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Two new species of *Prototheora* Meyrick from the Democratic Republic of the Congo and Tanzania representing the northernmost records for the genus (Lepidoptera: Hepialidae)

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Abstract: The new species *Prototheora katangensis* Landry & Davis and *P. tanzaniensis* Davis & Landry are respectively described from the Haut-Katanga region of the Democratic Republic of the Congo and from the Makete District of Tanzania. The collecting localities are the northernmost known thus far for the genus *Prototheora* Meyrick.

Keywords: Prototheoridae - Ethiopian Region - Angola - Malawi - Republic of South Africa - Zimbabwe.

INTRODUCTION

Prototheora Meyrick was regarded in the past as the only genus of the family Prototheoridae Meyrick, but this family name has been synonymized with Hepialidae by Regier *et al.* (2015), a decision that is supported by the latest publication on the phylogeny of Hepialoidea (Simonsen & Kristensen, 2017). Prior to the present study, the genus included 13 species from the Ethiopian Region distributed mostly in the Republic of South Africa, but also Malawi (1 species), Angola (1 species), and Zimbabwe (1 species) (Davis, 1996, 2001, 2004; Mey, 2017). Thus, with the addition of the two species described herein the known fauna of *Prototheora* now stands at 15.

MATERIAL AND METHODS

The specimens reported here are deposited in the "Muséum d'histoire naturelle," Geneva, Switzerland (MHNG) and the Natural History Museum, University of Oslo, Norway (NHMO). The abdomens were detached, macerated, cleaned by BL at the MHNG, and sent in glycerin to DRD at the Natural History Museum, Smithsonian Institution, Washington, D.C., U.S.A. (NMNH) for description, drawing, and slide mounting. The photo of the holotype of *P. katangensis* (Fig. 1) and those of the head and genitalia in situ (Figs 2-5, 7-10) of both species were taken in the MHNG with a Leica DFC425 camera mounted on a Leica M205C stereoscopic microscope and the images were stacked

using Zerene Stacker 1.04. The photo of the holotype of *P. tanzaniensis* (Fig. 6) was taken in the MHNG also with a Nikon D800 camera with a Micro-Nikkor 60 mm lens. The data recorded in the Material examined sections are transcribed exactly as found on the holotype labels, with vertical bars (|) to show changes of lines.

DESCRIPTIONS

Prototheora katangensis Landry & Davis sp. nov

Figs 1-5, 11, 13

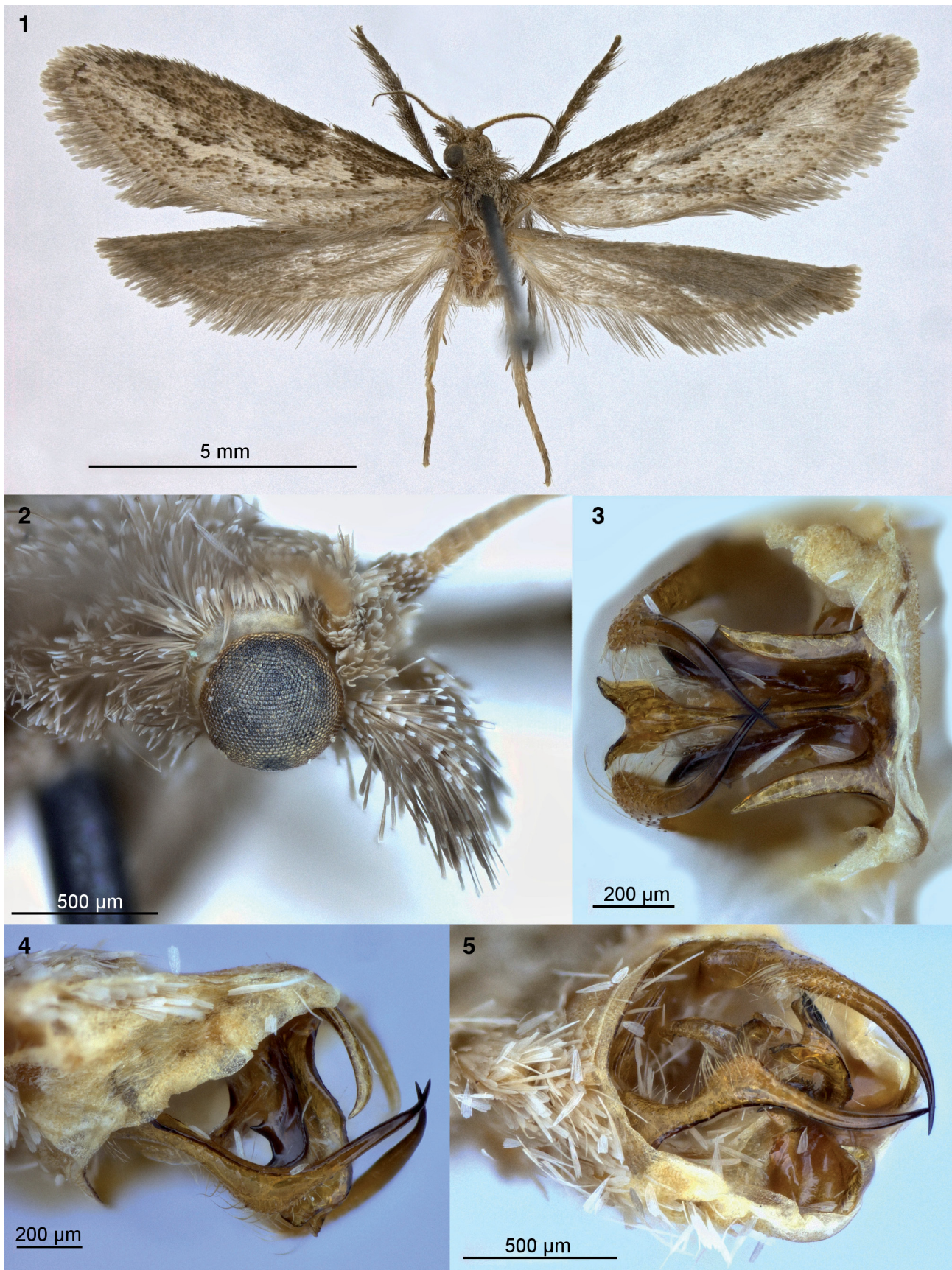
Material examined

Holotype: ♂, 1- "H[au]t Katanga | Tshinkolobwe | 10.11.30 | J[ean]. Romieux" (on card stock in black ink with first and last lines printed); 2- "MHNG | ENTO | 00011170" (printed on white card stock in black ink); 3- "HOLOTYPE | *Prototheora* | *katangensis* | Landry & Davis" (hand-written on red card stock in black ink) (MHNG).

The MHNG number corresponds both to the database number and the genitalia slide number.

Type locality: Democratic Republic of the Congo, Haut-Katanga, Shinkolobwe.

Diagnosis: Similar in forewing pattern (Fig. 1) and size to several other species of *Prototheora*, this species can be separated from its congeners by the presence in the male genitalia (Figs 3-5, 11) of a distinct uncus and the shape of the tergal processes and valvae, notably.



Figs 1-5. *Prototheora katangensis*, habitus and genitalia in situ of male holotype. (1) Habitus. (2) Head in lateral view. (3-5) Genitalia. (3) Apical view. (4) Lateral view. (5) Semi-ventral view.

Description

Male (Figs 1, 2): Head with scales between antennae and on frontoclypeus narrow, uniformly pale tan; posteriorly on vertex scales narrow, slightly longer, mixed light greyish brown with white tip and pale greyish white; on occiput with scales 2-3X as long as vertex scales, slender (some piliform), erect, greyish brown with white tip; without scales between eye margin and margin of antennal socket. Antenna with 26 flagellomeres, about 0.3X length of forewing, with pale brown to darker greyish brown, white-tipped scales dorsally only on scape, pedicel and first four flagellomeres, with fewer scales from pedicel to 3rd flagellomere; rest of flagellomeres' surface with short setae of same length from basal to apical flagellomeres. Labial palpus with vestiture expanded dorsoventrally, scales greyish brown, paler at base dorsally, usually white tipped. Thorax: Scales of dorsum of variable lengths and widths, those of undercover mostly uniformly white to dirty white, longer piliform scales greyish brown with white tip; basal half of metascutum devoid of scales, with tiny spines directed medially, posterior half with dirty white piliform scales directed posteromedially; ventrally with sparse vestiture of short white, appressed scales and long, light greyish brown, piliform scales. Wingspan 17 mm. Forewing length 8.0 mm; colour mostly dark brown on costal half with scales paler at their base, darker brown at base, pale brown on dorsal half, with white irregular stripe from base to apex below midline, running parallel to dorsum and termen, costa with short, uniformly colored scales of various shades of grey from base to before apical fringe scales; fringe pale greyish brown to white. Hindwing greyish brown, paler at base of dorsum, with concolourous fringe. Foreleg with short, brown, mostly white-tipped scales and longer, more slender, darker and longer greyish brown white-tipped scales slightly erect along dorsal margin of tibia and first three tarsomeres. Midleg as foreleg except with fewer and mostly paler, less-contrastingly patterned longer scales on dorsal margin of tibia and tarsomeres I-III, with some of these longer scales piliform. Hindleg with white to dirty white, mostly uniformly coloured scales, darker on last three tarsomeres, with few piliform on most segments. Abdomen colour not recorded.

Male genitalia (Figs 3-5, 11). Tegumen with an elongate, slender uncus arising medially from ventro-caudal margin of tegumen; apex of uncus bifurcate; a pair of slender tergal processes arising from dorso-caudal margin of tegumen; a pair of stout processes with slightly broader bifurcate apices arising ventrally from base of tegumen. Gnathos consisting of a slender sclerotized bridge extending between ventral processes of tegumen. Juxta moderately broadly triangular at base and then tapering to a much slender apex. Valvae elongate, slender and curved dorsad near midlength. Vinculum broad, with anterior margin slightly produced near middle; a slender, deeply bifurcate process projects middorsally from caudal margin of vinculum. Phallus membranous.

Female: Unknown.

Distribution: (Fig. 14). Known only from the type locality, which is located approximately 20 km west of Likasi, 20 km south of Kambove, and about 145 km northwest of Lubumbashi at 11°03'S 26°33'E (Wikipedia).

Remarks: The costal 1/3 of the hindwings of the unique specimen available is folded ventrally behind the rest of the hindwings. Jean Romieux (1893-1951), the collector of the holotype of *P. katangensis* was a mining engineer who worked in the Haut-Katanga province for several years in the 1920s and 1930s. He was also a prominent member of the "Société lépidoptérologique de Genève", which became the "Société entomologique de Genève" in 1946. Mr Romieux's collection was donated to the MHNG over the course of his life, as he worked there as an assistant occasionally (Rehfous, 1952). Seventy-two species, for which the holotypes are in the MHNG, have been described based on his beautiful material until now. The stout, elongate process that arises from the ventro-caudal margin of the tegumen in this species, has been referred to as the uncus in this study. A similar structure has not been observed in other *Prototheora*.

Prototheora tanzaniensis Davis & Landry sp. nov

Figs 6-10, 12-14

Material examined

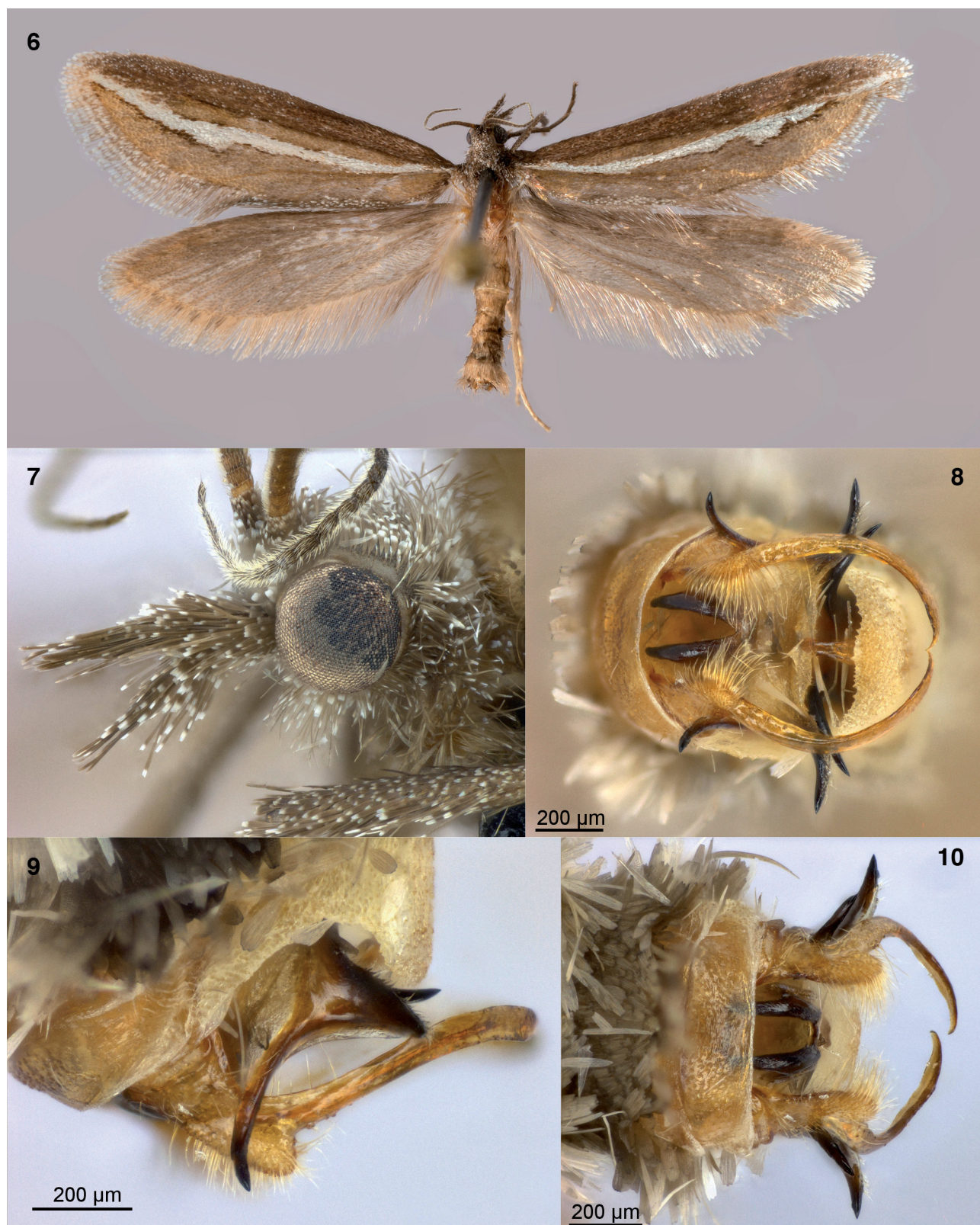
Holotype: ♂, 1- "TANZANIA | Iringa Reg[ion]., Makete Distr[ict].: | Kiitulo [sic] Plateau N[orth]. 2700 m | 29. xi. - 1. xii. 2005 | L. Aarvik, M. Fibiger, A. Kingston" (printed on white card stock in black ink); 2- "BL 1830 ♂" (green paper, hand written in black ink); 3- "♂ genitalia on | slide 4653 | D.R. Davis (printed except for hand-written number)"; 4- "HOLOTYPE | *Prototheora* | tanzaniensis | Davis & Landry" (hand written on red card stock in black ink) (NHMO).

Type locality: Tanzania, Iringa Region, Makete District, Kitulo Plateau North, 2700 m in elevation.

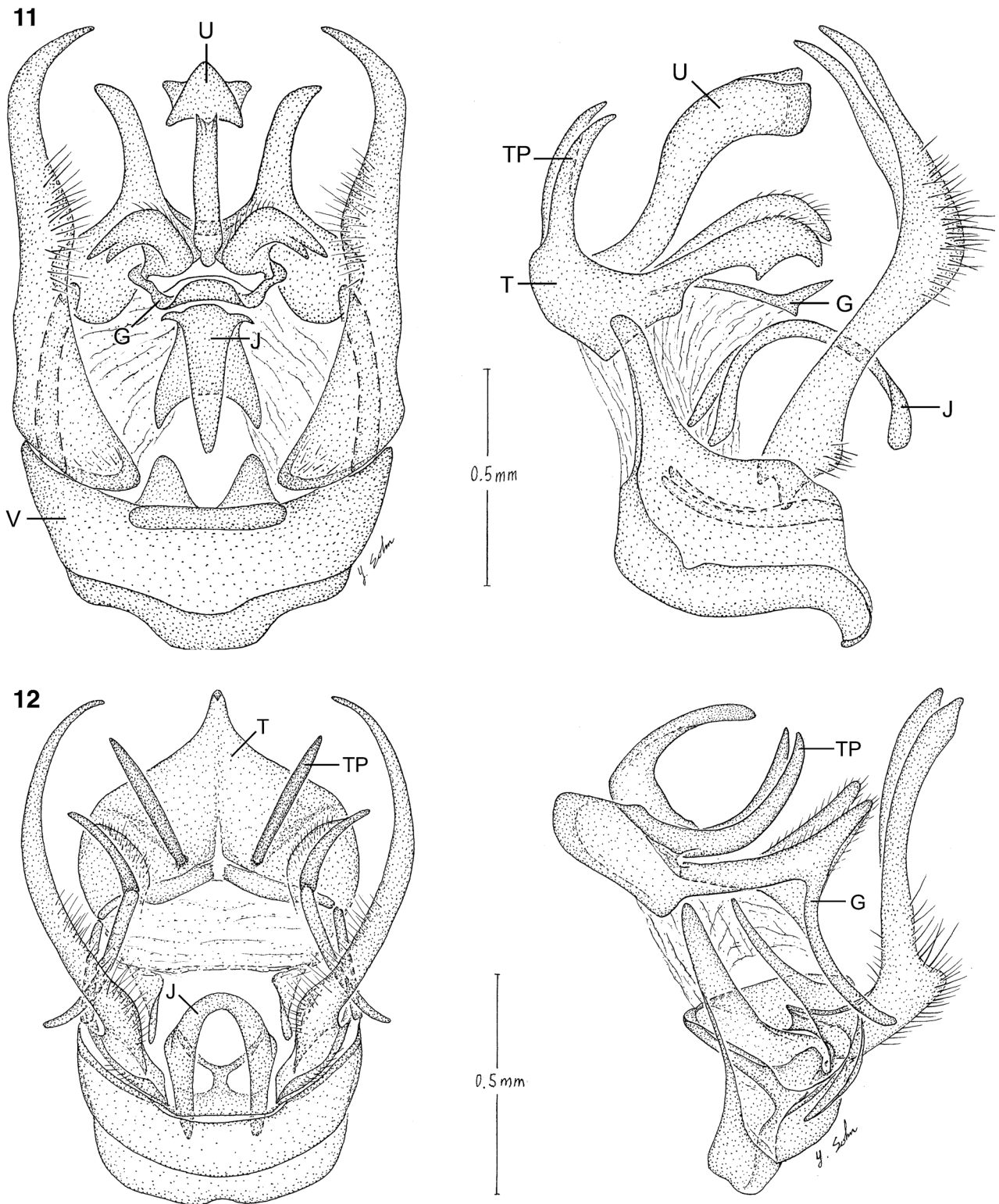
Diagnosis: This species is remarkable and distinct from its congeners by the golden yellow bands above and below a clearly contrasting white band on the forewing (Fig. 6).

Description

Male (Figs 6, 7): Head with scales between antennae and on frontoclypeus short and mostly narrow, directed straight up, greyish brown with white tip; posteriorly on vertex with most scales similar, appressed and converging toward middle; on occiput with few erect piliform scales 2-3X as long as vertex scales, concolourous with those of rest of head; without scales between eye margin and margin of antennal socket. Antenna with 30 flagellomeres, about 0.3X length of forewing, with 2-3 dark greyish brown, white-tipped scales on first three flagellomeres and pedicel; rest of flagellomeres' surface with short



Figs 6-10. *Prototheora tanzaniensis*, habitus and genitalia in situ of male holotype. (6) Habitus. (7) Head in lateral view. (8-10) Genitalia. (8) Apical view. (9) Lateral view. (10) Ventral view.



Figs 11-12. Genitalia of *Prototheora* male holotypes in ventral view (left) and lateral view. (11) *P. katangensis*. (12) *P. tanzaniensis*. G: gnathos, J: juxta, T: tegumen, TP: tergal process, U: uncus, V: vinculum.

setae of equal length from basal to apical flagellomeres, about half as long as width of basal flagellomeres. Labial palpus slender, with scales white-tipped greyish brown. Thorax: Scales of dorsum greyish brown, darker at base of tegulae, with mixture of short, appressed, narrow scales and longer piliform scales; basal half of metascutum devoid of scales, with tiny spines directed medially, posterior half with dirty white piliform scales directed posteromedially; ventrally with sparse vestiture of short white, appressed scales and long, light greyish brown, piliform scales. Wingspan 21 mm. Forewing length 10.0 mm; with wide costal greyish brown band enclosing some white-tipped scales from middle and closer to costa; with white median band from base to apex running parallel to dorsum and termen, with single row of brown scales along most of its dorsal and ventral edges; with golden yellow above and below white band, with some white and greyish brown along dorsal margin from base to 2/5; with irregular terminal line of short white scales; fringe light greyish brown, white-tipped scaled. Hindwing light greyish brown with golden hue along costa from middle and along terminal and dorsal margins; fringe light golden at base, otherwise with scales white-tipped, light greyish brown. Foreleg dark

greyish brown with most scales white tipped; with few longer and more slender, slightly erect scales along dorsal margins of tibia and first three tarsomeres. Midleg with scales mostly uniformly dark greyish brown on femur and base of tibia, lighter greyish brown to grey towards apex of tibia and on tarsomeres. Hindleg uniformly light greyish brown, with white only at apex of terminal tarsomere; with concolourous, uniformly coloured, erect piliform scales along dorsal and ventral margins of tibia. Abdomen colour not recorded.

Male genitalia (Figs 8-10, 12). Tegumen very broad, triangular, terminating in a slender, acute apex; a pair of slender, acute, and upturned tergal processes arising ventrally from tegumen. Gnathos comprised of a pair of slender, spinose sclerites arising ventrally from anterior margin of tegumen; median region of gnathos projecting ventro-caudally as an elongate, acute lobe. Juxta with slender arms in the form of an inverted U-shaped sclerite. Valvae elongate, slender, slightly broader at basal fifth where valva then turns abruptly dorsad at about a 45° angle. Vinculum broad, with anterior margin slightly curved and with a minute median indentation. Phallus membranous.

Female: Unknown.



Fig. 13. *Prototheora* habitat of male holotype of *P. tanzaniensis*, with collector of specimen Leif Aarvik, left, and Michael Fibiger†.

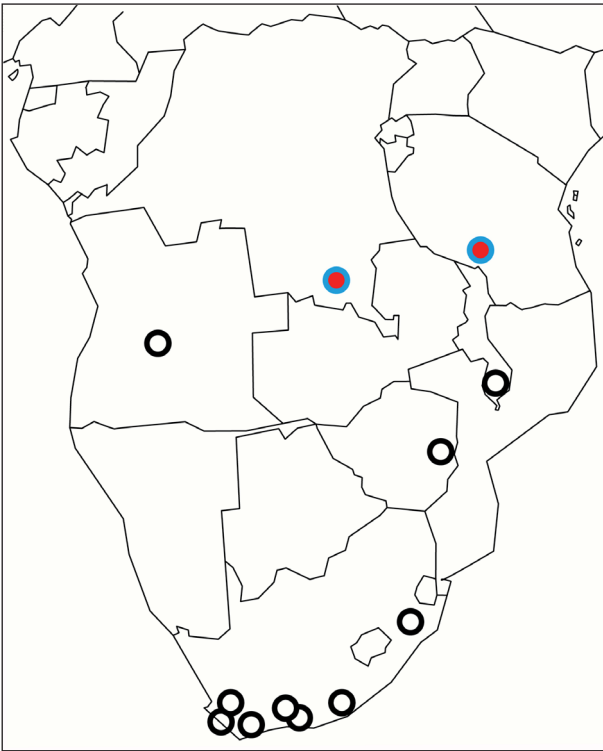


Fig. 14. Distribution map of all known *Prototheora* species in Africa with the coloured dots representing the collecting localities of the species described herein, modified from that of John Grehan (<http://johngrehan.net/index.php/hepialidae/prototheoridae>) with permission.

Distribution: (Fig. 14). Known only from the type locality in Tanzania.

Remarks: The holotype's right forewing is partly folded onto itself at the tip of the longitudinal white band, hence a break is visible on the outer margin of the wing. The correct spelling of the collecting locality's name of the Plateau is 'Kitulo'. The vegetation cover of the collecting locality is shown in Fig. 13.

ACKNOWLEDGEMENTS

We are grateful to John Grehan (Evans, New York), for providing information and suggestions to improve our understanding of the species described here and to improve the manuscript, Leif Aarvik (NHMO) for the gracious loan of the unique holotype of *P. tanzaniensis*, Philippe Wagner (MHNG) for the photo of the holotype of *P. tanzaniensis*, Florence Marteau (MHNG) for producing the plates, Young Sohn, Department of Entomology, NMNH, for the genitalia drawings, and J. Grehan, Gilles Roth (MHNG) and F. Marteau for the distribution map (Fig. 14).

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