1948; Dipidi, 1700 m, 22.IV.1947; Ganza, 860 m, 30.V.—10.VI. 1949; Kalule, Mujinja-Kalenge, 1050 m., 28.II—3.III.1949; Kaswabilenga, 700 m, 16.X.1947; Kaziba affl. g. Senze s. (affl. dr. Lufira), 1140 m, 8—14.XI.1948; Kiamokoto-Kiwakishi, 1120 m, 4—16.X.1948; Lubanga affl.dr. Senze af. dr. Lufira, 1750 m, 5.IV.1948; Lukawa affl. r. dr. Lufira 1750 m, 5.IV.1948; Lusinga, 1760 m, 12—17.XII.1947; Masombwe, 1130 m, 6—9. VII.1948; R. Bowa affl.dr. Kalule N. prés Kiamalwa, 13.III.1949; R. Lupiala af. r. dr. Lufira, 700 m, 6—9.X.1947, Miss. de Witte. Bassin Kukuga, 1935, H. de Saeger; Congo da Lemba, I—II.1913, R. Mayné; Elisabethville, 5.III. 1949, C. Seydel; Kabambare, VI.1907, Flamand; Kaniama, 1931, R. Massart; Kasenyi, 19.VIII. 1937, H. Brédo; Katanga, Kalunkumia, 3.IV. 1925, C. Seydel; Lulua, Kapanga, II.1934, G. Overlaet; Malela, XII.1913, L. Burgeon; Mulongo, Niunzu, 20—30.V.1930, P. Gérard; Ruts-huru, 28.V.1936, L. Lippens; Sankisia, 1911, Dr. Rodhain; Tanganika, Musosa, XI.1953, H. Bomans. Uganda: Bugiri, 3 paratypes, 5—8. VIII.1957, P. Basilewsky. Ruanda: Gite de Nkuli, 1 paratypes, 18.III.1936, L. Lippens. Angola, Cuango, Cafungo, several paratypes, IX—X.1969, S. Peles. Type and paratypes in my collection, paratypes also in Mus. Brussels, Mus. Paris, Mus. Tervuren and Mus. Dundo.

Annidion Kirkaldy

Annidion KIRKALDY 1905:267. Type *A. pulcherrimum* Kk.

Unknown to me. Description by Kirkaldy: Einem *Hecalus* ziemlich ähnlich. Kopf und Pronotum leicht abhängig;

Scheitel verlängert, die Seitenränder dünn, ziemlich gleichlaufend, leicht längsgekielt, die Vorderseitenränder leicht gerundet, Ende winkelig; Hinterrand fast abgestürzt. Stirn schmal, verlängert, hinten verbreitert, Seitenränder allmählich erhöht, blattförmig, spitzig. Scheitel etwa zwei drittermal länger als das Pronotum. Augen klein, mit dem Pronotum fast zusammenstossend; Nebenaugen nicht bedeutend. Fühlergrund ausgehöhlt, Pronotum hinten erhöht, gerundet und verbreitert, Hinterrand buchtig. Apikaldrittel der Decken netzartig; Clavus mit zwei starken Nerven. Die ganze Oberfläche stark und klein punktiert.

1. *A. pulcherrimum* Kirkaldy

Annidion pulcherrimum KIRKALDY 1905:268.

Bleich gelblich, Kopf, Pronotum und Schildchen scharlachrot marmoriert; unten bleich gelblich, Beine scharlachrot marmoriert. Deckennerven abwechselnd bleich gelb und scharlachrot gestreift. Decken bis zum Ende reichend.

♀. Letztes Abdominalsegment in der Mitte tief ausgebuchtet, einen Teil des Ovipositors aussetzend. Scheide fast fünfmal so lang (von der Seite gesehen) als das letzte Abdominalsegment. Länge 12 mm.

Range: Ivory Coast: Bouake.

Genera excluded

Gcaleka Naudé

Gcaleka NAUDÉ 1926:39. Type: *G. laticephala* Nd.

Belongs to the Euscelini (THERON 1972:207).

Parabolitus Naudé

Parabolitus NAUDÉ 1926:37—38. Type: *P. anceps* Nd.

Belongs to the Nirvaninae. A synonym of *Narecho* Jac. (THERON 1972:207).

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