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Description of new *Ceratitis* MacLeay (Diptera, Tephritidae) species from Africa

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Abstract

As an addition to earlier published systematic revisions of the genus *Ceratitis* MacLeay, five new species are hereby described: *Ceratitis* (*Pardalaspis*) *millicentae* sp. n., *C. (Ceratalaspis)* *oraria* sp. n., *C. (C.) perisae* sp. n., and *C. (C.) perseus*, sp. n. all from Kenya, and *C. (C.) ealensis* sp. n. from the Democratic Republic of Congo. Their relationship with closely allied species within the respective subgenera is discussed and differentiating characters given.

Keywords: *Afrotropical*, *Ceratitis*, *new species*, *Tephritidae*

Introduction

Tephritidae are picture-winged flies of variable size and worldwide distribution. Although commonly named “fruit flies”, larval development can also take place in other parts of the host plants, including flowers, seeds and stems. Fruit flies of economic significance were treated by White and Elson-Harris (1994), and the currently acknowledged classification is presented by Norrbom et al. (1999). The genus *Ceratitis* MacLeay belongs to the tribe Ceratitidini (subfamily Dacinae) which is predominantly an Afrotropical group. For a discussion of classification and relationship with other genera, see White and Elson-Harris (1994), De Meyer (1999b) and Norrbom et al. (1999). The larvae of most Ceratitidini species develop in fruit, and several species of agricultural importance are known, especially within the genera *Ceratitis*, *Capparimyia* Bezzi, *Neoceratitis* Hendel, and *Trirhithrum* Bezzi.

Within the scope of a full revision of the genus *Ceratitis*, all six subgenera have recently been revised: *Pardalaspis* Bezzi (De Meyer 1996), *Ceratalaspis* Hancock (De Meyer 1998), *Ceratitis* (De Meyer 2000), the monotypic *Hoplolophomyia* Bezzi and *Acropteromma* Bezzi (De Meyer and Copeland 2001), and *Pterandrus* Bezzi (De Meyer and Freidberg forthcoming).

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Since 1999 recent surveys in Kenya have been undertaken by the second author, as part of USAID and USDA projects, funded through Texas A&M University. In total 3257 collections (834,040 fruits) were collected from ca 800 plant species, representing 109 families (Copeland et al. 2002; R. Copeland, unpublished data). Twenty-five per cent of the collections produced tephritids, including at least 20 species new to science. New species belonging to the subgenus *Pterandrus* are included in above-mentioned paper. New species of the subgenera *Ceratalaspis* and *Pardalaspis* are described below. Also included is another new *Ceratalaspis* species from the Democratic Republic of Congo, that was found in the recently revised collection of the Royal Institute for Natural Sciences at Brussels, Belgium (KBIN).

Material and methods

Terminology follows McAlpine (1981) and White et al. (1999). A specific term used for describing the leg ornamentations is “feathering”. This refers to a regular row of long, stout and flattened setae along margins of a femur or tibia, giving that part the appearance of a bird’s feather (see De Meyer and Freidberg forthcoming). Drawings were made with a camera lucida attached to either a dissecting or compound microscope. Measurements of wing length and body length (average and range) are based on 10 specimens of each sex (whenever available) and are given in mm. Body length measurements do not include oviscapae. Plant names follow Mziray (1992), Brummitt (1992), Beentje (1994), and Mabberley (1998).

Results

Subgenus Ceratitits (Ceratalaspis) Hancock

A diagnostic description of the subgenus *Ceratalaspis* is given in De Meyer (1996).

Ceratitits (Ceratalaspis) oraria sp. nov.

(Figures 1, 7, 12)

Diagnosis

Arista with short to medium long rays; frons yellow to yellow-orange, without silvery microtrichosity; postpronotal lobe with distinct black spot; scutal pattern with distinct black spots; anepisternum yellow with upper margin white, with one anepisternal seta; wing bands with subapical band separate, posterior apical band absent; legs without feathering; abdomen without distinct spots, with grey band on tergites 2 and 4; aculeus tip slightly bilobed.

Description

Female. Head: antenna yellow to yellow-orange. First flagellomere three times as long as pedicel. Arista with short to medium long rays at most twice as long as basal width of arista; ventral rays shorter than dorsal rays basally. Frons yellow to yellow-orange; with short scattered black setulae. Face white, lower half and below lower eye margin more yellow. Genal seta and setulae orange to red, well developed.

Figures 1–5. Thoracic pattern, dorsal view. (1) *C. oraria* sp. n. (2) *C. perisae* sp. n. (3) *C. perseus* sp. n. (4) *C. ealensis* sp. n. (5) *C. millicentae* sp. n.

Figure 6. Mid leg *C. perseus* sp. n., anterior view.

Thorax: postpronotal lobe pale yellowish white; with black spot. Scutum (Figure 1), ground colour yellow-orange, with distinct black markings including median presutural and sutural spots; prescutellar markings yellowish white, merged; with silver microtrichosity and yellow pilosity. Scapular setae yellow. Scutellum white to yellow, basally with small black spots, apically with three separate black spots, extending to basal third. Subscutellum yellow with three separate black spots, sometimes black spots touching along dorsal margin. Anepisternum yellow, upper margin white with black patch; one black anepisternal seta, setulae pale.

Legs: yellow; setation yellow to orange except last tarsal segments black. Fore femur with ventral setae orange.

Wing: pattern as in Figure 7; bands mainly yellowish with some brown patches. Anterior apical and discal bands not separated; subapical band free; posterior apical band absent; crossvein R-M at, or just proximal to, middle of discal medial cell.

Abdomen: yellow to orange; pilosity mixed yellow and black. Tergites 2 and 4 with pale grey band occupying posterior third of tergite. Tergite 5 with longer black setulae along

Figures 7–11. Wing. (7) *C. oraria* sp. n. (8) *C. perisae* sp. n. (9) *C. perseus* sp. n. (10) *C. ealensis* sp. n. (11) *C. millicentae* sp. n.

posterior margin. Oviscape about as long as preabdomen. Aculeus 10 times longer than wide, tip (Figure 12) slightly bilobed and lateral margin slightly sinuate.

Male. As female except for the following characters. Arista with medium long rays, longest dorsal rays about three times as long as basal width of arista. Face completely white. Fore femur posteriorly with longer and somewhat denser pilosity.

Body length. 4.94 (4.30–5.50) mm.

Wing length. 4.67 (4.35–5.00) mm.

Type material

Holotype: ♀, Kenya, Coast Province, Arabuko Sokoke Forest, 3 January 2001, USDA sample 942, reared ex fruits *Salacia leptoclada*, leg. R. S. Copeland. Holotype deposited at National Museums of Kenya, Nairobi (NMK). Paratypes: 9♂♂, 15♀♀, same data as holotype; 3♂♂, 1♀, same locality as holotype, 9 January 2000, USAID sample K338, reared ex fruits *Salacia leptoclada*; 2♂♂, 1♀, same locality as holotype, 7 September 2000, USAID sample K754 reared ex fruits *Salacia leptoclada*, 1♂, 1♀, same locality as holotype, 29 November 2000, USAID sample K789 reared ex fruits *Salacia leptoclada*, all leg R. S. Copeland. Paratypes deposited at NMK, the Royal Museum for Central Africa, Tervuren,

Figures 12–17. Aculeus, apical part. (12) *C. oraria* sp. n. (13) *C. perisae* sp. n. (14) *C. perseus* sp. n. (15) *C. brucei* (in situ, not dissected; tip broken); (16) *C. ealensis* sp. n. (17) *C. millicentae* sp. n.

Belgium (KMMA), the Natural History Museum, London, UK (BMNH), the International Centre for Insect Physiology and Ecology, Nairobi, Kenya (ICIPE), Texas A&M University, Texas, USA (TAMU) and the Natural History Museum, Washington DC, USA (USNM).

Etymology

After the Latin “orarius”, meaning coastal dweller, and referring to the type locality Arabuko Sokoke Forest which is the largest remnant of coastal forest in Kenya.

Host plant

Reared from the fruits of *Salacia leptoclada* Tul. (Hippocrateaceae).

Remarks

This species is very similar to *C. stictica* Bezzi and keys out as such in De Meyer (1998). The following characteristics can be used to differentiate both species. Arista with medium long rays in *C. oraria*, at most three times basal width; distinctly plumose in *C. stictica* with longest rays at least five times as long as width. Presutural median spot less developed in *C. oraria*. Basal scutellar spots small, reduced in *C. oraria*. Also abdominal pilosity largely yellow in *stictica* while mixed in *oraria*, and grey band on tergite 4 more distinct in *oraria*. *C. stictica* often with variable wing pattern, with subapical band joined with discal band. This is not the case in *C. oraria* which has the typical *Ceratitis* pattern with subapical band separate from discal band. The species can be identified with the key provided by De Meyer (1998) given the following adjustment.

- 40 Mesonotum with median presutural spot linear *lunata*
- Mesonotum with median presutural spot rounded or arrowhead shaped 41
- 41 Arista distinctly plumose, longest rays at least five times as long as basal width of arista and equal to width of first flagellomere; female aculeus simply pointed *stictica*
- Arista with medium long rays, longest rays at most three times as long as basal width of arista and half the width of first flagellomere; female aculeus with tip bilobed *oraria* sp. n.

Confirmed records for *C. stictica* so far are all from Central Africa, as well as Ukerewe Island in Lake Victoria and Kakamega forest (the easternmost relict of Guineo-Congolian rain forest, situated in the extreme west of Kenya, close to the border with Uganda). *C. oraria* is a coastal species, known from a plant host whose distribution is also restricted to the coastal region in Kenya. The only specimens of *C. stictica* from Kenya, on the other hand (Kakamega forest, vide supra), were reared from fruits of *Craterispermum schweinfurthii* Hiern. (Rubiaceae), a plant that is restricted in Kenya to Kakamega forest.

***Ceratitis (Ceratalaspis) perisae* sp. nov.**
(Figures 2, 8, 13)

Diagnosis

Arista with short rays; frons pale yellow, without silvery microtrichosity; two frontal setae; postpronotal lobe without a spot; scutal pattern with distinct black spots but latter strongly reduced; anepisternum completely yellow, with one anepisternal seta; wing bands with subapical band joined to discal band, and posterior apical band joined to anterior apical band; legs without feathering; abdomen without distinct spots, with grey band on tergites 2 and 4; apical part of aculeus with three large rounded indentations.

Description

Female. Head: antenna pale yellow. First flagellomere darker yellow; three times as long as pedicel. Arista with short rays, longest dorsal rays about as long as basal width of arista. Frons pale yellow; with short scattered yellow setulae; two frontal setae. Face white. Genal setulae darkish, poorly developed; genal seta reddish.

Thorax: postpronotal lobe yellowish white; without spot. Scutum (Figure 2), ground colour yellow-orange, with distinct brown to black markings but these restricted to intra-alar spot and spot linking dorsocentral and acrostichal prescutellar setae, sutural spot brownish, other dark markings pale brownish; prescutellar markings white, separate; with yellow microtrichosity and pilosity. Scapular setae black. Scutellum white, basally without black spots but with yellow-brown marking, apically with three separate black spots, extending to basal third. Subscutellum yellow with three separate black spots, touching along dorsal margin. Anepisternum yellow; one black anepisternal seta, setulae pale.

Legs: yellow; setation yellow to orange except last tarsal segments black. Fore femur with ventral setae yellow, posteriorly with longer pilosity.

Wing: pattern as in Figure 8; bands mainly yellowish with some brown patches. Anterior apical and discal bands not separate; subapical band joined to discal band; posterior apical band joined to anterior apical band; crossvein R-M at proximal two-fifths of discal medial cell.

Abdomen: yellow to orange; pilosity mainly black. Tergites 2 and 4 with pale grey band occupying posterior third of tergite. Tergite 5 with longer black setulae along posterior margin. Oviscape shorter than preabdomen. Aculeus six to seven times longer than wide, apical part (Figure 13) with three large rounded indentations, tip with small depression.

Male. As female except for the following characters. First flagellomere pale yellow. Mesonotal pattern with sutural spot also pale brownish, male paratype of Ngaia Forest with very weak mediolongitudinal line postsuturally. Scutellum basally with yellow marking. Subscutellum with black spots separate. Wing, crossvein R-M at proximal third of discal medial cell.

Body length. 4.60 (4.50–4.70) mm.

Wing length. 4.83 (4.75–4.90) mm.

Type material

Holotype: ♀, Central Province, Kikuyu Escarpment, 21 September 1999, USAID sample 286, ex fruits *Vepris simplicifolia*, leg. R. S. Copeland. Paratypes: ♂ allotype, same data as holotype; 1♂, 1♀, Eastern Province, Ngaia Forest, upper part, 5 November 2003, USDA sample 2604, ex fruits *Vepris simplicifolia*, all leg. R. S. Copeland. Holotype and allotype deposited in the collections of NMK; other paratypes in collection of KMMA.

Etymology

Named for Ms Peris Machera, an extraordinarily dedicated technician whose work was largely responsible for the success of the USAID and USDA projects that resulted in this new material.

Host plant

Reared from the fruits of *Vepris simplicifolia* (Engl.) Mziray (Rutaceae).

Remarks

This species keys out to the *connexa*-*argenteobrunnea* couplet in the key of De Meyer (1998). It can be differentiated from the former by differences in number of frontal seta (always two pairs in *perisae*, one or three pairs in *C. connexa* (Bezzi)) and from the latter by the different mesonotal pattern. The aculeus shape indicates a relationship with *C. argenteobrunnea* Munro and with the *C. andranotobaka* Hancock species group as defined in De Meyer (1998) within the subgenus *Ceratalaspis* as well as with *C. (Hoplolophomyia) cristata* (Bezzi). The host plant of *perisae* is also known to host *C. cristata* in the same region. It can be identified with the key provided by De Meyer (1998) given the following adjustment.

- 12 Male with one pair of frontal setae (sometimes two additional pairs of very small setae); female with three pairs of frontal setae *connexa*
- Male and female always with two pairs of frontal setae 12a
- 12a Scutellum with well-defined black basal spots; black lateral presutural spots present *argenteobrunnea*
- Scutellum without black basal spots, at most yellow-brown marking; lateral presutural spots absent *perisae* sp. n.

***Ceratitis (Ceratalaspis) perseus* sp. nov.**
(Figures 3, 6, 9, 14)

Diagnosis

Arista with medium long rays; frons yellow, without silvery microtrichosity; postpronotal lobe with distinct black spot; scutal pattern with distinct black markings; anepisternum yellow with upper half white, with one anepisternal seta; wing bands with subapical band separate, posterior apical band absent; male mid tibia with black feathering; abdomen without distinct spots, with grey band on tergites 2 and 4; aculeus tip with median step.

Description

Male. Head: antenna yellow to yellow-orange. First flagellomere three times as long as pedicel. Arista with medium long rays, longest dorsal rays about three times as long as basal width of arista; ventral rays shorter than dorsal rays basally. Frons yellow to pale yellow; with short scattered black and yellow setulae. Face white. Genal seta and setulae black, well developed.

Thorax: postpronotal lobe pale yellowish white; with black spot. Scutal pattern (Figure 3), ground colour yellow to dark orange, with distinct black markings, including median sutural spot, prescutellar markings white, separated by pale area; with golden microtrichosity and yellow pilosity. Scapular setae black. Scutellum white to yellow, basally with black spots, apically with three separate black spots, extending to basal third. Subscutellum black. Anepisternum yellow, upper half white, one anepisternal seta, setulae white to yellow.

Legs: yellow; setation yellow to orange. Fore femur with ventral setae mainly black; posteriorly with dense yellow to silvery pilosity. Mid leg (Figure 6), femur ventrally with few conspicuously longer yellow setulae along basal third; tibia with black feathering at apical outer half and inner two-fifths, area of tibia with feathering coloured black.

Wing: pattern as in Figure 9; bands mainly yellowish with some brown patches. Anterior apical and discal bands largely but incompletely separated, narrowly joined; subapical band free; posterior apical band absent; crossvein R-M at, or just distal to, middle of discal medial cell.

Abdomen: yellow to orange; pilosity mixed yellow and black. Tergites 2 and 4 with pale grey band occupying posterior third of tergite. Tergite 5 with longer black setulae along posterior margin.

Female. As male except for the following characters. Frons only with short black setulae. Fore femur with less dense pilosity posteriorly; mid tibia without black feathering, completely yellow. Oviscape shorter than preabdomen. Aculeus eight times longer than wide, tip (Figure 14) with median step and lateral margin slightly sinuate.

Body length. 5.60 (4.80–6.20) mm.

Wing length. 5.35 (4.55–5.70) mm.

Type material

Holotype: ♂, Kenya, Coast Province, Shimba Hills, 24 April 2002, USDA sample 1902, reared ex fruits *Pleiocarpa pycnantha*, leg. R. S. Copeland. Holotype deposited in collection of NMK. Paratypes: 13♂♂, 13♀♀, same data as holotype; 3♂♂, 3♀♀, same locality as holotype, 23 April 2002, USDA sample 1957, reared ex fruits *Pleiocarpa pycnantha*; Watamu, 2♂♂, 5♀♀, 15 April 2000, USAID sample K500, reared ex fruits *Hunteria zeylanica*; 1♂, 1♀, 16 May 2000, USAID sample 680, reared ex fruits *Hunteria zeylanica*; 4♂♂, 3♀♀, 9 February 2001, USDA sample 985, reared ex fruits *Hunteria zeylanica*; Eastern Province, Ngaia Forest upper part, 115♂♂, 89♀♀, 5 December 2003, USDA sample 2602, reared ex fruits *Pleiocarpa pycnantha*; all leg. R. S. Copeland. Paratypes deposited in collections of NMK, KMMMA, BMNH, TAMU, ICIPE and USNM.

Etymology

After the Greek mythological figure Perseus, who borrowed the God Hermes' winged shoes when killing the Medusa.

Host plants

Reared from the fruits of *Hunteria zeylanica* (Retz.) Gardn. and *Pleiocarpa pycnantha* (K. Schum.) Stapf (both Apocynaceae).

Remarks

This is an enigmatic species, showing characteristics of the subgenus *Ceratalaspis*, and apparently related to the *stictica* group as defined in De Meyer (1998). However, the male has secondary sexual characters typical for the subgenus *Pterandrus* in that the mid tibia has distinct black feathering (the only other *Ceratalaspis* species with feathering, *C. neostictica* De Meyer, has orange feathering on the mid tibia). *C. perseus* lacks, however, the black band on abdominal tergite 3 which is found in most *Pterandrus* species. *C. perseus* shows

some affinities with *C. brucei* Munro. The latter is only known from the female holotype of which the aculeus tip is damaged. However, the general shape of the aculeus in the latter is different from that of *C. perseus*. In *brucei* it is slender, and gradually narrowing towards the apex, while in *C. perseus* it is much broader (cf. Figures 14 and 15). Currently, we place this species in the subgenus *Ceratalaspis*. The species can be identified with the key provided by De Meyer (1998) given the following adjustment.

- 29 Wing pattern dark brown; mesonotum ash-grey *roubaudi*
- Wing pattern yellow or yellow-brown; mesonotum with yellow-orange tinge 29a
- 29a Male mid tibia with black feathering at apical outer half and inner two-fifths, area of tibia with feathering coloured black; female aculeus tip with median step *perseus* sp. n.
- Male mid tibia without feathering, all pilosity yellow to orange; female aculeus tip either simply pointed or slightly bilobed, never with median step 30

***Ceratitis (Ceratalaspis) ealensis* sp. n.**
(Figures 4, 10, 16)

Diagnosis

Arista with short rays; frons yellow, without silvery microtrichosity; postpronotal lobe without a spot; scutal pattern with distinct black markings but spots restricted; anepisternum yellow, with two anepisternal setae; wing bands with subapical band joined to discal band, posterior apical band absent; legs without feathering; abdomen without distinct spots, with grey band on tergites 2 and 4; apical part of aculeus with two large rounded indentations.

Description

Female. Head: antenna yellow. First flagellomere two times as long as pedicel. Arista with short rays, longest dorsal rays usually about as long as basal width of arista; if somewhat longer never twice as long as basal width. Frons yellow; with short scattered yellow setulae. Face yellowish white, below lower eye margin darker yellow. Genal setulae and genal seta yellow to orange, well developed.

Thorax: postpronotal lobe yellow; without spot. Scutal pattern (Figure 4), ground colour yellow, with distinct black markings but the latter strongly reduced; prescutellar markings white, separate or merged; with yellow microtrichosity and pilosity. Scapular setae yellow-orange. Scutellum yellow-white, basally without black spots, apically with three separate black spots, extending to basal half. Subscutellum yellow with three separate black spots. Anepisternum yellow; setulae yellow; two black anepisternal setae, occasionally with a third, less developed and dark orange, seta below two black ones.

Legs: yellow; setation yellow to orange. Fore femur with ventral setae orange.

Wing: pattern as in Figure 10; bands mainly yellowish with some brown patches. Anterior apical and discal bands not separate; subapical band joined to discal band; posterior apical band absent; crossvein R-M at basal third of discal medial cell.

Abdomen: yellow; pilosity mainly yellow. Tergites 2 and 4 with pale grey band occupying posterior third to half of tergite. Tergite 5 with longer black setulae along posterior margin.

Oviscape about as long as preabdomen. Aculeus eight times longer than wide, apical part (Figure 16) with two large rounded indentations, tip with small depression.

Male. As female.

Body length. 5.98 (5.15–6.55) mm.

Wing length. 5.75 (5.50–5.95) mm.

Type material

Holotype: ♀, Democratic Republic of Congo, Eala, 26 January 1935, leg. J. Ghesquière, sample 170, “larves dans fruits d’*Anopyxis*”. Holotype deposited in collection of KBIN. Paratypes: 4♂♂, 1♀, Democratic Republic of Congo, Eala, 26 January 1935, leg. J. Ghesquière, sample 170. Paratypes deposited in the collections of KBIN and KMMA.

Etymology

Named after the type locality, Eala.

Host plant

Reared from the fruits of *Anopyxis* (Pierre) Engl. sp. (Rhizophoraceae).

Remarks

C. ealensis keys out to *C. hancocki* De Meyer in De Meyer (1998). It shows some affinities with this species, but lacks a black spot on the postpronotal lobe, has lateral presutural black spots that do not reach the postpronotal lobe, and possesses an aculeus that lacks the large blade-like serrations. It seems to be more closely related to *C. paradumeti* De Meyer. The latter has a similar strongly reduced mesonotal pattern with restricted black spots, and an aculeus with rounded indentations. *C. ealensis* can be differentiated by the depression at the tip of the aculeus (rounded and without depression in *C. paradumeti*), and by the subapical band joining the discal band (subapical band isolated in *C. paradumeti*). More material of both species is, however, needed to unambiguously confirm the status of both taxa. This species can be identified with the key provided by De Meyer (1998) given the following adjustment.

- 18 Mesonotum with a narrow mediolongitudinal line extending along entire length; two dorsocentral lines with darker yellow coloration *striatella* (part)
- Mesonotum without mediolongitudinal or dorsocentral lines 18a

- 18a Postpronotum spotted; lateral presutural spots reaching posterior margin of postpronotum; scutellum with well-defined black basal spots; apical part aculeus with blade-like serrations *hancocki*
- Postpronotum without black spot; lateral presutural spots not reaching margin of postpronotum; scutellum without black basal spots; apical part aculeus with rounded indentations *ealensis* sp. n.

Subgenus Ceratitis (Pardalaspis) Bezzi

A diagnostic description for the subgenus can be found in De Meyer (1996).

***Ceratitis (Pardalaspis) millicentae* sp. nov.**

(Figures 5, 11, 17)

Diagnosis

Arista with short rays; male frons with silvery microtrichosity; postpronotal lobe without a spot; scutal pattern largely without distinct spots; anepisternum yellowish brown, with upper half white, with two anepisternal setae; wing bands with subapical band separate, posterior apical band absent; legs without feathering; abdomen spotted, without grey bands; aculeus with tip slightly bilobed.

Description

Male: Head: antenna orange. First flagellomere two times as long as pedicel. Arista with short rays, longest dorsal rays usually about twice as long as basal width of arista; ventral rays shorter. Frons completely silvery, less dense in front of ocellar triangle, with short scattered darker setulae. Face orange. Genal setulae and genal seta black, well developed.

Thorax: postpronotal lobe pale greyish white; without spot. Scutum (Figure 5), ground colour greyish, with darker stripes and streaks but no distinct black spots except near intra-alar and prescutellar acrostichal setae; prescutellar markings white, separated by pale area or merged; with silver-grey microtrichosity and pilosity. Scapular setae black. Scutellum pale yellow, basally with two distinct black spots, apically with three separate black spots, extending to basal third. Subscutellum completely black. Anepisternum lower half yellow-brown, upper half white; two black anepisternal setae, setulae white, upper margin with black setulae.

Legs: pale yellowish brown; setation mixed black and white. Fore femur with ventral setae black.

Wing: pattern as in Figure 11; bands mainly brown. Anterior apical and discal bands not separate; subapical band separate; posterior apical band absent; crossvein R-M at, or just distal to, middle of discal medial cell.

Abdomen: greyish, lateral margin and tergite 5 largely with orange tinge; pilosity mixed black and white. Tergites with darker spots.

Female. As male except for the following characters. Frons yellow-brown, weakly silvery. Face white, lower margin yellow. Oviscape about as long as preabdomen. Aculeus at least 10 times longer than wide, tip (Figure 17) bilobed and lateral margin slightly sinuate.

Body length. 6.54 (5.75–7.20) mm.

Wing length. 5.99 (5.25–6.50) mm.

Type material

Holotype ♂, Kenya, Coast Province, Shimba Hills, 21 July 2000, USAID sample 780, reared ex fruits *Tabernaemontana elegans*, leg. R. S. Copeland. Holotype deposited in

collection of NMK. Paratypes: 16♂♂, 17♀♀, same data as holotype; 1♂, 8 June 2000, USAID sample K582, reared ex fruits *Tabernaemontana elegans*; 1♂, 1♀, 8 June 2000, USAID sample 717, reared ex fruits *Tabernaemontana elegans*; 7♂♂, 12♀♀, 5 February 2001, USDA sample 995, reared ex fruits *Tabernaemontana elegans*; 4♂♂, 7♀♀, 5 February 2001, USDA sample 1033, reared ex fruits *Tabernaemontana elegans*; 1♀, 21 March 2001, USDA sample 1085, reared ex fruits *Tabernaemontana elegans*, all leg. R. S. Copeland. Paratypes deposited in collections of NMK, KMMA, BMNH, TAMU, ICIPE, and USNM.

Etymology

Named after the late Ms Millicent Okumu, the chief laboratory technician for the USAID and USDA projects at ICIPE, who supervised the rearing of this and other new species described in this paper.

Host plants

Reared from fruits of *Tabernaemontana elegans* Stapf (Apocynaceae).

Remarks

This species is closely related to *C. punctata* (Wiedemann). The females can be easily differentiated by the shape of the aculeus tip which is simply pointed in *C. punctata* while bilobed in *C. millicentae*. The males are very similar, the only difference noted is in the extent of the frontal microtrichosity. In *C. punctata* the silvery microtrichosity is restricted to the lower third of the frons (not along entire length as first stated in De Meyer 1996, see correction in De Meyer 1999a), not extending beyond the frontal setae. In *C. millicentae* the microtrichosity extends all the way up to the medial vertical seta, but is less conspicuous in the upper median part in front of the ocellar triangle. Confusion in earlier identified material of *C. punctata* cannot be excluded and records, especially from eastern and southern Africa, should be reconfirmed. The species can be identified with the key provided by De Meyer (1996) given the following adjustment.

For the males:

- 7 Mesonotum with orange tinge; scutellum without black basal spots . . . *hamata*
- Mesonotum greyish, no orange tinge; scutellum usually with well-defined black basal spots 7a
- 7a Frons with silvery microtrichosity restricted to lower third, not extending beyond the frontal setae *punctata*
- Frons with silvery microtrichosity extending up to the medial vertical seta *millicentae* sp. n.

For the females:

- 16 Anepisternum with black pilosity on lower half *ditissima*
- Anepisternum completely with pale pilosity 17
- 17 Mesonotum with orange tinge; scutellum without black basal spots, at most slightly darker coloration *munroi*
- Mesonotum without orange tinge; scutellum with distinct black basal spots *millicentae* sp. n.

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References

- Beentje H. 1994. Kenyan trees, shrubs and lianas. Nairobi: National Museums of Kenya. 742 p.
- Brummitt RK. 1992. Vascular plant families and genera. London: Kew Royal Botanic Gardens. 804 p.
- Copeland RS, Wharton RA, Luke Q, De Meyer M. 2002. Indigenous hosts of *Ceratitis capitata* (Diptera: Tephritidae) in Kenya. *Annals of the Entomological Society of America* 95:672–695.
- De Meyer M. 1996. Revision of the subgenus *Ceratitis* (*Pardalaspis*) Bezzi, 1918 (Diptera, Tephritidae, Ceratitini). *Systematic Entomology* 21:15–26.
- De Meyer M. 1998. Revision of the subgenus *Ceratitis* (*Ceratalaspis*) Hancock (Diptera, Tephritidae, Ceratitini). *Bulletin of Entomological Research* 88:257–290.
- De Meyer M. 1999a. Additional notes and records on the subgenus *Ceratitis* (*Pardalaspis*) (Diptera, Tephritidae). *Bulletin et Annales de la Société royale belge d'Entomologie* 134:199–202.
- De Meyer M. 1999b. Phylogeny of *Ceratitis*. In: Aluja M, Norrbom AL, editors. *Fruit flies (Tephritidae): phylogeny and evolution of behaviour*. Boca Raton (FL): CRC Press. p 409–428.
- De Meyer M. 2000. Systematic revision of the subgenus *Ceratitis* MacLeay s.s. (Diptera, Tephritidae). *Zoological Journal of the Linnean Society* 128:439–467.
- De Meyer M, Copeland RS. 2001. Taxonomic notes on the afrotropical subgenera *Ceratitis* (*Acropteromma*) Bezzi and *C. (Hoplolophomyia)* Bezzi (Diptera: Tephritidae). *Cimbebasia* 17:77–84.
- Mabberley DJ. 1998. *The plant-book: a portable dictionary of the higher plants*. 2nd ed. Cambridge: Cambridge University Press. 858 p.
- McAlpine JF. 1981. Morphology and terminology. In: MacAlpine JF, Peterson BV, Shewell GE, Teskey HJ, Vockeroth JR, Wood DM, coords. *Manual of nearctic diptera*. Volume 1. Ottawa: Monograph of the Biosystematics Research Institute. p 9–63.
- Mziray W. 1992. Taxonomic studies in Toddalieceae Hook. f. (Rutaceae) in Africa. *Acta Universitatis Upsaliensis: Symbotae Botanicae Upsaliensis* 30(1):1–95.
- Norrbom AL, Carroll LE, Thompson FC, White IM, Freidberg A. 1999. Systematic database of names. In: Thompson FC, editor. *Fruit fly expert identification system and systematic information database*. Myia 9:65–251.
- White IM, Elson-Harris M-M. 1994. *Fruit flies of economic significance: their identification and bionomics*. CAB International: London. 601 p (Reprint with addendum).
- White IM, Headrick DH, Norrbom AL, Carroll LE. 1999. Glossary. In: Aluja M, Norrbom AL, editors. *Fruit flies (Tephritidae): phylogeny and evolution of behaviour*. Boca Raton (FL): CRC Press. p 881–924.