

A new species of *Physocrobylus* (Caelifera: Acridoidea: Acrididae: Coptacrinae), with notes on the phenology and habitat of the genus

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Abstract

A new species of *Physocrobylus*, *P. venetus* sp. nov., is described from the Nguru Mountains of Tanzania. It is the third species in the genus restricted to Tanzanian localities. While *P. venetus* sp. nov. and *P. tessa* Hochkirch prefer moister forest communities from lowland to submontane forest in the East Usambara and Nguru Mountains, *P. burtti* Dirsh is an inhabitant of Miombo woodlands.

Keywords

East Africa, grasshopper, lowland forest, submontane forest, Tanzania, taxonomy

Introduction

The genus *Physocrobylus* was erected by Dirsh (1951) on a single female collected in the Kiboriani Hills, Mpwapwa District of Tanzania. Dirsh placed it in Catantopinae. Jago (1978) assigned *Physocrobylus* to Euryphyminae and described the male of *P. burtti*. When Hochkirch (1996) detected a second species of the genus, *P. tessa*, in the East Usambara Mountains, the genus *Physocrobylus* was transferred to Coptacrinae because it shared a furcula and the transverse fold on the subgenital plate with this subfamily.

Up to now, few specimens of the two members of the genus *Physocrobylus* have been collected. In the entomological collection of London (NHML), besides the female holotype of *P. burtti*, there are a couple of specimens that were collected by Jago from a locality 44 miles north of Dodoma (East Chenene Forest Reserve). Hochkirch collected specimens of *P. tessa* in the East Usambara Mountains at Amani at an elevation of about 800–1000 m in protected patches of submontane to montane forest. The East Usambara Mountains were intensively surveyed by our team. Survey sites included several lowland wet forest reserves such as Magoroto Forest Estate, the Nilo Forest Reserve, and the Mtai Forest Reserve, as well as the Amani Nature Reserve, the Kwamkoro Forest Reserve, and other patches on the Amani plateau. Thus, more data on the distribution and the habitat requirements of *P. tessa* became available and are presented in this paper. A third species of the genus

was discovered in the submontane forests of the Nguru Mountains. *Physocrobylus venetus* sp. nov., a common inhabitant in the Nguru Mountains, is here described.

Material and methods

Measurements.—The total body length refers to the body length of the insect from head to the tip of the abdomen.

Depositories.—CCH: Collection of Claudia Hemp. NHML: Natural History Museum, London, UK.

Results

Physocrobylus venetus sp. nov.

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Type material.—**Holotype** male. Tanzania, Nguru Mountains, submontane forest, 1100–1200 m, 6.05336°S, 37.56076°E – 6.06702°S, 37.57339°E. June 2017. Depository: CCH.

Paratypes. 11 males, 13 females, 3 female nymphs, same data as holotype and February 2017, March 2017, November 2017, January 2018, March 2019, and March 2020. Depository: CCH.

1 male (NHML 013454600), 1 female (NHML 013454558), same data as holotype. Depository: NHML.

Description.—**Male.** General coloration: Dorsally broad brown fascia running over head, pronotum, and abdomen; this brown fascia medially with three fine white lines, interrupted at each segment; end of abdomen light brown and white lines obsolete. Eyes reddish. Legs green, hind knees dark, tibiae bright blue (Fig. 1A–C).

Head and antennae. Antenna about body length or slightly shorter; antennal segments much longer than wide. Eyes globular, strongly protruding. Fastigium verticis very narrow between eyes, appears only as a callous ridge; in front of eyes widening to rhomboid structure (Fig. 2A). Frontal ridge typical for genus, strongly projecting in front of eyes; shallow concave and punctured; carinae below the ocellus flat and almost obsolete.

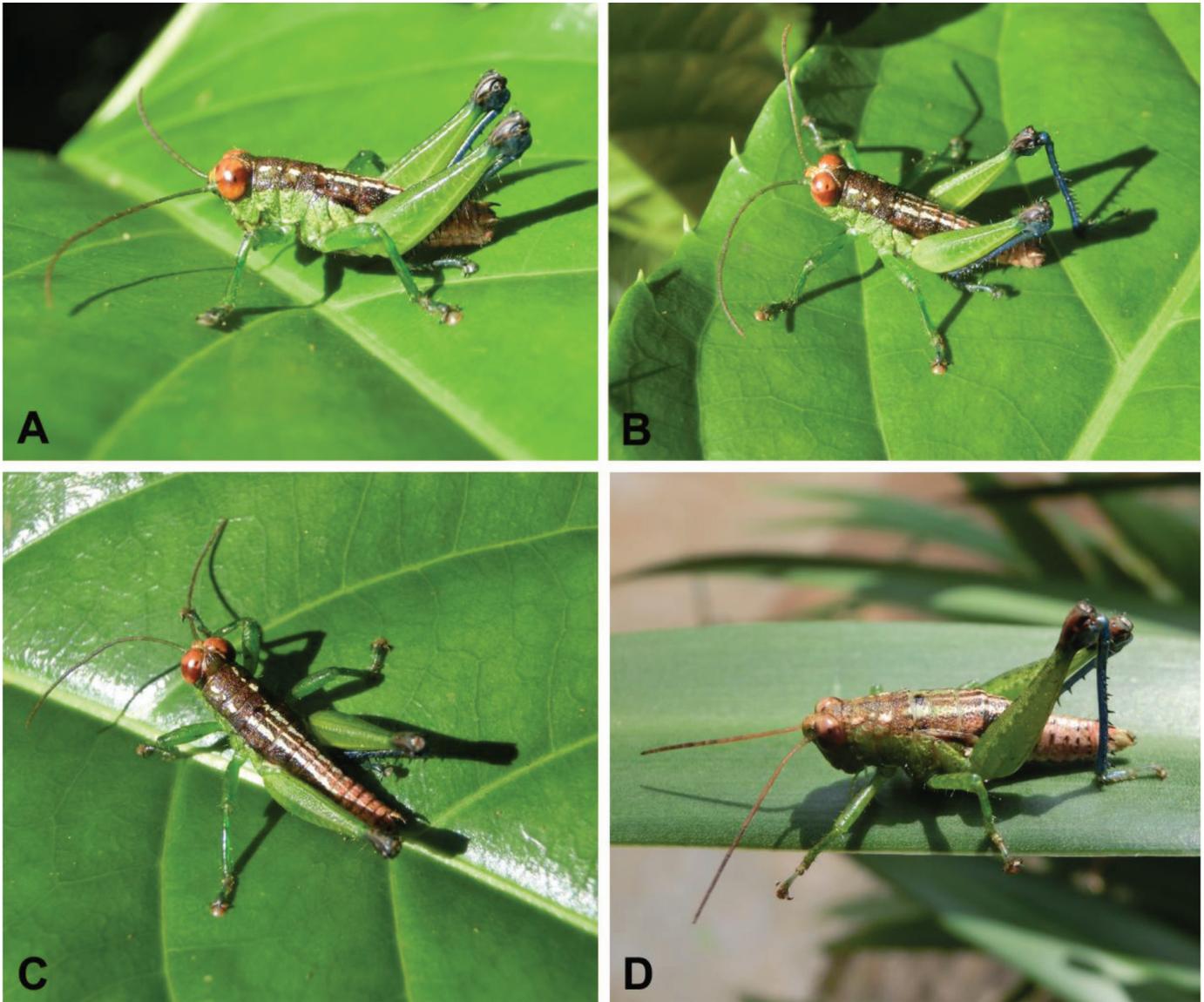


Fig. 1. *Physacroblytus venetus* sp. nov. A–C. Male; and D. Female.

Thorax. Thorax strongly wrinkled and impressed with dots, deeply crossed by two sulci; lateral carinae absent. Anterior margin evenly rounded; posterior margin medially incurved (Fig. 2A). Prosternal tubercle conical, laterally compressed. Tegmina strongly reduced, elongate lobes with narrow anterior part, slightly widening posteriorly, broadly rounded and with reduced venation (Fig. 3C). Alae absent.

Legs. Fore and mid femora round, with largest diameter in the middle; unarmed. Hind femora stout; unarmed. Fore and mid tibiae also roundish, unarmed except for black spurs; fore tibiae with three outer and two inner spurs, mid tibiae each with an outer and an inner pair of spurs. Hind tibiae with double row of dorsal long spines, white at the base, with black tips; on inner side, two large and laterally flattened spurs, on outer side, a pair of smaller but also enlarged stout spurs. Tarsi of light color; mid tarsal segment very short, the other two segments about 3 times as long as the middle one.

Abdomen. Supra-anal plate typical for Coptacrinae, elongate, tongue-like with elevated lateral margins and a rounded tip

(Fig. 4C). Furcula of 10th abdominal tergite well developed. Cerci slightly longer than supra-anal plate; inwardly curved and laterally slightly compressed. Subgenital plate with well-developed transverse fold. Epiphallus as in Fig. 5. Bridge divided (Fig. 5A), lophi curved, almost tri-angular with acute apices (Fig. 5C, D), posterior processes narrow and elongated with rounded apices, anterior processes rounded (Fig. 5A). Ancorae well developed (Fig. 5A).

Female. Coloration similar to male but duller and also with bright blue hind tibiae. Larger and stouter but with same spination of the legs (Figs 1D, 2C). Supra-anal plate elongate, anterior part sculptured (Fig. 6A). Subgenital plate broad with acute tip at posterior margin (Fig. 6B).

Measurements.—(mm) Males (n = 6). Body length: 14.7–16.7; Median length of pronotum: 2.5–3.4; length of tegmina: 3.1–3.7; length of hind femur: 10.1–11.2.

Females (n = 6). Body length: 20.1–22.0; Median length of pronotum: 3.7–4.2; length of tegmina: 3.5–4.3; length of hind femur: 14.0–14.5.

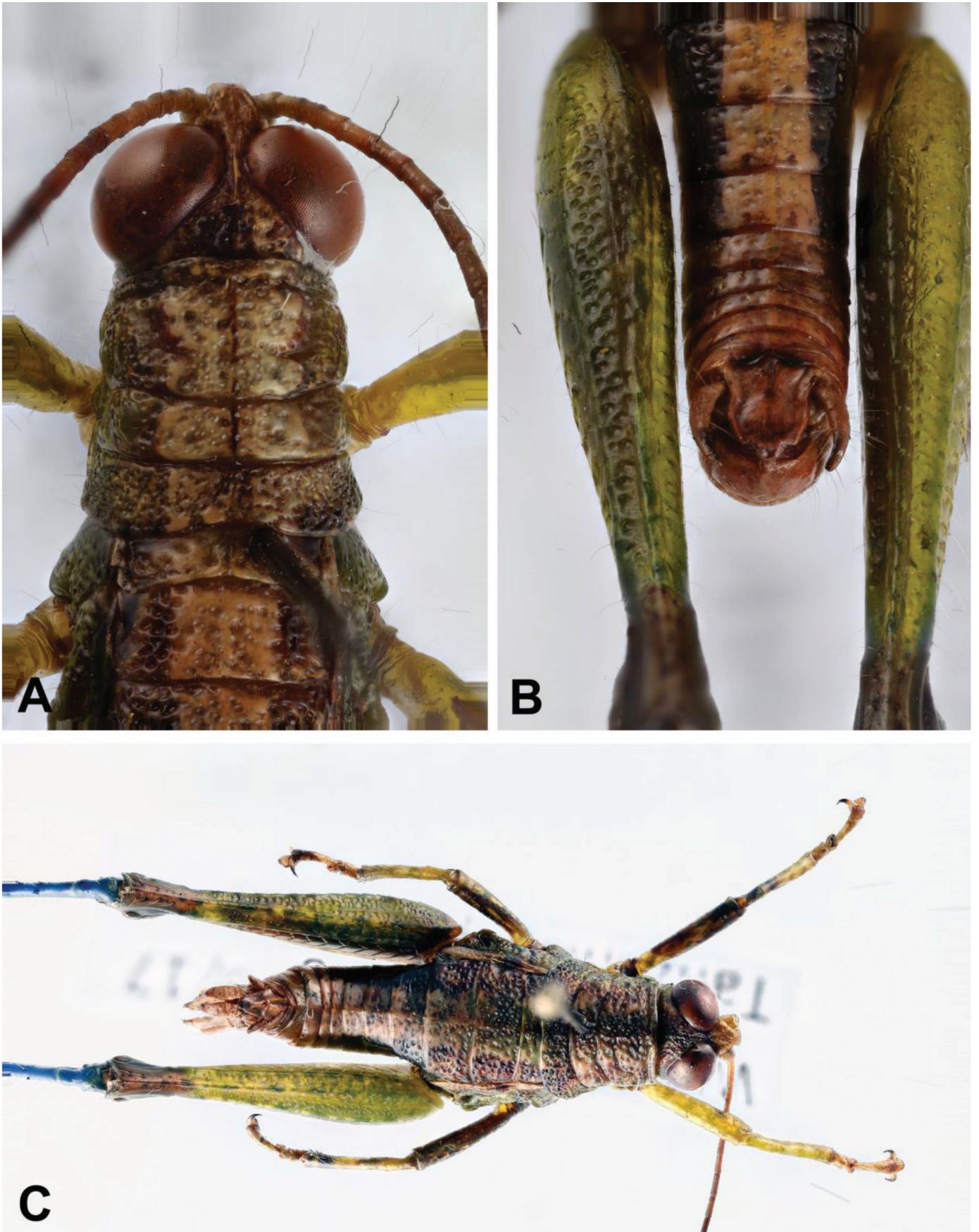


Fig. 2. Details of *Physicrobylus venetus* sp. nov. A. Male, head, dorsal view; B. Abdomen, dorsal view; and C. Female, dorsal habitus.



Fig. 3. Right tegmen of male *Physicrobylus* species. A. *P. burtti*; B. *P. tessa*; and C. *P. venetus* sp. nov.

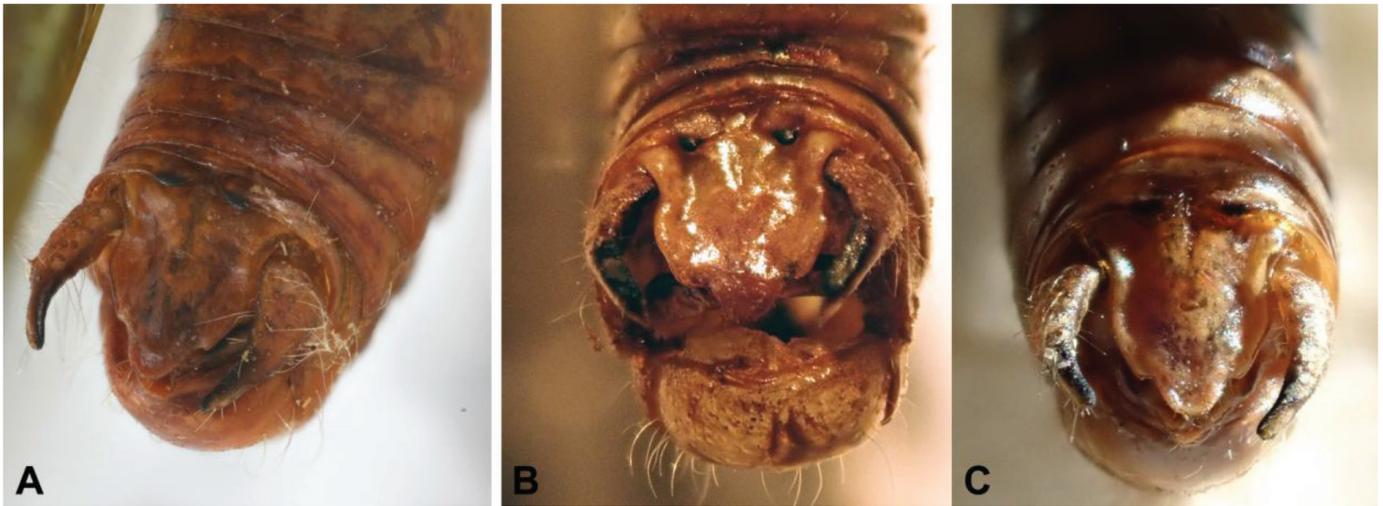


Fig. 4. Abdominal apices of male *Physicrobylus* species. A. *P. burtti*; B. *P. tessa*; and C. *P. venetus* sp. nov.

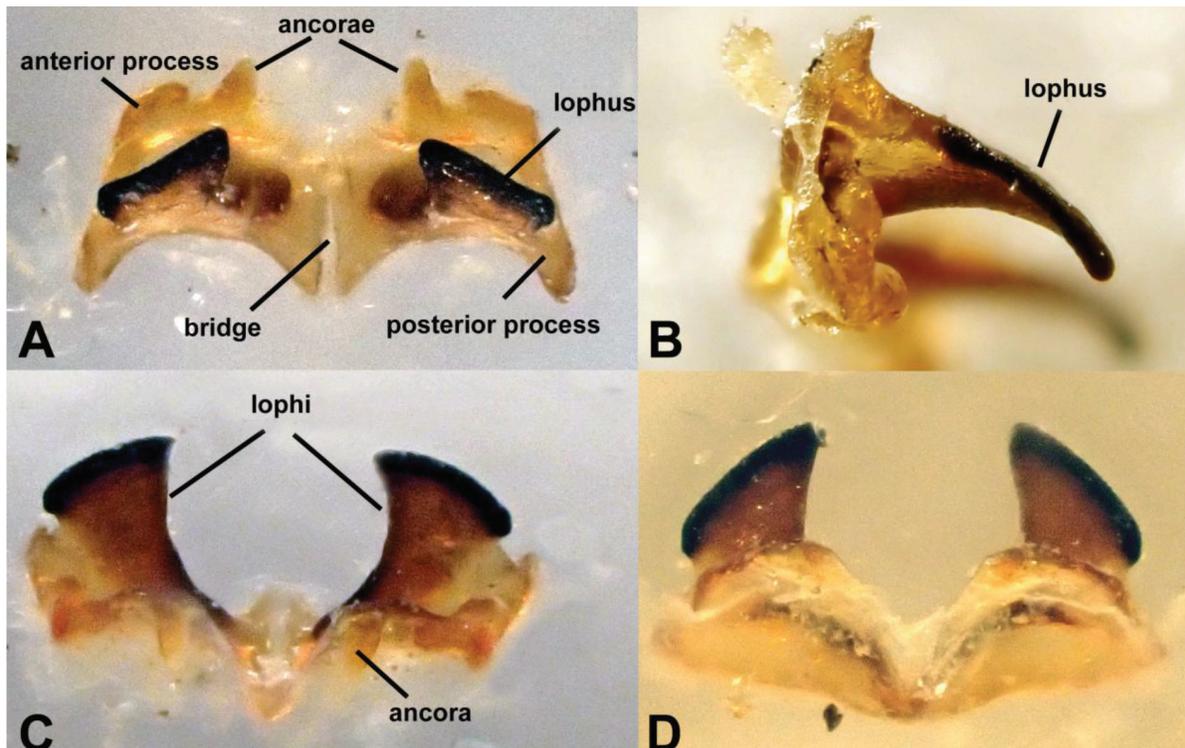


Fig. 5. Epiphallus of male *Physicrobylus venetus* sp. nov. A. Dorsal view; B. Lateral view; C. Anterior axial view as epiphallus is situated when looking at opened apex of animal; and D. Posterior axial view.

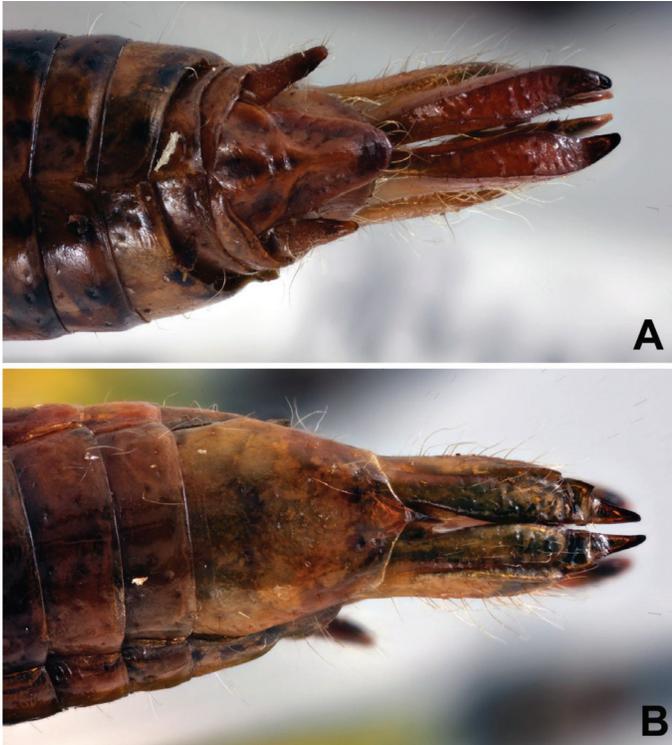


Fig. 6. Abdominal apex of female *Physocroblylus venetus* sp. nov. A. Dorsal view; and B. Ventral view.

Diagnosis.—In habitus and size, *P. venetus* sp. nov. is similar to *P. tessa* from the East Usambara Mountains but is less stout, while *P. burtti* is smaller and very stout (Fig. 7). Pronotum posteriorly not as wide as in *P. tessa*. Also, the coloration of *P. venetus* sp. nov. differs from both other *Physocroblylus* species. The femora are bright green in *P. venetus* sp. nov. while they are brown or speckled brown in the other two species, although specimens of *P. tessa* from the Nilo Forest Reserve population can also have partly dark green legs or speckled green legs (Fig. 7). Easily distinguished also by the bright blue tibiae in both sexes of *P. venetus* sp. nov., while *P. tessa* has brown to green hind tibiae and *P. burtti* has brown tibiae in both sexes. The tegmina in males of the three species are of similar shape, all reduced to elongate lobes with reduced venation (Fig. 3). However, *P. tessa* has slightly broader tegmina compared to the other two species. Differences are also found in the outer genitalic morphology of the males (Fig. 4). The male cerci of *P. burtti* are thick and rugose in the basal half with tips round and marked darker brown to black. The cerci of both *P. tessa* and *P. venetus* sp. nov. are laterally compressed, especially in the apical half, and darker to black at their tips. All three species have differently shaped epiphalli (see fig. 1d, e in Hochkirch (1996), figs 5–7 in Jago (1978) and fig. 5). Similar to *P. tessa*, the ectophallus has two sclerotized ridges.

Etymology.—From latin: *-venetus* = green, blue-green, because of the blue tibiae and partly green body and legs.

Distribution.—Tanzania, Nguru Mountains.

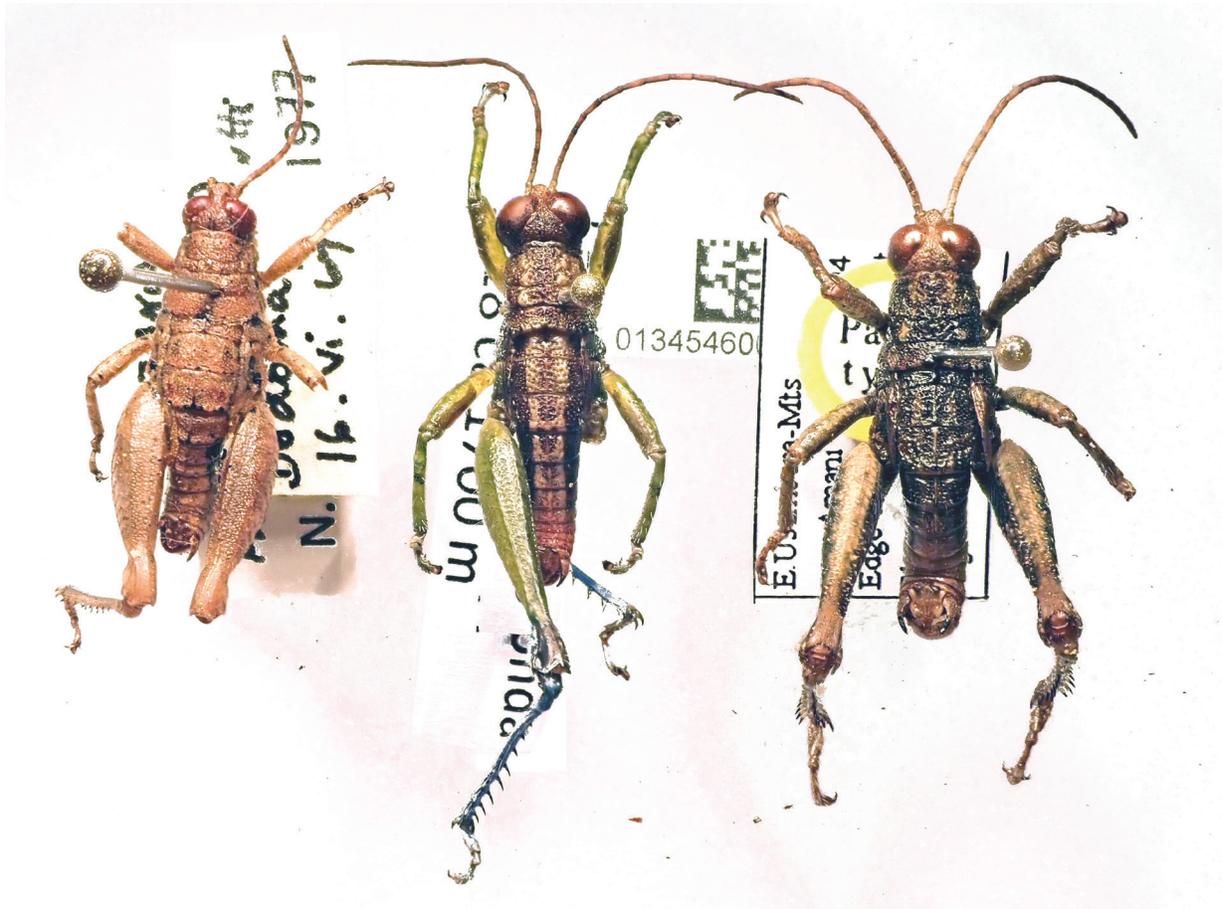


Fig. 7. Dorsal habitus of male *Physocroblylus* species. From left to right: *P. burtti*, *P. venetus* sp. nov., and *P. tessa*.

Notes on the habitat of Physocrobylus species.—Both *P. venetus* sp. nov. and *P. tessa* occur in submontane forests in the litter layer and on low herbs; they are, however, restricted to different mountain areas. *P. tessa* is a rather rare species in submontane and montane elevations in the East Usambara Mountains. Most adults are found from November until about April. In the East Usambara Mountains, several forest reserves offer protection for some of the last lowland wet forests in eastern Africa. Numerous individuals were collected in Magoroto Forest Estate at elevations between 670 to 880 m a.s.l., indicating that lowland wet forests harbor higher numbers of this forest dwelling species, and in the Nilo Forest Reserve. In the latter, single individuals were even collected in July, indicating that the species may be present year-round. Very few individuals of *P. tessa* have been found so far at Kwamkoro Forest Reserve on the plateau of the East Usambara Mountains near Amani at elevations of around 900 m, although the area was surveyed for *P. tessa* many times and at different times of the year. The Nguru Mountains have been deforested below about 700 m, thus only submontane and montane forests still exist in this area. Specimens of *P. venetus* sp. nov. are more common during the warm time of the year, from about November to April, but individuals were also collected in June and July. Thus, the phenology is similar to *P. tessa* in the East Usambara Mountains.

Little information is available for the third species, *P. burtti*. Although the area where *P. burtti* occurs was visited several times (Hemp and Heller 2019), this species was not collected by our team. The holotype was collected in the Mpwapwa area of Tanzania, but detailed information of the habitat is lacking. The type locality at the Kiboriani Hills where the District city of Mpwapwa is located has transformed almost completely to maize fields (see also Hemp and Heller 2019) but formerly was covered by Miombo woodlands. *P. burtti* was also collected 44 miles north of Dodoma, in the East Chene Forest Reserve, which is also the type locality for other species (e.g., *Odonturoides insolitus* Ragge, 1980). This forest reserve, today

heavily impacted by illegal charcoaling, consists of typical Miombo woodlands at elevations between 1200 and 1550 m a.s.l. Thus, *P. burtti* probably is a dweller of the ground layer in this forest type and, thus, occupies a completely different ecological niche than the other two *Physocrobylus* species, which prefer moister habitats.

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References

- Dirsh VM (1951) Some new and little-known African Acrididae (Orthoptera). Proceedings of the Royal Entomological Society of London (B) 20: 73–79. <https://doi.org/10.1111/j.1365-3113.1951.tb01023.x>
- Hemp C, Heller K-G (2019) Orthoptera (Tettigoniidae and Acridoidea) from Miombo woodlands of Central Tanzania with the description of new taxa. Zootaxa 4671: 151–194. <https://doi.org/10.11646/zootaxa.4671.2.1>
- Hochkirch A (1996) *Physocrobylus tessa*, a new grasshopper species from the East Usambara Mountains, NE Tanzania and its systematic position (Acridoidea, Acrididae, Coptacridinae). Journal of Orthoptera Research 5: 53–55. <https://doi.org/10.2307/3503580>
- Jago ND (1978) The systematic position of *Physocrobylus burtti* Dirsh 1951, with description of the undescribed male sex. Acrida 7: 79–83.