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## **A new species of *Afrothaumalea* Stuckenberg, 1960 (Diptera: Thaumaleidae) from the Western Cape (South Africa) and first description of the pupa of this genus**

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### ABSTRACT

One new species of *Afrothaumalea* is described from South Africa (*A. stuckenbergi* sp. n.). The pupa of *Afrothaumalea* is described for the first time and a key to all three species of *Afrothaumalea* is provided.

KEY WORDS: Afrotropical Region, South Africa, Diptera, Thaumaleidae, new species.

### INTRODUCTION

The Thaumaleidae (Diptera) or seepage midges (Fig. 1) are a small family with 183 described species. The immature stages are restricted to thin films of flowing water, known as madicolous or hygropetric habitats, and are formed at the edge of waterfalls, splash zones on boulders in cascading streams and roadcut seeps (Fig. 2). In the Afrotropical Region, only the genus *Afrothaumalea* Stuckenberg is recorded. The genus is endemic to this region and currently confined to South Africa (Stuckenberg 1960, 1961; Sinclair & Stuckenberg 1995; Sinclair in press).

Prior to this study, two described species were known from South Africa: *A. pamela* Stuckenberg, 1960 (from the Drakensberg) and *A. capensis* Sinclair & Stuckenberg, 1995 (from Maanschynkop). In this study a new species is described from Cederberg, South Africa, where larvae and pupae were also collected from the seepage face (Figs 1–4). The larva of *Afrothaumalea* was described by Sinclair and Stuckenberg (1995) and the pupa of this genus is herein described for the first time.

### MATERIAL AND METHODS

Terms used for adult structures primarily follow those of McAlpine (1981), except wing venation, where the interpretations of Sinclair (in press) and Saigusa (2006) are accepted. Homology of the male terminalia follows that of Sinclair (1992).

This study is based on specimens deposited in the following institutions: Canadian National Collection of Insects, Ottawa, Canada (CNC); KwaZulu-Natal Museum, Pietermaritzburg, South Africa (NMSA); and National Museum, Bloemfontein, South Africa (BMSA).

Label data for the primary type is presented exactly as they appear. Data are listed from the top downward on the staging pin, with data from each label enclosed in quotation marks; lines are delimited by a forward slash mark. The repository is given in parentheses.

## TAXONOMY

*Afrothaumalea stuckenbergi* sp. n.

Figs 1, 3–10

**Etymology:** The specific name is a patronym in honour of Dr Brian Stuckenberg, who collected the first African specimens of Thaumaleidae.

**Recognition:** This species is distinguished from the other two species of *Afrothaumalea* by the stout, blunt setae on the gonostyli,  $R_{4+5}$  and  $M_1$  running parallel, and female terminalia with elongate cerci and stout setae on the apex of the hypogynium.

**Description:**

*Adult.*

**Coloration** (Fig. 1): Head dull, dark brown. Mesonotum dark reddish brown, abdomen dark brown and dull; katapisternum, coxae, femora and tibiae pale brown, tarsi darker; halter knob dark brown; terminalia dark reddish brown.

**Thorax:** Scutum above wing base not developed into ridge. All legs with deeply bilobed tarsomere 4 in dorsal view; ventral face with dense whitish pubescence. Tarsal claw very long, nearly subequal in length to tarsomere 5.

**Wing** (Fig. 5): Length 2.5–2.8 mm; infusate, darker on basal third;  $R$  with macrotrichia in two scattered rows,  $R_1$  and  $R_1(+R_{2+3})$  with sparse row of microtrichia along entire length, remaining veins bare;  $R$  flexed into cell  $br$ , flexure sclerotised and dividing  $bm$  cell into two separate cells;  $R_{2+3}$  crossvein apparently absent; distinct bend in  $R_{4+5}$  lacking;  $R_{4+5}$  and  $M_1$  running parallel to wing margin.

**Abdomen:** Male sternites 2–7 rectangular with anterior margin well sclerotised, bearing microtrichia and numerous setulae. Sternite 8 unmodified, bearing setulae; anterior margin straight, transverse; posterior margin attenuated medially, parallel with hypandrium. Male terminalia (Figs 8, 9): Epandrium subtriangular, wider than long; posterior margin pointed medially; lacking posterolateral epandrial processes. Hypandrium very narrow and slender. Gonocoxite quadrate, slightly longer than wide with short triangular process on posterolateral margin medially. Gonocoxal blade finger-like, half-length of gonocoxite, arched medially, cruciate with opposite blade tip; tapered with rounded tip. Gonostylus very broad, paw-like, expanded somewhat apically; shorter than gonocoxite; arched medially with inner margin bearing long peg-like setae; tips of pegs truncate. Parameres paired, straight, flattened; angled medially; apex truncate; extending to apex of gonostylus. Cercus apparently greatly reduced, not setose or pad-like; proctiger comprises 3 pairs of sclerotised rods. Female terminalia (Fig. 10): Sclerites of segment 8 connected anterolaterally by internal sclerotised apodeme. Hypogynial valve elongate, bearing dense spine-like setae, projecting beyond tergite 9. Tergite 9 quadrate in lateral view, longer than tergite 8. Cercus prolonged posteriorly, longer than wide, projecting posterodorsally.

*Pupa.*

Length 3.0–3.2 mm (Figs 3, 6, 7). Dorsoventrally flattened, rectangular in cross-section with distinct lateral sclerite on abdominal segments, broadest at abdominal segment 4; maxillary sheath short, posteromedially-directed, apices of palpi separated medially; fore and mid leg sheaths projecting straight and slightly beyond wing sheaths; hind leg



Figs 1–4. *Afrothaumalea stuckenbergi* sp. n.: (1) female; (2) Steve Marshall collecting immatures on rock face at type locality; (3) pupae; (4) larva (photographs: S.A. Marshall).

S-shaped beneath wing, projecting along posterior margin of wing sheath. Respiratory organ short, cylindrical, truncate apically, with spiracular openings encircling apex; abdomen with lateral open spiracles on segments 5–7, spiracles directly dorsally. Caudal segment truncate, lacking hook-like process. Chaetotaxy lost during preservation.

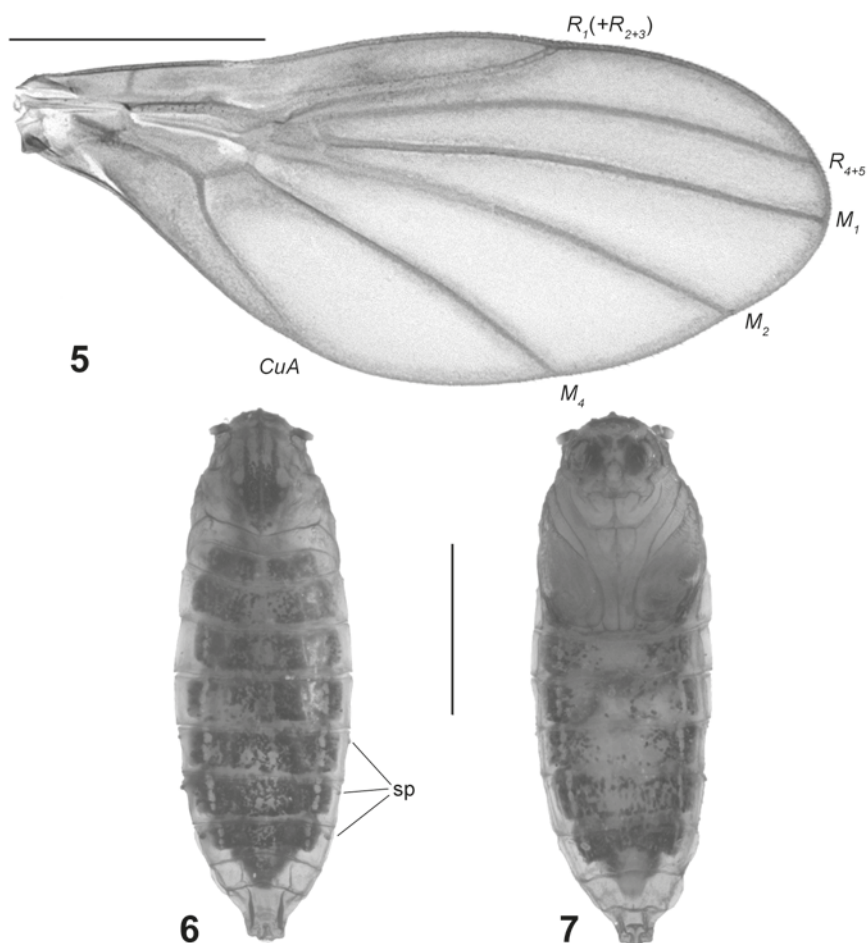
#### *Larva.*

Length 6–7.5 mm (Fig. 4). See Sinclair and Stuckenberg (1995) for description. Key generic features include: cone-like protuberances on head capsule absent; mesonotum and metanotum with blade-like macrosetae; conical lobes on either side of posterior spiracular plate absent.

Holotype: ♂ “RSA: Western Cape/ Cederberg Wilderness/ Duiwelsgat near at: 32°24.086'S 19°05.268'E/ 16.ix.2013, 693 m/ leg. A.H. Kirk-Spriggs/ ex. rock seepage”; “HOLOTYPE/ *Afrothaumalea/ stuckenbergi/ Sinclair* [red label]” (BMSA).

Paratypes: Same data as holotype (11 ♂, 8 ♀, BMSA, CNC, NMSA).

Distribution: Known only from the type locality (Fig. 2). The Cederberg range lies 200 km north of Cape Town and is part of the Cape Fold Belt, consisting mainly of



Figs 5–7. *Afrothaumalea stuckenbergi* sp. n.: (5) wing; (6) pupa, dorsal view; (7) pupa, ventral view. Scale bars = 1.0 mm. Abbreviations: *CuA* – anterior branch of cubital vein;  $M_{1,2,4}$  – medial veins;  $R_{1,2,3,4,5}$  – radial veins; sp – spiracle.

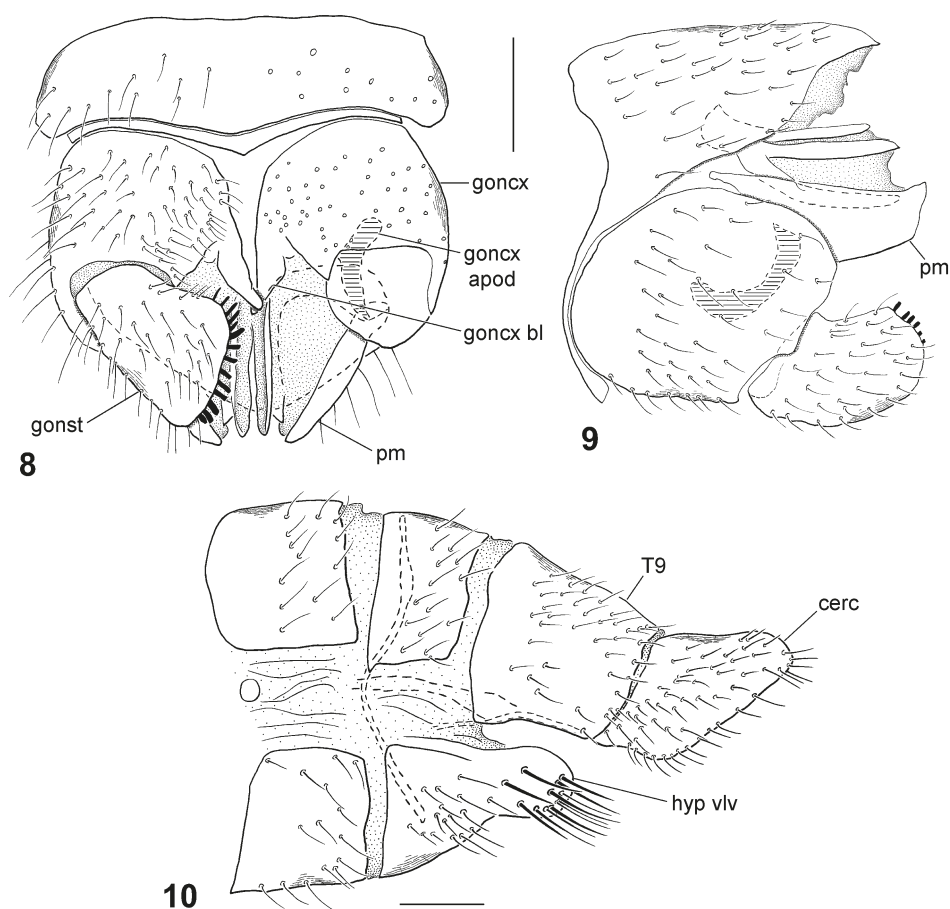
Table Mountain sandstone. Most rains fall between May and September, and vegetation is predominantly mountain fynbos. The Cederberg Wilderness received World Heritage status in 2004.

#### Key to males of *Afrothaumalea*

(Females are not included in the key because they are generally poorly known, although *A. stuckenbergi* possesses what appears to be distinctly shaped terminalia).

- 1  $R_{4+5}$  and  $M_1$  running parallel to wing margin (Fig. 5). Gonostyli with stout, blunt setae; cerci apparently greatly reduced, not visible in ventral view (Fig. 8) ..... *stuckenbergi* sp. n.
- $R_{4+5}$  distinctly arched beyond apex of  $R_1(+R_{2+3})$  (Stuckenberg 1960, fig. 2; Sinclair in press, fig. 4). Gonostyli without stout setae; cerci well developed and clearly visible in ventral view ..... 2





Figs 8–10. *Afrothaumalea stuckenbergi* sp. n., terminalia: (8) male, ventral view, left gonostylus removed; (9) male, lateral view; (10) female, lateral view. Scale bars = 0.1 mm. Abbreviations: cerc – cercus; goncx – gonocoxite; goncx apod – gonocoxal apodeme; goncx bl – gonocoxal blade; gonst – gonostylus; hyp vlv – hypogynial valve; pm – paramere; T – tergite.

- 2 Gonostyli rectangular, gradually tapered apically; apex of gonocoxal blades and parameres rounded (Sinclair & Stuckenberg 1995, fig. 6; Sinclair in press, fig. 6) ..... *pamelae* Stuckenberg
- Gonostyli broad, with medial lateral projection; apex of gonocoxal blades and parameres pointed (Stuckenberg 1961, fig. 2; Sinclair in press, fig. 5) ..... *capensis* Sinclair & Stuckenberg

#### DISCUSSION

*Afrothaumalea* is defined by broad gonostyli (with or without stout terminal setae), paired, finger-like gonocoxal blades and a triangular-shaped epandrium. The genus was considered closely related to *Niphta* Theischinger, 1986 on the basis of reduced setae on the first vein (Sinclair & Stuckenberg 1995), but this will need to be re-evaluated since setae extend the length of the vein in *A. stuckenbergi*. Although the pupa of *A. stucken-*

*bergi* is similar to *Trichothaumalea* Edwards, 1929 in overall shape (i.e., dorsoventrally flattened) and the absence of caudal hooks, it differs from *Trichothaumalea* where the tergites and sternites join laterally along a narrow seam. In contrast, the tergites and sternites in the pupa of *A. stuckenbergi* are separated by a broad rectangular sclerite and consequently the similarity in shape is likely not homologous.

In addition, *A. stuckenbergi* has tarsomere 4 modified or bilobed and appears to be independently developed in a number of species, including *Niphta farecta* Theischinger, 1986, *N. bickeli* Theischinger, 1986, *Oterere setipennis* (Edwards, 1930), *Austrothaumalea appendiculata* Tonnoir, 1927 and *Au. concava* Sinclair, 2008 (see also Theischinger 1986, fig. 1).

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