

New and Interesting Grasshoppers from Southern Africa - 2 (Orthoptera: Acridoidea)

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In the more arid and desert regions of South and South West Africa there are found several grasshoppers whose appearance and coloration resemble to a remarkable degree the stony ground upon which they live. Representatives of such lithophilous forms are found in the families Pamphagidae, Lentulidae (*sensu* Dirsh, 1956a: 169) and Lathicridae. Truly apterous species are, however, confined to the two latter families only. In general appearance these stone-like forms are superficially very alike, the body is dorsoventrally depressed, often excessively widened in the metathoracic region giving them a spindle-like appearance, the integument is characteristically sculptured and rugulose, and the coloration varies considerably from white to brown and purple, harmonizing rather closely with the colour of the substrate upon which they live. All species of the Lathicridae are of this type but in the Lentulidae there are only a few and these are confined to the genera *Lithidium* Uvarov, *Lithidiopsis* Dirsh and *Eneremius* Saussure. Of these *Lithidium* is now perhaps the best known and together with *Lithidiopsis* form the subject of the present study.

With regard to the position of these genera, Dirsh (*loc. cit.*) assigned them only provisionally to the Lentulidae pending examination of the males which were at that time unknown. In the light of the present study, together with the recent examination of the male of the type species, *Lithidium pusillum* Uvarov, this diagnosis becomes untenable. The phallic complex, for instance, as figured below for *Lithidium desertorum* spec. nov. (fig. 4), shows practically no similarity to any other member of the Lentulidae and the valves of the penis of the newly described males are moreover divided into basal and apical parts, thus differing from the normal undivided condition of the family. Ecologically too, the evidence does not support this view as all members of the Lentulidae are strictly phytophilous in habit, being associated with trees, shrubs and sometimes grasses. With the exception of the genera under consideration not one is geophilous in habit. The distribution of the family indicates furthermore that there is a significant absence of the group in the more arid areas of Southern Africa where the genera in question occur. The Lentulidae are well represented in the evergreen sclerophyll flora of the South Western Cape, extending along the mountain ranges and coastal forests eastwards to Natal, Basutoland and the Highveld area of the Orange Free State and Transvaal. To the north, in the Rhodesias, they are

rarer and only two genera range as far north as Kenya. Their western limits coincide more or less with the southern borders of South West Africa and Bushmanland where only species of *Shelfordites* Karny are found. This genus and *Karruacris* Dirsh have been recorded from the less arid areas of Namaqualand. Although the group is associated predominantly with mesophytic habitats, it is well represented in the semi-arid Karroo Region of the central Cape Province, occurring exclusively upon the dwarf shrubs typical of this steppe zone. But here too, it seems that the xerophytic species of the family are restricted to areas which receive a reasonably reliable rainfall thus ensuring more or less regular annual florescence of the vegetation. Their absence in the more arid areas may in part reflect the inability of the group to inhabit areas which are exposed to low and irregular rainfall resulting in infrequent and even rare florescence.

The foregoing indicates therefore that the evidence is insufficient to justify the retention of these genera in the family Lentulidae. In all contexts, phallic structure, ecology and distribution, they are remote from any other member of the family. Their true position must however be deferred for the present pending more critical analysis.*) Our knowledge of these remarkable insects is still very fragmentary and in part, this can be ascribed to their minute size (some of the males measure only 7 mm) and nymph-like appearance which has possibly led collectors to mistake them for nymphs and therefore ignore them. It is hardly surprising therefore that for a long time after their original discovery, the group was known from females alone and only recently was the first male of the type species *Lithidium pusillum* Uvarov, described and figured (Brown, 1960: 137).

Besides enhancing the established species *Lithidium rubripes* Uvarov and *Lithidiopsis carinatus* Dirsh with descriptions of the first males, the present study adds two new species to the former genus, one collected from the arid pebble plains of the Namib Desert and the other from the south east border of South West Africa. Besides my own few finds, the data on distribution were obtained from specimens in the collections of the Transvaal Museum, Pretoria, South African Museum, Cape Town and the Locust Control and Research Section of the Department of Agriculture, Pretoria.

The types, as well as the newly described males (labelled as metallotypes) are deposited in the Transvaal Museum, paratypes and other material in the British Museum (Natural History), London, National Collection of Insects, Department of Agriculture, and the South African Museum.

Genus *LITHIDIUM* Uvarov, 1925

Type species: *L. pusillum* Uvarov

In 1925 Uvarov established *Lithidium* with the type species *pusillum* from a series of females collected from Kenhardt, N.W.Cape Province; in 1929

*) While in press. Dirsh [1961, *Bull. Brit. Mus. (Nat. Hist.)* (b) 10(9):395], has established a new subfamily Lithidiinae for this group.

he added the species *rubripes* based on a female from Haris(?) South West Africa. Both types are preserved in the British Museum (Nat. Hist.). Many years elapsed before Dirsh (1956c) described *bushmanicum* on a unique female from Vioolsdrif, Namaqualand. This specimen is in the Transvaal Museum. In 1960 the male of *pusillum* was described. Two additional species are now added bringing the total species known for *Lithidium* s.s. to five; of these the males of all but *bushmanicum* are now described. In view of these recent additions it is perhaps a good opportunity to provide a key to the species of this interesting genus.

Key to species of *Lithidium* Uvarov

♂♂

- 1 Hind tibia blue or sandy white 2
 — Hind tibia cherry-red **rubripes**
 2 Hind tibia blue **punctifrons**
 — Hind tibia sandy-white 3
 3 Compound eyes close-set, separated by space equal in length to first antennal segment, body scarcely inflated **desertorum**
 — Compound eyes further apart, separated by a space almost three times as long as first antennal segment, body strongly inflated **pusillum**

♀♀

- 1 Hind tibia blue or sandy-white 2
 — Hind tibia cherry-red **rubripes**
 2 Hind tibia blue, body strongly sculptured **punctifrons**
 — Hind tibia sandy-white, body feebly sculptured 3
 3 Pronotum with posterior margin straight with small median incision **bushmanicum**
 — Pronotum with posterior margin scalloped 4
 4 Compound eyes close-set, separated by space equal to half width of eye; frontal ridge narrow, concave **desertorum**
 — Compound eyes far apart, separated by a space equal to width of eye; frontal ridge wide, flat **pusillum**

Lithidium bushmanicum Dirsh, 1956

1956, *J. ent. Soc. S. Afr.* 19(2):270 (♀-type).

SOUTH AFRICA: Namaqualand: Vioolsdrif, 13.IX.1950, one ♀ (G. van Son); Aggeneis, October 1939, one ♀ (S.A. Museum); Steinkopf, March 1935, three ♀♀ (idem).

The male of this species is still unknown.

Lithidium desertorum spec. nov., figs. 1-7

♂-TYPE: Body very small, slender, scarcely inflated in metathorax, with finely wrinkled lustrous integument.

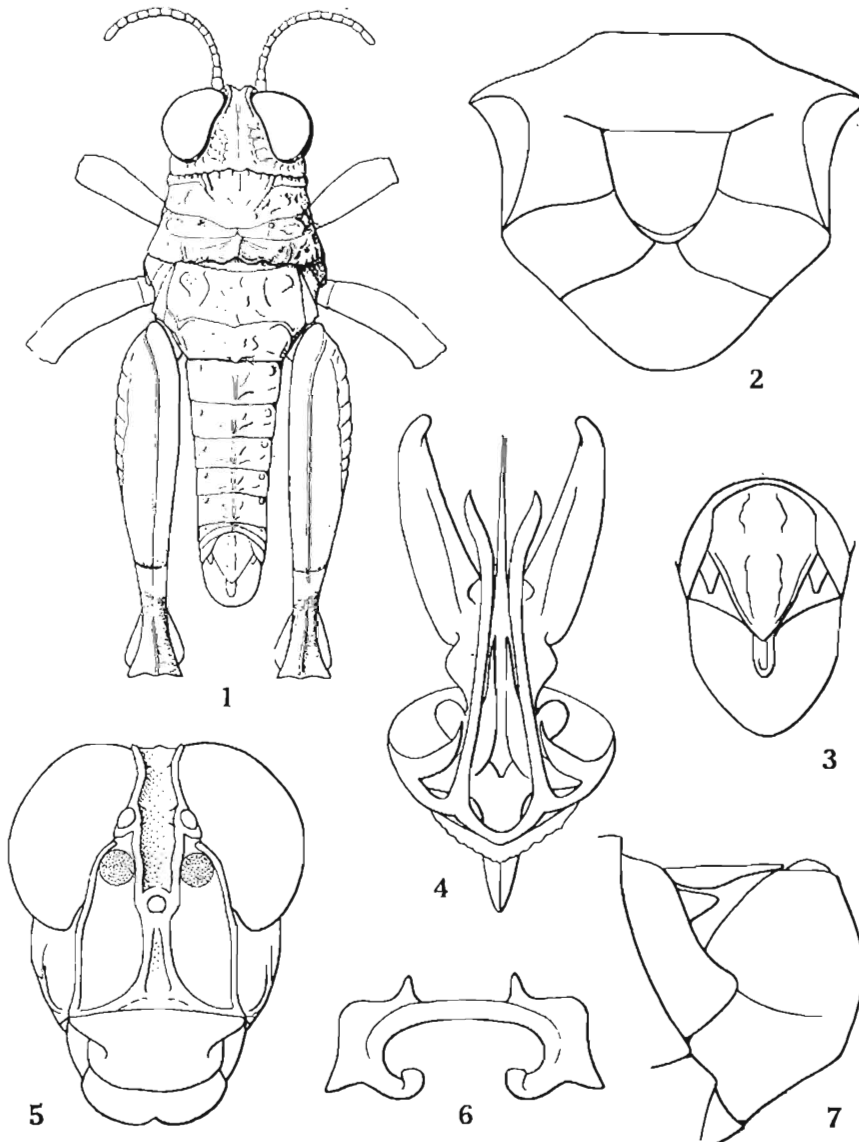
Antenna with 15 filiform segments, somewhat compressed towards apex and as long as head and pronotum together. Head globular; fastigium of vertex short and narrow, sloping roundly forwards, concave in middle with raised lateral carinulae, anteriorly continuous with those of frontal ridge and posteriorly ceasing suddenly between eyes; apex of fastigium excised; occiput with fine median carina and laterally with tuberculate areas along posterior margin of eyes. Frons in profile, slightly excurved between antenna, frontal ridge in upper half deeply sulcate with high parallel carinulae which merge with those of fastigium, in lower half flat with low divergent carinulae, slightly constricted beneath median ocellus. Facial carinulae in profile straight, sloping slightly backwards; eyes large, strongly convex, from above close-set and separated by a distance equal in length to first antennal segment; ocelli large, lateral ones situated on raised carinate projections.

Pronotum short, broadest at posterior margin which is scalloped, whole upper surface finely wrinkled, feebly tuberculate and lustrous; median carina disappearing in middle of dorsum, represented by longitudinal callosities at anterior and posterior margin of pronotum; lateral carinae also evident as marginal convexities only; dorsum of pronotum crossed by two fine transverse sulci, basal one fused to anterior one; posterior margin of metazona in middle slightly raised and excised; lateral lobe of pronotum longer than wide; mesonotum almost completely hidden by pronotum; metanotum rugulose and sculptured. Prosternal tubercle, transverse, laminate, acutely triangular in section; mesosternal interspace widely cup-shaped with truncate lateral lobes; metasternal interspace almost obliterated, partly fused to mesosternal interspace. Anterior and middle legs with femora feebly inflated and carinate; hind femur stout with convex external surface, regular fish-bone pattern and with dorsal carina feebly toothed in basal half; hind tibia with six outer and seven inner spines, arolium about equal in length to claw.

First abdominal segment strongly sculptured and fused to metanotum, other abdominal tergites feebly rugulose with a series of low tubercles located along middle and sides of each segment. Supra-anal plate triangular with long acutely tapering apex; cercus small, conical. Subgenital plate small, conical with broadly rounded profile and blunt apex; epiphallus with curved bridge, stoutly hooked lophi and erect, pointed ancorae.

General body colour pale sandy-brown, head, face and pronotal pleura pale ivory-white; fore and middle legs also white but with scattered black patches; hind femur ivory-brown becoming black towards knee and crossed by a wide preapical fascia; tibia pale white, spurs capped with black.

♀ - PARATYPE: Larger, more inflated but less sculptured than male, integument finely punctured over dorsal surface; fastigium of vertex wider, frontal ridge feebly depressed with low obtuse lateral margins, shallowly sulcate with surface wrinkled and contorted above median ocellus. Metathorax strongly widened; supra-anal plate triangular with more rounded apex than male. Ovipositor valves slender, strongly curved at apices, lower pair with



Lithidium desertorum spec. nov.

♂ - type. Fig. 1, whole insect, dorsal view. 2, sternum. 3, end of abdomen, dorsal. 4, phallic complex, dorsal. 5, face. 6, epiphallus. 7, end of abdomen, lateral.

small acute, tooth-like externolateral projections; subgenital plate flat with triangular median and lateral lobes.

General body colour similar to male but with more white.

Measurements: Length of body: ♂ 7.2-7.6, ♀ 10.8-12.0; pronotum: ♂ 1.1-1.3, ♀ 1.9; hind femur: ♂ 4.7-5.0, ♀ 6.2-6.5 mm.

The paratypes are fairly uniform, exhibiting only slight variation in degree of sculpture of the thorax and development of transverse sulci of pronotum, sometimes these are indistinct. The body colour also varies, two of the males have the metathorax and first abdominal segments lustrous black while in another the entire body is pale yellow.

Material examined: SOUTH WEST AFRICA: Central Namib, Game Reserve No. 3, 18 m. N. E. Gorab Mine, 12-18.V.1959, five ♂♂, four ♀♀ and two nymphs (including the type). All H. D. Brown, W. Giess, R. F. Lawrence and L. Vári leg.

This species is probably closest to *L. pusillum* possessing also the scalloped hind margin of the pronotum and triangular supra-anal plate. However, it is at once distinguished by the smaller, more slender body; sulcate and narrow frontal ridge with straight, parallel lateral carinulae; closely set compound eyes and slightly different epiphallus form.

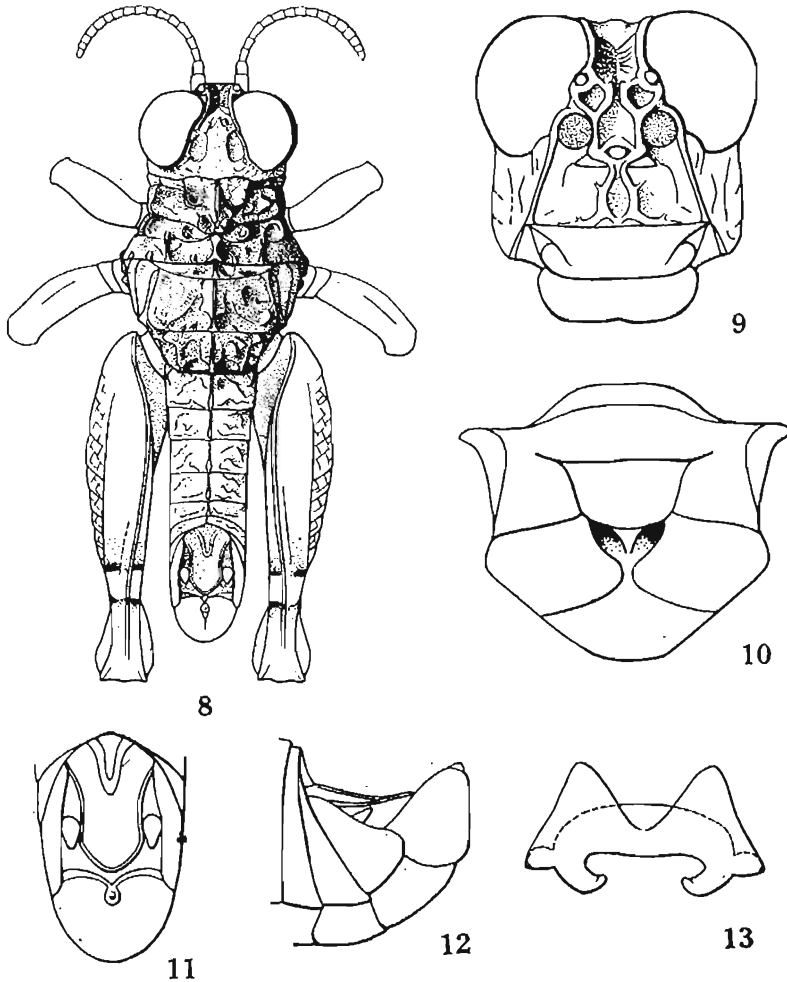
NOTES ON HABITAT: A general description of the locality will be given elsewhere and needs no repetition here (Brown, in press). The small series were all collected in open areas upon compacted, wind-sorted quartz and sandstone gravel. A diligent search indicated that they were fairly scarce, occurring singly here and there upon the plain. Feeding was noted upon the leaves of a small annual *Aristida* grass species which sparsely dotted the plain. The insects are mimetic and not easily detected as they sit immobile amongst the stones and attention is drawn to their presence only when disturbed. Like other members of the genus they are very agile, leaping considerable distances for their size.

Lithidium punctifrons spcc. nov., figs. 8-13

Principally distinguished by its more sculptured body, large subocular cavities of the face, protruding fastigium of vertex, blue coloration of hind tibia and very distinctive epiphallus.

♂-TYPE: Antenna with 17 filiform segments about as long as head and pronotum together. Head above with lateral irregular depressions behind eyes; fastigium of vertex short, slightly concave and protruding forwards, laterally with strong carinulae which merge anteriorly with those of frontal ridge; frons in profile almost vertical, frontal ridge in upper half with deep sulcus which is continuous with one of vertex, with strong carinate margins dividing below lateral ocelli to form two large circular cavities; eyes large, strongly convex separated by a distance equal to about one and a half length of first antennal segment; ocelli well developed.

Pronotum short, strongly rugulose and tuberculate, median carina partly obliterated in middle forming raised tubercle at posterior margin of pronotum; lateral carinae incompletely developed, evident as low parallel callosities; posterior margin straight, unadorned; dorsum of pronotum with deeply impressed transverse sulci, deeper on lateral lobe. Prosternal tubercle transverse, from above curved; mesosternal interspace transverse, cup-shaped, lateral



Lithidium punctifrons spec. nov.

♂-type. Fig. 8, whole insect, dorsal view. 9, face. 10, sternum. 11, end of abdomen, dorsal. 12, ditto, lateral. 13, epiphallus.

lobes with truncate margins; metasternal interspace compressed and deeply pitted. Anterior and middle legs with thickened femora; hind femur also very stout, convex, in upper half cellular, in lower with normal fish-bone pattern.

First abdominal segment strongly sculptured; supra-anal plate elongate, strap-like, somewhat constricted in middle with parabolic apex and basal convexity; cercus conical, large for the genus; subgenital plate short, upcurved with attenuate sub-acute apex. Epiphallus with incurved hooked lophi and very large triangular ancorae.

General body colour dull brown with some scattered black dots; face and lower margin of hind femur white; hind femur with a black preapical transverse stripe, internal disc with black patch towards knee; fore and middle legs with narrow black fasciae. Hind tibia pale blue, spines with black apices.

♀ - PARATYPE: Similar to male but larger and more spindle-shaped; eyes separated by a space about three times length of first antennal segment; supra-anal plate broadly triangular with acute apex, divided across middle by transverse ridge; ovipositor valves moderately slender with curved apices, lower pair with broad externolateral projections; subgenital plate with acute apex and sinuous sides. General body colour blackish-brown.

Measurements: Length of body; ♂ 7.2-8.5, ♀ 9.9-12.5; pronotum: ♂ 1.1-1.3, ♀ 1.5-1.9; hind femur: ♂ 4.8-5.1, ♀ 6.1-6.9 mm.

While the paratypes vary in colour from brown to dark slate-grey they are structurally surprisingly uniform.

Material examined: SOUTH WEST AFRICA: 8 m. N. Keetmanshoop, 2.V.1959, one ♀; 4 m. E. Ariamsvlei, 12.II.1959, one ♂; Karasburg, 11.II.1959, three ♂♂ and seven ♀♀; 29 m. S. Aroab, 10.II.1959, one ♂ and one ♀.

SOUTH AFRICA: 14 m. W. Rietfontein (Gordonia Distr.), 10.II.1959, five ♂♂ and eight ♀♀ (including the type). All H. D. Brown and A. S. Steenekamp leg.

NOTES ON HABITAT: This distinctive little species was collected from areas of loose stony rubble on low undulating hill slopes with a sparse bush cover consisting of *Rhigozum*, *Monechma* and *Catophractes*, the stony spaces between the bushes scantily sown with tufts of grass. The colour of these insects matches very closely the stony ground and specimens collected from localities where the stones were brown (sandstone), red (dolerite) or grey (shales) all exhibited a similar colour resemblance. Combined with their stone-like form and minute size this camouflage makes them difficult to detect on the uneven ground. When disturbed they are able to leap distances of up to five feet or so and when persistently pursued make several such leaps and often escape. Sometimes however, it is possible to follow their direction and even landing point because they strike the rocks with an audible click. In habits they are geophilous but sometimes in the early afternoon when the rock surface becomes very hot (often reaching 140° F.), several were observed perching on the lower twigs of the bushes in the shade, others also found shelter in the small patches of shade in the lee of the rocks. When disturbed from these

refuges they readily leap onto the hot stones but walk across them hurriedly with the body well raised off the surface upon extended middle and fore legs.

All were caught by dropping a net over them while they sat at rest amongst the rocks. Pairing was observed but when approached the couples proved exceptionally alert and rapidly separated. In cages they fed on several grasses but within a short while the specimens all died without ovipositing. At Rietfontein they were seen feeding on green shoots of *Enneapogon* grass.

Lithidium pusillum Uvarov, 1925

1925. *Ann. Natal Mus.* 5(2): 177 (♀-type); Brown, 1960, *J. ent. Soc. S. Afr.* 23(1):135 (♂-metallotype).

SOUTH AFRICA: N. W. Cape Province: Kenhardt, February 1957, two ♀♀ (including the type), leg. Division of Entomology, Pretoria; Jagbult (Prieska Distr.), 1946, one ♀ (A. L. Reyneke); Pofadder-Kenhardt Road, November 1955, one ♂ and one ♀ (A. Lea and J. A. Buys); Fransenhof, 23.XI.1957, three ♂♂ and four ♀♀ (J. H. Kruger); same locality and date, one ♂ and four ♀♀ (A. L. Reyneke); Namaqualand: Vanrhynsdorp, 1.V.1960, one ♂ and 32 m. N. E. Okiep, 2.V.1960, one ♂ and one nymph (H. D. Brown). SOUTH WEST AFRICA: Lüderitzbucht, one ♀ and one nymph; Otjimbingue (Karibib Distr.), one nymph; no locality, one ♀; all specimens without date or collector.

Lithidium rubripes Uvarov, figs. 14-18

1929. *Ann. S. Afr. Mus.* 29: 55 (♀-type)

SOUTH WEST AFRICA: Haris (?), 9.I.1916, one ♀ (type); another ♀ labelled only "Br. S.W. Africa"; both R. W. Tucker leg.

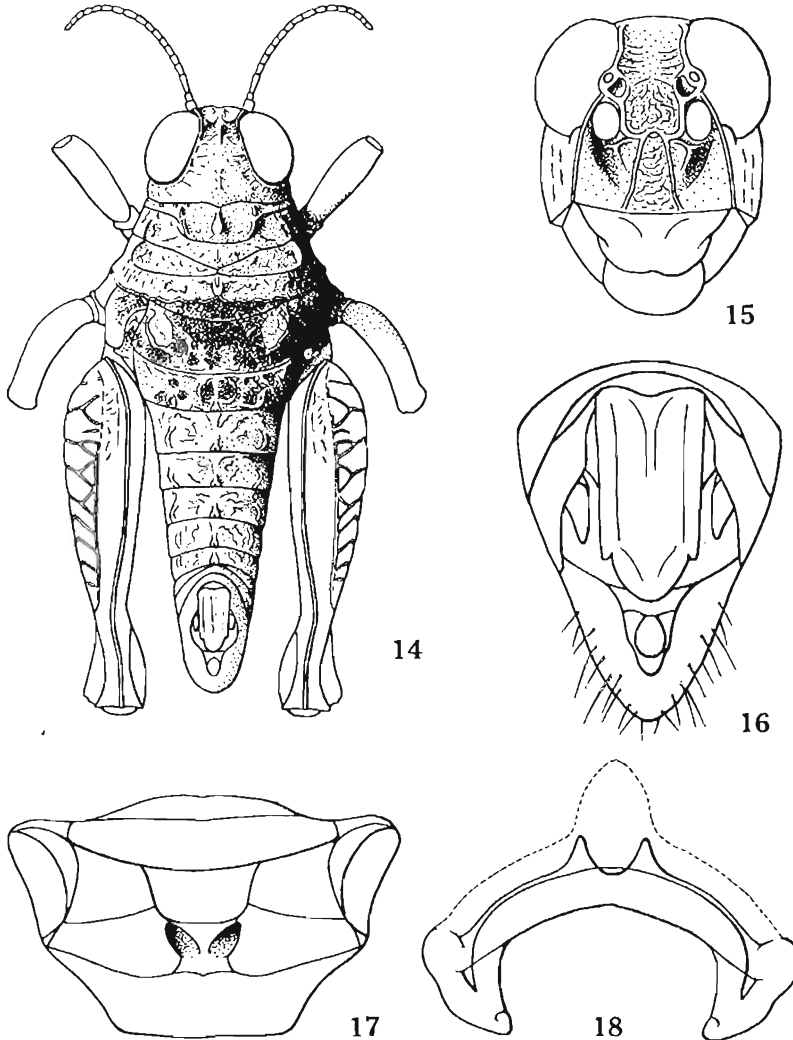
Some confusion arises over the type locality above as there are in the territory, two localities called Haris, one is south west of Windhoek and the other north east of Lüderitzbucht. Both are indicated on the map (see fig. 25).

The hitherto unknown male is described below:

♂-METALLOTYPE: Smaller and less inflated than female, body moderately sculptured, coarsely punctured in metathorax, ventral surface covered with coarse white pubescence. Antenna with 18 segments; fastigium of vertex narrower than female, between eyes twice as wide as length of first antennal segment, sloping roundly in front with slightly raised lateral margins; frons in profile, slightly excurved, frontal ridge strongly constricted at median ocellus, parallel above and divergent below, forming small circular depressions below lateral ocelli: surface of ridge flat and wrinkled.

Pronotum with undulating posterior margin, lateral carinae evident in prozona as small disconnected callosities; metanotum very inflated; surface of meso- and metanotum densely and coarsely punctured; prosternal tubercle rounded in section, callose and collar-like; abdomen with more sculpture than metathorax, each tergite with small median and lateral tubercles, first segment with scattered punctures. Supra-anal plate strap-like with parallel sides and

with two small lateral tooth-like projections just before rounded apex; cercus short, conical; subgenital plate laterally compressed, rounded in profile. Epiphallus bridge-shaped with ancorae closely approximated, lophi large, distinctively bifurcate basally where fused to lateral plates.



Lithidium rubripes Uvarov

♂ - metalotype. Fig. 14, whole insect, dorsal view. 15, face. 16, end of abdomen, dorsal. 17, sternum. 18, epiphallus.

General body colour above whitish-brown (living specimens, I am told, were reddish-white, closely matching the colour of iron oxidized quartz), ventral surface, prosternal tubercle, thorax and abdomen, cherry-red. Middle and fore legs brown; hind tibia cherry-red, the apices of the spines capped with black.

Measurements: Length of body: 12.8; pronotum: 2.2; hind femur: 7.4 mm.

The three females from the same locality measure respectively: body: 16.7, 16.9, 17.7; pronotum: 3.5, 3.1, 3.2; femur: 9.0, 9.5, 8.8 mm.

Material examined: SOUTH WEST AFRICA: 80 m. S. Gobabis on Nossob River, 30.XII.1960, one ♂ and three ♀♀ (W. D. Haacke).

This is a large species which is adequately distinguished from all others by its characteristic supra-anal plate, distinctive epiphallus, red tibiae and ventral surface. The colour of the tibia of one of the females is somewhat faded, the red only visible towards the apex. It is, therefore, sometimes necessary in checking this character to examine the appendages carefully under high magnification.

The affinities of this species probably lie with *punctifrons* with which it shares such characters as the facial cavities, strap-like supra-anal plate and coloured hind tibia. It agrees however with *pusillum* in having the posterior margin of the pronotum with an undulating margin.

NOTES ON HABITAT: The insects were collected from undulating ridges of compacted grit and gravel covered by a sparse stunted growth of *Acacia detinens* Burch. and *Phaeoptilum spinosum* Radl. bushes.

Genus *LITHIDIOPSIS* Dirsh, 1956

Type species: *L. carinatus* Dirsh

This genus was recently established by Dirsh (1956a) and based on the distinct species *carinatus* and *rugulosus* Dirsh which are known from females only; the genus is distinguished from *Lithidium* on differences afforded by the stronger body sculpture, protrusive frons and mesosternal shape. Such structural differences, however, are also found in species of *Lithidium* (cf. *punctifrons*, figs. 8 and 10 with *carinatus*, figs. 19 and 21). The epiphallus of the newly described male of the type species *carinatus* is, moreover, very similar to that of some *Lithidium* species (cf. *desertorum*, fig. 6 with *carinatus*, fig. 24), while its type species has also a similar epiphallus.

The two genera *Lithidium* and *Lithidiopsis* therefore intergrade and their points of difference are considered to be probably insufficient to separate them at the generic level; *Lithidiopsis* will probably prove to be a synonym of *Lithidium*.

Before establishing such synonymy, however, it is necessary to exercise caution because *Lithidiopsis carinatus* is described from a female and the only positive method of associating the correct male is collecting them in copula or rearing them from eggs. There is the possibility that the present

determination of the male of *carinatus* is incorrect, referring perhaps to some other species. In view of this, it is therefore advisable to leave Dirsh's generic assignment unaltered until more material becomes available. Should such evidence support the present diagnosis then *Lithidiopsis* must undoubtedly fall as a synonym of *Lithidium*.

Lithidiopsis carinatus Dirsh, figs. 19-24

1956, *S. Afr. Animal Life* 3: 169 (♀-type).

SOUTH AFRICA: Richtersveld, January 1923, one ♀ (S. E. Small).

There appears to be an error in the type locality of this species for the Richtersveld lies to the south of the Orange River and is therefore not in South West Africa as originally published but in Namaqualand. There is another female in the Transvaal Museum from SOUTH WEST AFRICA: Brandberg, Damaraland, July 1951 (E. Scherz).

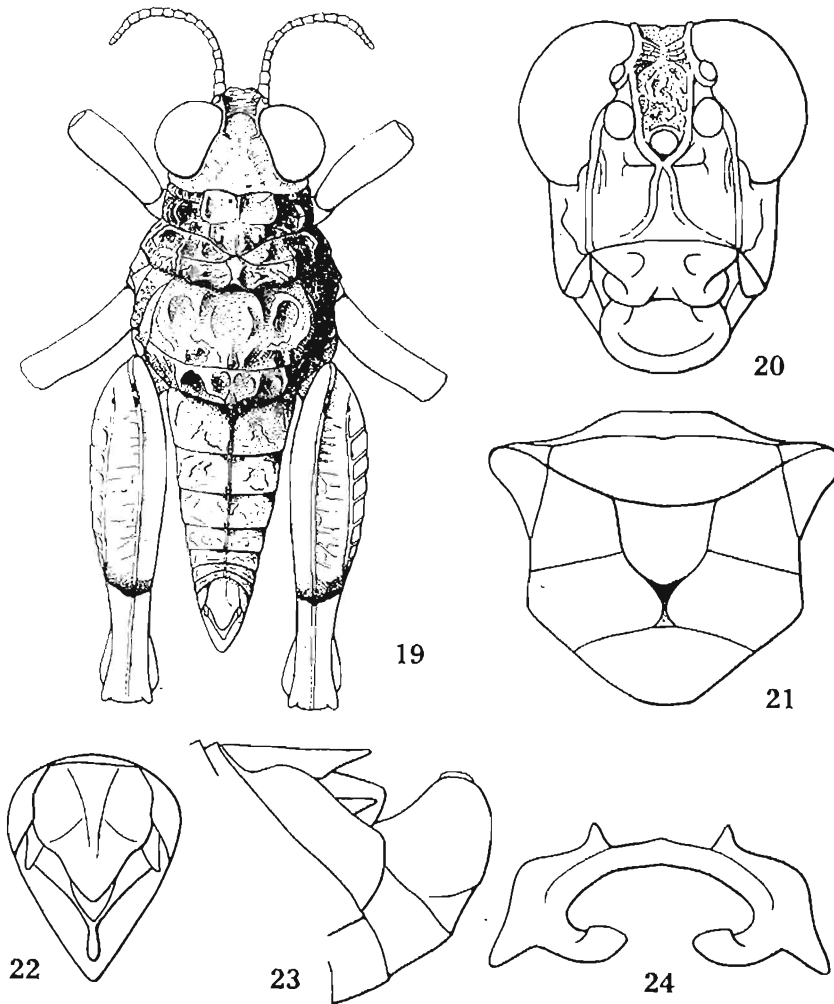
After comparing the ♀-type of *carinatus* in the British Museum (Nat. Hist.) with males in my collection I believe them to be conspecific. The description of the newly discovered male is given below.

♂-METALLOTYPE: Small with strongly sculptured and tuberculate body, slightly inflated in middle. Antenna with 17 filiform segments; fastigium of vertex short and broad, protruding in front, with concave dorsal surface and strong lateral carinulae; occiput with irregular lateral depressions; frontal ridge, with rugose surface, in upper half sulcate. broad with strong lateral carinulae continuous with those of fastigium of vertex, in lower half strongly constricted immediately beneath median ocellus, diverging above clypeus: facial carinulae strongly developed, in profile almost straight; eyes strongly convex, from above separated by a space twice as long as first antennal segment; ocelli well developed, lateral ones located on conspicuous tubercles.

Pronotum widest at posterior margin which is slightly raised and excised in middle: median carina strongly developed towards margins, indistinct in middle of dorsum, crossed by two fine transverse sulci; lateral carinae in prozona evident as parallel convexities; dorsum strongly tuberculate and rugulose. Metanotum comparatively little sculptured; prosternal tubercle broadly transverse, rectangular in profile; mesosternal interspace cup-shaped, lateral lobes rectangular with truncated margins; metasternal interspace fused to mesosternal one, partly obliterated and with deep lateral pits. Legs with fore and middle femora swollen and rugulose; hind femur broad, strongly convex with coarse granular fish-bone pattern. upper carina in apical half below knee dentate.

First abdominal segment fused to metathorax with strong tubercles converging posteriorly; remaining segments less tubercular, but with strong median ridge running down middle; supra-anal plate triangular with median longitudinal ridge; cercus small and conical; subgenital plate laterally compressed, upcurved with blunt rounded apex; epiphallus with curved bridge, hooked lophi, strong lateral projections and short erect ancorae.

General colour pale sandy-brown, face and base of hind femur white; anterior margin of pronotum, tibiae and tarsi of fore and middle legs and first abdominal segment all black; internal disc of hind femur with black patch, knee with black transverse fascia.



Lithidiopsis carinatus Dirsh

♂ - metalotype. Fig. 19, whole insect, dorsal view. 20, face. 21, sternum. 22, end of abdomen, dorsal. 23, ditto, lateral. 24, epiphallus.

Measurements: Length of body: 8.6; pronotum: 1.6; hind femur: 5.2 mm.

There is another male available which agrees very well with the description above but differs in being much larger, its measurements are: body: 11.1; pronotum: 1.8; hind femur: 6.4 mm.

Material examined: SOUTH WEST AFRICA: 40 m. E. Swakopmund, 11.V.1960, one ♂ (A. Port). SOUTH AFRICA: Namaqualand: 32 m. N. E. Okiep, 2.V.1960, one ♂ (described as metallotype above), H. D. Brown leg.

NOTES ON HABITAT: The Okiep specimen was collected from a very arid plain of coarse gritty red sand with scattered outcrops of crumbling white quartz. The insect was found amongst the pebbles of quartz near a small community of *Salsola* bushes. It proved to be a very powerful jumper and was caught after much difficulty. Of the large specimen I have no information except that it was collected from an area of recent rainfall in the stony plains of the Namib Desert.

Lithidiopsis rugulosus Dirsh

1956, *S. Afr. Animal Life* 3: 171 (♀-type).

SOUTH WEST AFRICA: Kaokoveld, 15 m. S. Anabib (Orupembe), ± 100 m. W. Ohopoho. 9.VI.1951, one ♀ (type), Swedish Expedition to South Africa. This specimen was collected by the expedition at locality No. 331 (Brink & Rudebeck 1955, p. 97) which reads: "Semidesert. Dry sandy river bed. Gravelly hill plateau covered by pebbles. Almost no vegetation."

The type is known to me from description only, and is preserved in the Entomological Museum, Lund University, Sweden. It is distinguished from *carinatus* by its less sculptured but more inflated body, convex fastigium of vertex which has no lateral carinulae, differently shaped frontal ridge and low uninterrupted median carina of pronotum.

The male is yet to be described.

GEOGRAPHIC DISTRIBUTION

Since nothing more than incidental collecting of this group has been made, any study on distribution must necessarily reflect more closely the poor collecting rather than the true limits of distribution of the species concerned. The records from the Koakoveld (northern South West Africa) for example represent the results of but a single collecting expedition. Nevertheless, despite these limitations it is clear that all the species have a decided westerly distribution (see fig. 25).

Seven species belonging to the two genera *Lithidium* and *Lithidiopsis* are known from Southern Africa: all inhabit arid, pebble-littered areas where the vegetation is restricted to a few dwarf shrubs and some annual grasses. The majority of the species are consequently distributed along the arid littoral belt which extends down the west coast from Angola to Namaqualand. This

is a zone which experiences a very scanty and irregular rainfall, often less than five inches per annum, and interrupted by prolonged periods of drought with sometimes many years elapsing between periods of florescence. The ecological tolerance of these insects with the ability to survive in such harsh conditions must be truly remarkable.

The paucity of records does not make it possible to remark accurately upon the distribution of most species, but one, *Lithidium pusillum* deserves mention as it has been tolerably well collected. The map indicates that it is relatively widely distributed. It has been collected from coastal South West Africa in the west and from Fransenhof (Prieska District) and Postmasburg

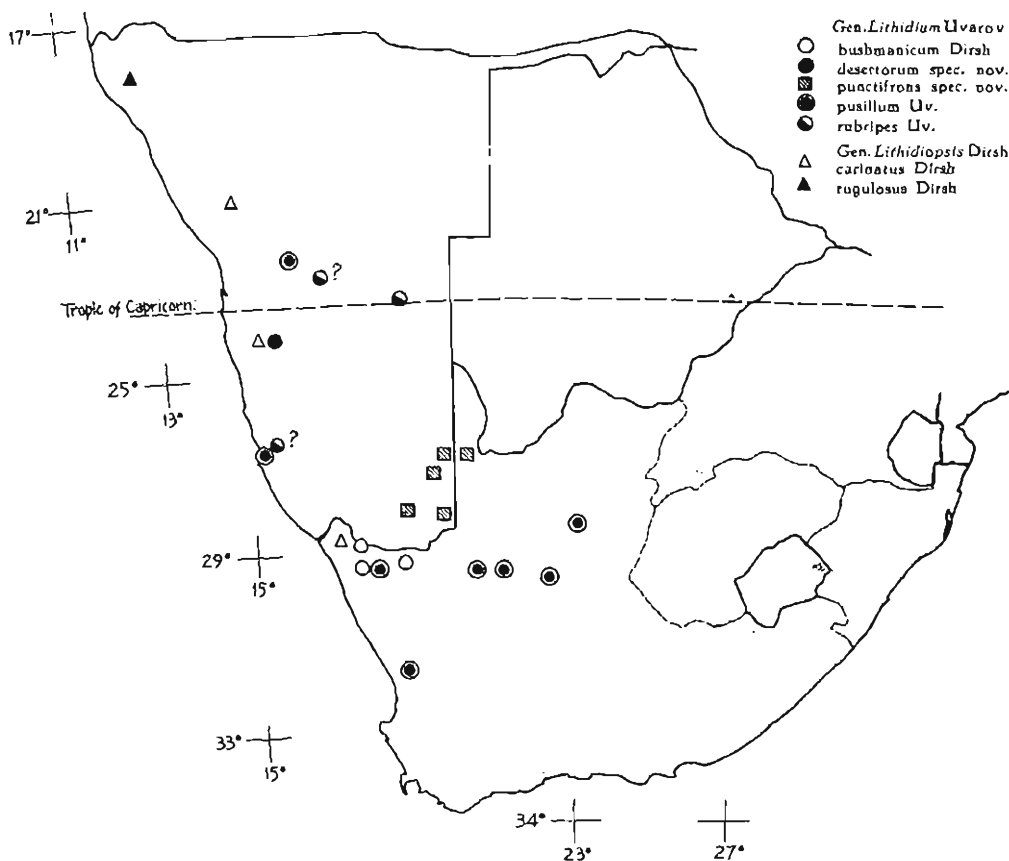


Fig. 25. Distribution of the genera *Lithidium* Uvarov and *Lithidiopsis* Dirsh in Southern Africa.

in the east, and its southern limit is Vanrhynsdorp. In distribution it exhibits therefore a fairly wide ecological amplitude existing in the arid coastal strip as well as the northern parts of the Cape Province where the rainfall is of a more reliable nature averaging about nine inches per annum. *Lithidiopsis carinatus* is also fairly well distributed along the coastal strip extending from Brandberg in the north to the Richtersveld in the south. In contrast, the available data indicates that the other species are all relatively localized with a disjunct distribution.

Although the northern limits of the group are vague, their eastern limits can be indicated with a fair degree of accuracy as the central parts of the Cape Province have been adequately collected and they appear to be absent from this area. Southwards, they extend along the west coast into Namaqualand and appear to peter out in the Vanrhynsdorp area.

The group is not connected with any species outside Southern Africa and must be regarded as a true endemic to this region.

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