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A NEW SPECIES OF *DNOPHERULA* FROM KENYA (Orthoptera, Acrididae)

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INTRODUCTION

In 1986 and 1991, the author visited Nairobi (Kenya) and sampled there some small grasshoppers belonging to Gomphocerinae (=Truxalinae) showing a fronto-vertical angle of more than 45°, pronotum with median and lateral carinae, prosternum without projection, tendency to brachypterous, radius of tegmen (elytra) projecting as a part of stridulatory mechanism. In both sexes, a stridulatory ridge (file) with pegs is visible on inner side of hind femora. Opening of tympanal organ is present. Penis is of moderate length. Epiphallus showing bridge, anchorae and lophi (compare Dirsh 1965, Hollis 1965/66, Uvarov 1966, Jago 1971, Harz 1975).

The genera of Gomphocerinae can be adequately defined only on a combination of characters if at all, and most related genera were established by numeric analysis (Jago 1971). For African gomphocerine genera (south of Sahara), Jago (1996) published a useful key. He divided the subfamily Gomphocerinae into two groups of genera geophilus and phythophilus, by means of the fronto-vertical angle. Regarding the gomphocerine genera from Africa, the phytophilous group has a fronto-vertical angle of 40° or less, and the geophilous group a larger one, mostly greater than 45°.

The geophilous gomphocerines of Africa have the following attributes:

- antennae usually less elongated and certainly never broadly expanded basely over segments 3-10;
- head rounded in profile, angle between frons and vertex being greater than 45°;

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- eyes oblique or with their longest axis nearly vertical to longitudinal body axis;
- eyestripes, if present, vertically orientated at right angles to the horizon when the insect assumes its normal resting position parallel to the ground;
- hind femora comparatively powerful, often swollen bilaterally and expanded vertically. Hind tibiae sometimes with elongated apical spurs on inner side;
- tegmina or subgenital plate (in males) bluntly pointed or rounded.

These studies based on the material preserved in NRI (Chatham) and NHM (London).

Following the group division of Jago (1996), the collected individuals from Kenya belong to the group with a greater angle(> 45°). A fronto-vertical angle was recorded between 60-70°, in females greater than in males, showing a geophilous behaviour of the species. Regarding the generic identification, the keys presented by Hollis (1965/66)and Jago (1996) showed that the *Dnopherula* complex was involved. The genus *Dnopherula* s. str. was characterised by a pronotal disc constricted in prozona with lateral carinae cut by transverse sulculi. Lateral carinae are weak in metazona but delineated by black pigment giving characteristic cross-shaped marking in most specimens.

In the genus *Dnopherula* Karsch, 1896, nine species were confidently allocated by Jago (1996):

D. callosa Karsch, 1896 (Nassaland; Malawi, Zimbabwe, Angola, Kenya), from Botswana (♂,♀) in author's collection, Palle Johnsen det.;

D. crassipes (Uvarov 1921), (S Africa);

D. obliquitrons (I. Bolivar 1912), (Uganda, Kenya, Zaire, Tanzania);

D. punctata (Chopard 1947), (W Africa, SW Tanzania);

D. descampsi Hollis, 1966 (Sierra Leone: Kukuna, Guinea, Kenya) (short winged);

D. phippsi (Llorente 1963), (Kabala, Sierra Leone);

D. pictipes (I. Bolivar 1912), (Zaire, W Tanzania, Sudan, Zambia);

D. richardsi (Uvarov 1953), (Tanzania; Zimbabwe, Zambia);

D. *backlundi* Hollis, 1966 (E Zaire, W Tanzania).

No species was fitting the specimens collected. A new species was created, named after the sampling site, *Dnopherula duduvillei* n. sp.

MATERIAL EXAMINED. Two males (holotype, paratype) and one female (allotype) were collected at Duduville near Nairobi, 1700 m a.s.l., on 10, 17.VII.1986, and one female (paratype), near the same place, on 30.VI.1991 on the Campus of the International Research Institute of Insect Ecology, Kenya. The insects were found on grassland near the shadow of higher plants. The population was small, so no more individuals could be collected, although, in summer 1991, the author stayed there for two days collecting grasshoppers.

For measurements of the tiny insects, drawings were made using a WILD binocular microscope. Photographs were taken by means of a STEMI 2000 C binocular (ZEISS) (magnification 40x) and a photocamera (MINOLTA) on KODAK-chrome EPY 64 film material.

Dnopherula d u d u v i l l e i n. sp.

DIAGNOSIS. Body small-sized in both sexes, in male body length one third shorter (fig. 1): Integument rugose and finely granulated. Antenna filiform, much shorter than length of head and pronotum together; in both sexes, middle antennal segments rounded as long as wide, sandy coloured.

TYPE MATERIAL. The male holotype, labelled Kenya, Nairobi, 17.VII.1986, G. H. Schmidt leg., was preserved, together with one male paratype and two females as paratype (allotype) and paratype in author's collection.

DESCRIPTION. Fastigium verticis parabolically rounded, almost flat, frontal part widened sloping concavely to behind, at 5° to long axis of body, and reducing transverse distance between lateral carnulae merging with faint carinulae of vertex; median dorsal carinula of vertex extending foreward to front rim of fastigium verticis, crossing weak transverse impression and merging with weak margin of vertex. Arcuate transverse sulcus (depression) being just behind its frontal rim. Light wide stripe, dorsally parallel lined, reaching hind margin of pronotum; Iight stripe behind complex eyes. Fastigial foveolae weak, not visible from above.

Frontal ridge narrowed, between antennal bases slightly diverging downward, generally flat, irregularly punctured, upper part somewhat convex. Temporal foveola area deeply impressed under rim of fastigium verticis expanded outward, thus foveola area situated below, directed ventro-Iaterally and deliminated ventrally by carinula in region just anterior to lateral ocellus (indistinct triangular shaped, not visible from above).

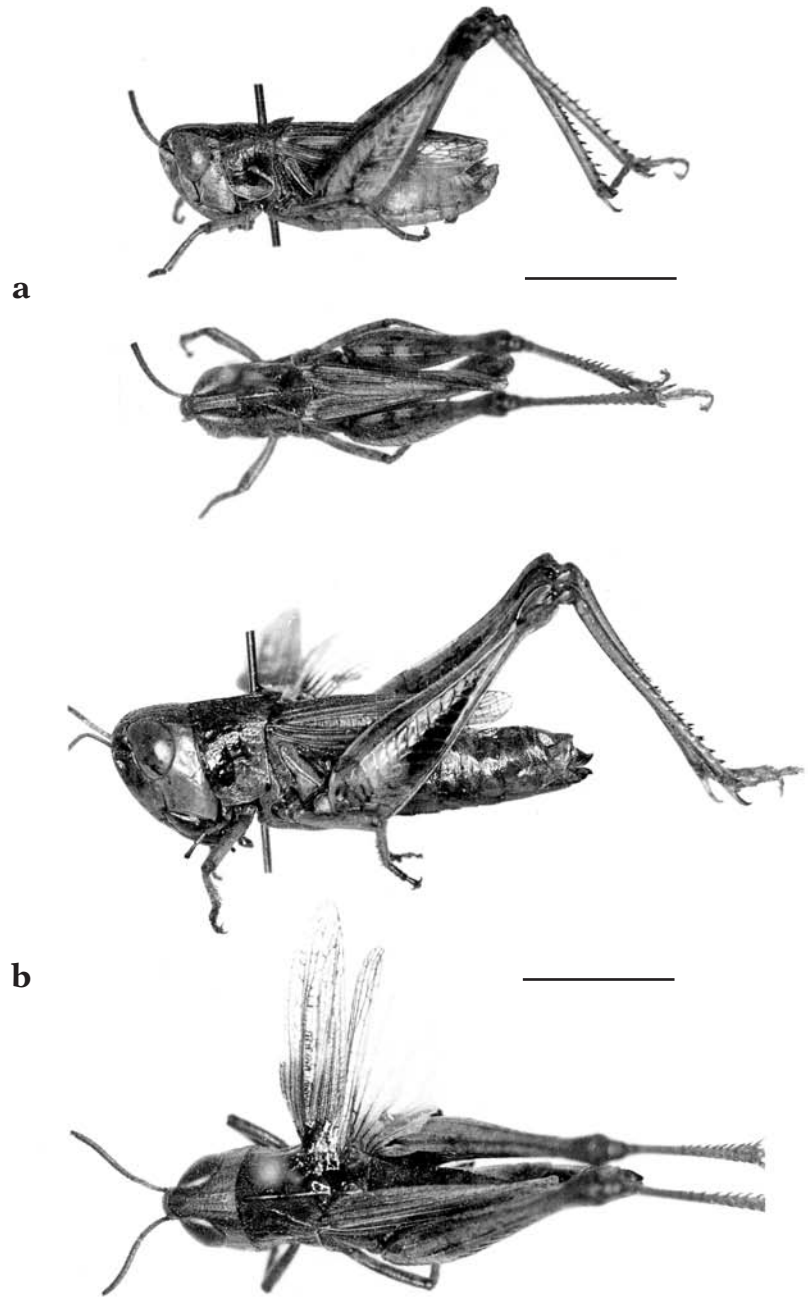

Fig. 1 – *Dnopherula duduvillei* n. sp.: male (smaller), paratype, antennae broken (a); female, paratype (both left side view and from above) (b). Scale bar: 5 mm.

Front margin of pronotum weak-convexly rounded; hind margin weak-angularly (about right-angled) rounded; on disc three transverse sulculi; pronotal disc constricted in prozona, with IateraI carinae cut by transverse sulculi; median pronotal carina straight, reaching hind margin of metazona, cut in midth by last transverse sulcus, prozonal length equal to metazonal; lateral carinae almost as powerful as median carina; pronotal disc strongly constricted in prozona, with three transverse sulculi; lateral carinae divergent in front of first transverse sulcus, then runnin-9 almost straight to lateral edge of hind margin; nearest width across pronotal prozona, about equal to half of greatest width of metazona; cut by two transverse sulculi (1st and 3rd); lateral carinulae most distinct in prozona, between 1st and 2nd sulculus and in metazona weaker delineated by black pigment and light markings in most specimens (fig. 2).

In male, paranotum with light oblique stripe in distal half, directing to distal edge (fig. 1 a), black marking in midth, in female more indistinct.

Mesosternal interspace very narrow in both sexes.

Tegmen and ala are developed in both sexes, semitransparent to transparent, but reduced in length. In male, tegmen reaching almost tip of abdomen; in female, apex of tegmen not surpassing tip of supra-anal plate, in female. Ala reaching roughly tip of tegmen in male, about one fifth shorter than tegmen in female; precostal area of tegmen widened basically; costal vein not confusing with strengthened precostal vein; costal area of tegmen widened reaching margin well beyond halfway, along front margin of tegmen; median area of. tegmen not greatly expanded (roughly same width of Cu 1 area); only traces of intercalata vein present (fig. 3).

On inner side of hind femora of both sexes, a short stridulatory file present. Posterior tibia little shorter than hind femur, somewhat swollen basically (quotient length/max.width 4.07 in female, 3.46 in male); hind femur with two dark markings media-dorsally, one near base, the other at about proximal one third of femur length, moving to midth; in male, weaker coloured than in female, but two further small dark spots in distal half of femur; tibia red-orange with about 10 strong, black-tipped spines, interiorly and exteriorly, black-tipped lower, inner, apical spur of hind tibia much longer than upper spur, straight in basal two-thirds and curved most distally in female; in male, curved in distal third; arolium moderately enlarged (fig. 4).

Fig. 2 – *Dnopherula duduvillei* n. sp. Above: male, holotype (right antenna and leg lost); below: head and pronotum of allotype (viewed from above). Scale bar: male 5 mm; female 1 mm.

Fig. 3 – *Dnopherula duduvillei* n. sp., female, allotype: right elytra with part of ala. Scale bar: 1 mm.

Fig. 4 – *Dnopherula duduvillei* n. sp., female, allotype; above: hind part of abdomen, mid: right hind tibia with long inner apical spur; below: inner side of right femur showing row of stridulatory pegs, situated on the inner lower margin of the inner area. Scale bar: 1 mm.

Tab. 1 – *Dnopherula duduvillei* n. sp., comparative measurements of body parts of male and female.

Body part (mm)	2 ♂ (holotype, paralectotype)	2 ♀ (allotype, paratype)
Body length	11.2, 12.0	15.2, 15.0
Antenna length	3.50	3.84
Head length	2.18	2.34
Head width	2.28	3.00
Interocular distance	0.70	0.835
Pronotum length	2.67	3.00
Posterior femur length	7.88	10.86
Posterior tibia length	6.72	8.35
Tegmen length	7.0	7.85
Ala length	6.60	6.68

Opening of tympanal organ large, round-oval, 1.3 times longer than wide. Cerci short conicle-chaped in female (fig. 4), longer, surpassing supra-anal plate in male. Valves of ovipositor strongly up- and down-curved. Sub genital plate in female enlarged laterally with short acute tip.

Discussion

For the tiny new *Dnopherula* species, the keys of Hollis (1965/66) and Jago (1996) led to *Dnopherula obliquifrons* (I. Bolivar 1912), which was sampled in Kenya, Shimba Hills, Tanzania and Angola. Totally, more than 60 males and 64 females were measured and regarded as conspecific by Hollis, showing similar pronotal structures as described by Jago (1996, fig. 23). But the new species was smaller, having shorter wings and antennae; hind femora of males were more powerful.

D. cruciata (Bolivar 1912), **comb. nov.**, was regarded as very variable and considered as colour forms by Hollis (1965/66). From Kenya, specimens were mentioned found at Kitale, Masai cis Mara, Ol denyo Mesereji, Ol Joroi Otowa Plain, Baringo, Mt. Kenya, Mt. Elgon, Kapenguria (Turkana), but all were bigger and more slender than the new species. Jago (1996) did not mention *D. cruciata*.

SUMMARY

A new species of the genus *Dnopherula* Karsch, 1896 (Gomphocerinae, Acrididae) was collected in Kenya, near Nairobi on grassland under bushes. The fronto-vertical angle of both sexes was much greater than 45^0 indicating a geophilous behaviour. The tiny insects have short antennae, swollen hind femora, specially in male, and strongly curved spurs on hind tibiae. The fastigium verticis had a parabolic shape, prozona and metazona of pronotum of equal length, median carina straight, lateral carina incurved, pronotal disc constricted, and lateral carina cut by transverse sulculi.

ZUSAMMENFASSUNG

Eine neue Art der Gattung *Dnopherula* Karsch, 1896 (Gomphocerinae, Acrididae) aus Kenya wird beschrieben. Die Individuen wurden bei Nairobi auf Grasland unter Gebüsch gefangen. Der fronto-vertikale Winkel ist in beiden Geschlechtern grösser als 45°, wodurch ein geophiles Verhalten angezeigt wird. Die kleinen Heuschrecken haben verkürzte Antennen, die hinteren Femora sind beim Männchen besonders verdickt und an der hinteren Tibia befindet sich ein langer, stark gebogener Sporn. Das Fastigium verticis hat eine parabole Form. Prozona und Metazona des Pronotum sind gleich lang. Der Mittelkiel ist gerade, das Pronotum in der Prozona verengt und die Seitenkiele sind von kleinen transversalen Einschnitten durchtrennt.

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