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Revision of the Subgenus *Ceratitis* (*Pterandrus*) Bezzi (Diptera: Tephritidae)

Marc De Meyer[1] and Amnon Freidberg[2]

ABSTRACT

This is another paper in a series revising the fruit fly genus *Ceratitis* MacLeay (Diptera: Tephritidae), and it specificly revises the subgenus *Pterandrus* Bezzi. Thirty-six species are recognized of which ten are described as new: *C. argenteostriata,* n. sp., *C. barbata*, n. sp., *C. copelandi*, n. sp., *C. flava*, n. sp., *C. nigricornis*, n. sp., *C. obtusicuspis*, n. sp., *C. paracolae*, n. sp., *C. pennitibialis*, n. sp., *C. stipula*, n. sp. and *C. whitei*, n. sp. Lectotypes are designated (with discussion on the type series where applicable) for the following species: *C. anonae* Graham, *C. lobata* Munro, *C. pedestris* Bezzi, *C. pennipes* Bezzi, and *C. podocarpi* Bezzi. A key and illustrations of male and female terminalia, as well as other diagnostic features important for species recognition, such as wing and mesonotal patterns, and male leg ornamentation are given. Distribution and known host plant data are listed. Tentative species groups within the subgenus are discussed and compared with earlier classifications.

[1]Entomology Section, Royal Museum for Central Africa, Leuvensesteenweg 13, B-3080 Tervuren, Belgium. E-mail: demeyer@africamuseum.be; [2]Department of Zoology, The George S. Wise Faculty of Life Sciences, Tel Aviv University, Tel Aviv 69978, Israel. E-mail: afdipter@post.tau.ac.il

INTRODUCTION

Tephritidae are usually adorned by body and wing patterns and often by sexually-dimorphic ornamentations. Although commonly named 'fruit flies', the 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 (1992), and the currently acknowledged classification was presented by Norrbom *et al.* (1999), although some modifications have recently been suggested (Korneyev 1999). The genus *Ceratitis* MacLeay belongs to the tribe Ceratitidini (subfamily Dacinae; subtribe Ceratitidina, tribe Dacini, sensu Norrbom *et al*., 1999) which is predominantly an Afrotropical group. For discussion on classification and relationship with other genera, see White and Elson-Harris (1992), 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.

Despite the economic importance of various Ceratitidini, the taxonomy of this group is not in a good state, and no modern keys are available for most of the genera (White, 1989). Older keys, such as Bezzi (1918, 1920), or Munro (1935a), are outdated. Recent keys for *Ceratitis* by Freidberg (1991) and White and Elson-Harris (1992) focus only on males and major pest species, respectively, or are restricted to relatively small areas (Malagasy subregion (Hancock, 1984) and Zimbabwe (Hancock, 1987)).

The systematic position and composition of the genus *Ceratitis* and its subgenera, *Ceratitis* s. str., *Pardalaspis* Bezzi, *Ceratalaspis* Hancock, *Hoplolophomyia* Bezzi, *Acropteromma* Bezzi and *Pterandrus* Bezzi, have been confusing. Hancock (1984) proposed the presently accepted classification, in which he included *Pterandrus* and *Pardalaspis* as subgenera of *Ceratitis*, and erected a new subgenus, *Ceratalaspis*, to accommodate most of the species formerly included in *Pardalaspis*. He redefined the subgenera and listed the species included in each of them. The subgenus *Pterandrus* was characterized by the thoracic markings (Hancock, 1984: 279: "mesonotum brown to gray, with darker longitudinal lines or streaks which do not form distinct black patches"), dark wing pattern, and the male leg feathering (see material and methods for definition) and/or color pattern. Subsequent subgeneric changes were proposed by Hancock (1985, 1987, 1991) and Freidberg (1991). The latter also provided a key to the males of the subgenera *Ceratitis* and *Pterandrus*. More recently Hancock and White (1997) transferred a number of species from *Trirhithrum* and *Neoceratitis* to *Pterandrus* and recognized a distinct species group within the subgenus, characterized by the markings on the postpronotal lobe (a large black spot within a pale background), scutum (blackish with extensive gray microtrichia) and scutellum (black area extensive). Although this group was not named, a number of species were explicitly included in it: *C. bicincta* Enderlein, *C. chirinda* (Hancock), *C. curvata* (Munro), *C. faceta* Enderlein, *C. gravinotata* (Munro), *C. inauratipes* (Munro), *C. lobata* Munro, *C. pedestris* (Bezzi), *C. podocarpi* (Bezzi), *C. querita* (Munro) and *C. roubaudi* (Bezzi). According to Hancock (personal communication), all other *Pterandrus* species except for *C. tananarivana* Hancock were included in 'typical *Pterandrus*', although the species in this latter group were not explicitly listed. 'Typical *Pterandrus*' are characterized by the postpronotal lobe being entirely yellow and the scutellum more broadly yellow basally. For a full overview on the taxomomic history of the genus *Ceratitis* see De Meyer (1999b). Within the scope of a full revision of the genus *Ceratitis*, De Meyer revised the subgenera *Pardalaspis*, *Ceratalaspis*, *Ceratitis*, and the monobasic *Hoplolophomyia* and *Acropteromma* (De Meyer,

1996, 1998, 2000, and De Meyer and Copeland, 2001, respectively). Additional notes on *Pardalaspis* were given by De Meyer (1999a). This is the last paper in this series on the genus, dealing with the subgenus *Pterandrus*. Species currently placed in this subgenus are very varied, and it is not certain if the subgenus, as currently recognized, is a monophyletic group. Some species may eventually have to be transferred to other subgenera. However, no subgeneric changes are proposed here, as was the case in the earlier revisions, mentioned above, of congeneric subgenera by the first author. It is suggested that such changes should wait until a comprehensive phylogeny for the entire genus is compiled.

MATERIAL AND METHODS

Specimens from the following institutions were studied (curator names given in parentheses):

AMG — Albany Museum Grahamstown, South Africa (F. Gess)
AMNH — American Museum of Natural History, New York, U.S.A. (D. Grimaldi)
BMNH — Natural History Museum, London, England (I.M. White, N.P. Wyatt)
BPBM — Bernice P. Bishop Museum, Honolulu, Hawaii (N. Evenhuis)
CAS — California Academy of Sciences, San Francisco, U.S.A. (P.H. Arnaud Jr.)
CIRAD — Centre de coopération Internationale en Recherche Agronomique pour le Développement, Réunion Branch, Réunion (J.F. Vayssières/S. Quilici) (including material of DPVM)
CNEARC — Centre National d'Etudes Agronomiques des Régions Chaudes, Montpellier, France (A. Barbet)
DPVM — Direction for Plant Protection, Ministry of Agriculture, Madagascar (material received through CIRAD)
FSCA — Florida State Collection of Arthropods, Gainesville, U.S.A (G. Steck)
ICIPE — International Centre for Insect Physiology and Ecology, Nairobi, Kenya (R.S. Copeland, S. Lux)
IZUSN — Instituto di Zoologia, Universita degli Studia di Napoli, Portici, Italy (G. Viggiani)
KBIN — Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel, Belgium (P. Grootaert)
KMMA — Koninklijk Museum voor Midden Afrika, Tervuren, Belgium
MHNG — Muséum d'Histoire Naturelle, Genève, Switzerland (B. Merz)
MNHN — Muséum national d'Histoire Naturelle, Paris, France (J. Charbonnel, L. Matile)
MNHU — Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (M. Kotrba, H. Wendt)
NMB — Naturhistorisches Museum Basel, Switzerland (D. Burckhardt)
NMK — National Museums of Kenya, Nairobi, Kenya (K. Maes)
NMSA — Natal Museum, Pietermaritzburg, South Africa (D. Barraclough)
PPRI — Plant Protection Research Institute, Pretoria, South Africa (M.W. Mansell)
SAMC — South African Museum, Cape Town, South Africa (M. Cochrane)
TAMU — Texas A&M University, Texas, U.S.A (R. Wharton)
TAUI — Tel Aviv University, Tel Aviv, Israel
UMO — University Museum, Oxford, England (D.J. Mann, A. Pont)
USNM — United States National Museum of Natural History, Smithsonian Institution, Washington D.C., U.S.A. (A. Norrbom)

Type material was studied for all species except for *C. chirinda* (material in the Natural History Museum, Bulawayo, Zimbabwe). Terminology follows McAlpine (1981) and White *et al.* (1999), except for wing banding which is according to Freidberg (1991) and earlier revisions by the first author. Specific terms used for describing the leg ornamentations are "bush" and "feathering". The former refers to an irregular pilosity of mixed short and long thin setae, usually covering the posterior part of a forefemur (e.g., Figs. 147, 211). The term "feathering" refers to a regular row of long, stout and flattened setae along a femur or tibia, giving that part the appearance of a bird's feather (e.g., Figs. 152, 204). Coloration is often referred to as being "pale" (ranging from white through yellow to pale brown) or "dark" (ranging from dark brown to black). Aculeus ratio is the value obtained by dividing the length of the aculeus by its maximum width. Drawings were made with a drawing tube attached to a dissecting or compound microscope. In total, 124 morphological characters were recorded on a coded form. Some of these characters are incorporated in a pictorial and computerized multi-entry key developed by White and De Meyer (2001).

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 oviscape. Male terminalia and leg ornamentation, and aculeus shape are described and illustrated for most species. For wing and scutal patterns, only representative species are depicted and the other species are compared with them. For male terminalia, only a lateral view of the epandrium and lateral surstylus is illustrated. Study of male terminalia has shown that this is the only structure that shows some interspecific variation that could be used for recognition of species groups. Other structures showed no diagnostic features of use in this study.

Lectotypes and paralectotypes are designated for those species based on a series of syntypes, with reference to rule 74.7.3 of the International Code of Zoological Nomenclature. The taxonomic purpose of this practice is to ensure taxonomic stability in species recognition, especially for those species for which the exact number and whereabouts of the syntype material is unknown. In the latter cases, a detailed explanation about the individual specimens is given in the comments following the particular species. This is the case for *C. pedestris*, and *C. podocarpi*.

In the distribution sections all countries from which material was studied are listed alphabetically. In addition, literature records that could not be confirmed are listed. Listing of host plants follows the same outline as that of the distribution data. Commercial host plants, if known, are listed (by common and scientific names) before non-commercial plants (which are listed by scientific names only). Family assignment for host plants is based on Brummitt (1992). A more elaborate and annotated check list of host plants for representatives of the genus *Ceratitis* was recently published by De Meyer *et al.* (2002).

The synonymy in cited literature is mainly restricted to taxonomic references and allied topics such as phylogeny, distribution and host plant specificity. References on applied entomology are not included.

TAXONOMY

Subgenus *Ceratitis* (*Pterandrus*) Bezzi

Pterandrus Bezzi, 1918: 231. Type species: *Ceratitis rosa* Karsch, 1887, by original designation. Bezzi, 1924a: 476 (key to South African Museum species); Bezzi, 1924b: 99

(key); Cogan & Munro, 1980: 530 (Afrotropical Catalog).

Ceratitis (*Pterandrus*): Hancock, 1984: 279 (subgeneric rank, species list); Hancock, 1987: 52 (key to Zimbabwean species); Freidberg, 1991: 167 (key); White & Elson-Harris, 1992: 302-312 (summary of species with pest status); Hancock & White, 1997: 196 (species groups); Norrbom *et al.*, 1999: 120 (World Catalog); De Meyer, 1999b: 409-428 (taxonomic history, phylogeny).

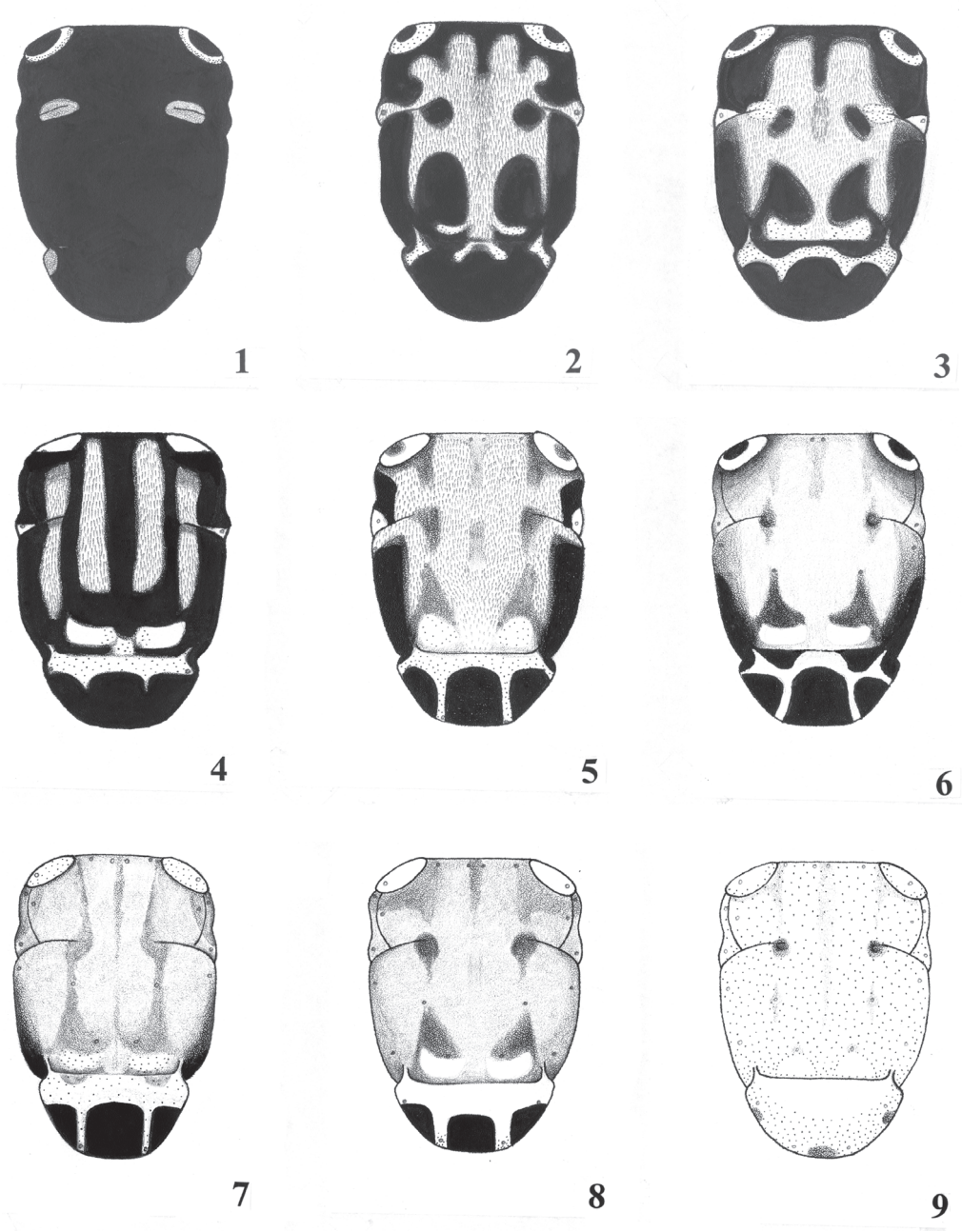
Description

Head. Antenna with first flagellomere 2-3 times as long as pedicel. Arista usually with short to moderately long rays on entire length both dorsally and ventrally, but rays ventrally shorter and sparser than dorsally, especially at base. Face usually white or yellow, gena sometimes with blackish spot. Frons yellow, convex or flat, longer than wide; in lateral view frontofacial angle usually not protuberant. In few cases frons, face and/or frontofacial angle with darker transverse banding or patches. Chaetotaxy: major setae dark and acuminate; two orbitals, anterior slightly thicker and longer than posterior; two frontals, usually of equal length, more slender than orbitals; ocellar very long, at least twice as long as ocellar triangle; medial vertical equal to or slightly longer than ocellar, lateral vertical shorter than ocellar; postocellar and postoculars slender; other setae and setulae short and dark (sometimes more reddish) except on occipital swellings and mouthparts where partly pale. Genal seta and setulae usually well developed, occasionally poorly developed.

Thorax (Figs. 1-9). Postpronotal lobe spotted or unspotted. Scutal pattern of several main types: 1) completely shiny black without any microtrichose stripes or spots; 2) shiny dark ground color partly covered by silvery microtrichia, leaving distinct shiny black or brown spots; or 3) predominantly brownish-gray or yellowish-gray microtrichose, without distinct shiny black spots. Anepisternum yellowish with ventral part darker; pilosity (the overall setulae cover) variable, from entirely white to entirely black. Chaetotaxy: setae normal in shape and usually dark; two scapulars, one postpronotal, one presutural supra-alar, two notopleurals, one postsutural supra-alar, one dorsocentral aligned slightly posterior to postsutural supra-alar, one postalar, one intra-alar, one prescutellar acrostichal, one basal and one apical scutellar, one anepisternal, one anepimeral, and one katepisternal; setulae pale or yellowish. Scutellum usually white or yellowish with black markings, sometimes completely black. Subscutellum black.

Legs (Figs. 102-221). Partly or wholly yellowish or brownish. Setae and setulae yellow or black; legs of male usually with setal ornamentation of variable shape on forefemur, midfemur, and/or midtibia, sometimes forefemur with conspicuous black and white pattern; rarely male legs without any ornamentation.

Wing (Figs. 10-21): Usually with bands well developed (*Ceratitis* type), bands vary between dark brown and combination of brown and yellow. Characteristic pattern of basal streaks and spots, typical for genus, present in all known species of the subgenus although reduced in a few species. Marginal band (= anterior apical band of White *et al.*, 1999) either joined with anterior part of discal band or these bands narrowly separated near apex of vein R_1. Discal band (= discal band of White *et al.*, 1999) crosses basal half of discal cell. Cubital band (= subapical band of White *et al.*, 1999) free or joined anteriorly with discal band or marginal band. Medial band (= posterior apical band of White *et al.*, 1999) present or absent. Vein R_{4+5} dorsally sparsely setulose on basal two-thirds. Posterodistal extension of cell bcu with middle part broadest.



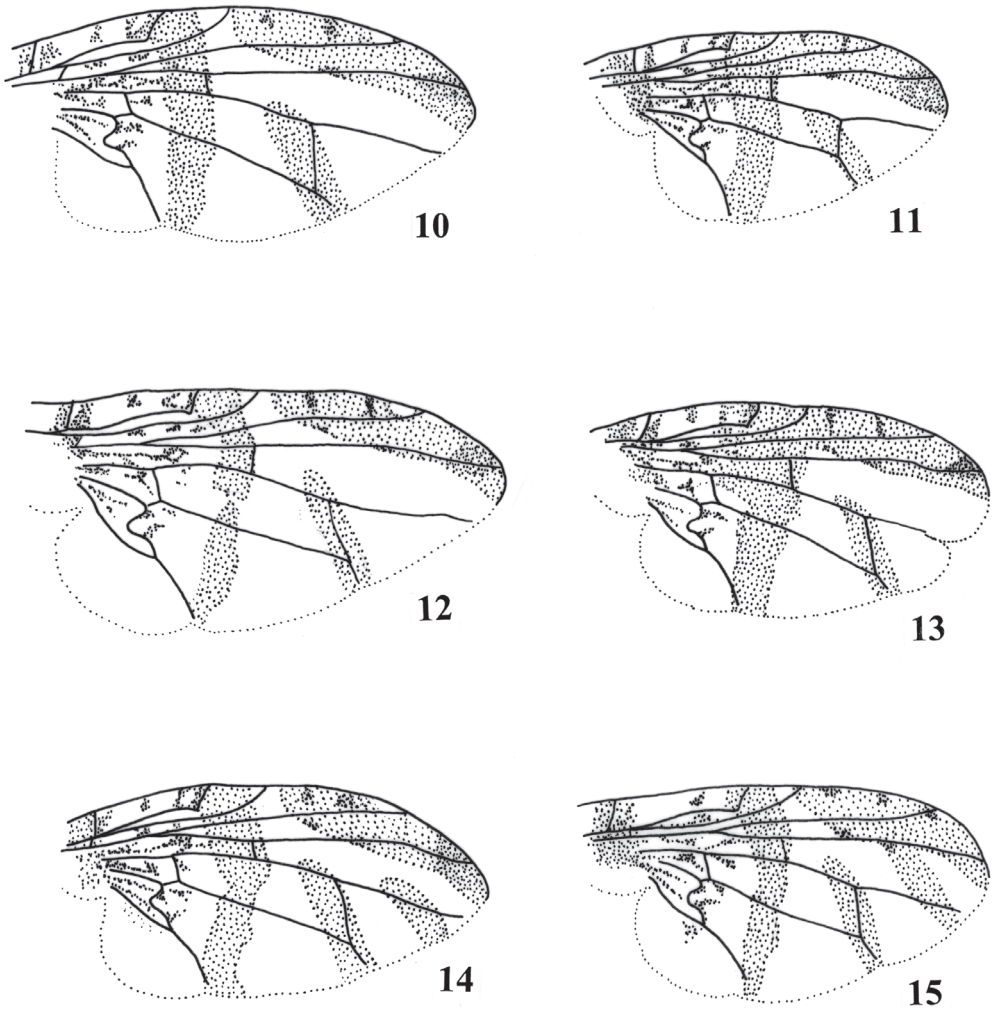
Figs. 1-9. Thoracic pattern. 1. *Ceratitis faceta*. 2. *C. gravinotata*. 3. *C. bicincta*. 4. *C. argenteostriata* n. sp. 5. *C. tananarivana*. 6. *C. pinnatifemur*. 7. *C. fasciventris*. 8. *C. colae*. 9. *C. flexuosa.*

Abdomen: Ground color variable, usually yellowish, with more or less pronounced silver or pale gray bands on tergites two and four, covering at least posterior 0.33 of each tergite; tergite three with black band of varying width along posterior margin. Ground color sometimes more brownish, or with brownish band or pair of brownish vittae at anterior or posterior margin. Occasionally ground color completely black. Pilosity mixed pale and dark, margins of tergites five and six with long dark setae. Oviscape of variable length; usually orange, apically somewhat darkened. Aculeus variable in shape, tip either pointed or with small notch. Two spermathecae, club-shaped.

Males (of six species tested so far) are attracted to trimedlure and terpinyl acetate (Hancock, 1987; De Meyer, 1999b).

Key to the species of the subgenus *Ceratitis* (*Pterandrus*)

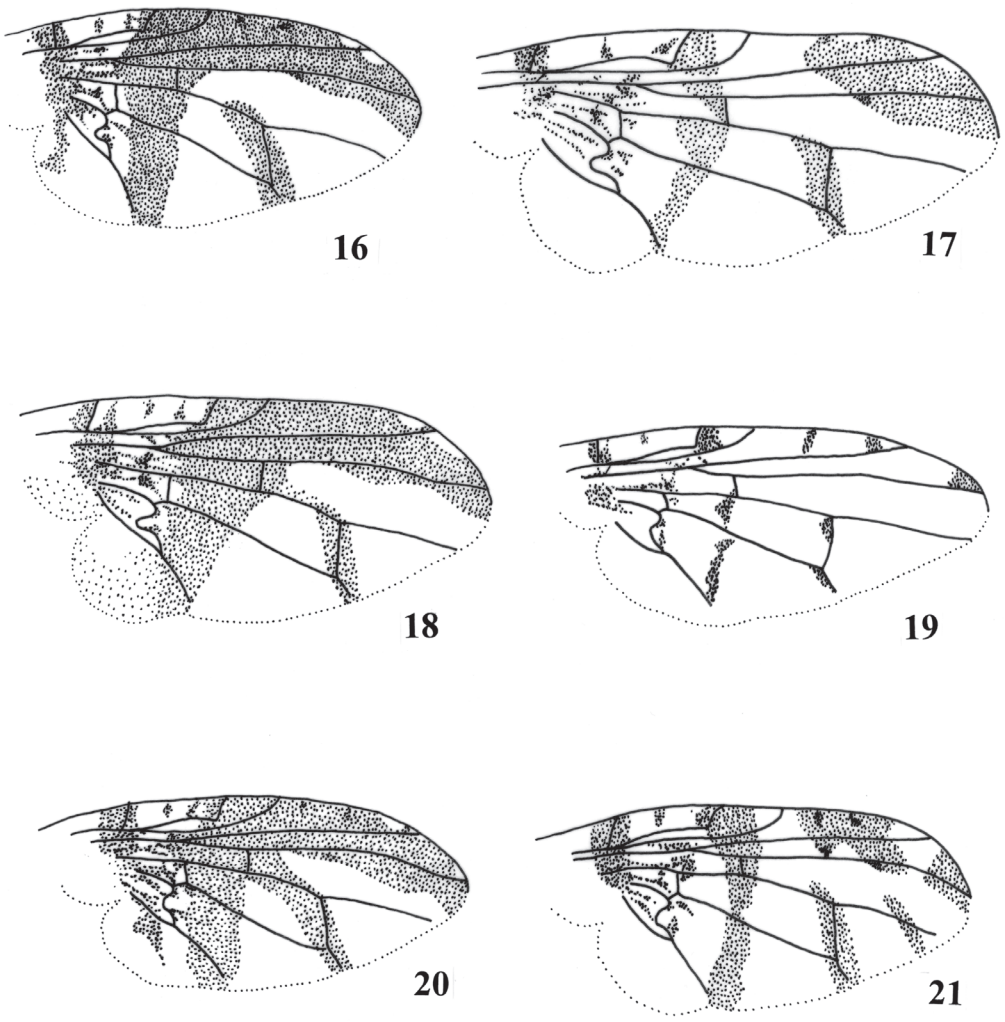
1. Postpronotal lobe spotted or partly dark (Figs. 1-6); scutum either entirely shiny black without microtrichia, or partly covered by silvery microtrichia, leaving distinct shiny black or brown patches or stripes; scutellum usually with two dark basal spots or more extensively black **2**
-. Postpronotal lobe without spot, at most dark yellow (Figs. 7-9), scutum predominantly brownish-gray or yellowish-gray microtrichose, usually without distinct shiny black spots; if shiny spots present on scutum, then scutellum base without black spots **22**
2. Cubital band joining both discal band and marginal band near anterior wing margin (Fig. 20) **3**
-. Cubital band free (at most with dark impression linking cubital band to discal band, Fig. 18) or joining discal band at more posterior point **4**
3. Face white, abdominal tergite 1 yellowish orange (Kenya, Zimbabwe) ..... ***querita***
-. Face yellow, abdominal tergite 1 black (Zimbabwe) ..... ***chirinda***
4. Scutum and scutellum predominantly shiny black; no streaks or spots (Fig. 1) except paler spots on transverse suture; no microtrichose areas **5**
-. Scutum with ground color brownish black or orange-brown, with silvery microtrichose areas and black spots or stripes; scutellum with white or yellow ground color, with black basal and/or apical spots (scutellar spots merged or separate) (Figs. 2-4) **7**
5. Legs predominantly black, only tarsi and distal two-thirds of foretibia and hindtibia yellow; male midfemur with black feathering along dorsal and ventral margin (Fig. 132); aculeus tip laterally more or less concave, broader (Fig. 91) (Congo (D.R.), Equatorial Guinea) ..... ***faceta***
-. Legs predominantly yellow, at most femora and tibiae partly brown; male midfemur with row of dispersed yellow setae along dorsal margin (Fig. 156) or without any feathering; aculeus tip evenly tapered, straight laterally, narrower (Fig. 99 – *C. bicincta*; female of *C. inauratipes* unknown) **6**
6. Male anepisternum without conspicuous silvery shine, with setulae mostly pale but with some dark setulae ventral to anepisternal seta; legs without feathering; aculeus at least 10 times as long as wide, tip blunt and with lateral margin straight (Fig. 99) (Ghana, Nigeria, Congo (D.R.)) ..... ***bicincta*** (part)
-. Male anepisternum with conspicuous silvery shine on ventral third, setulae pale except single dark setula ventral to anepisternal seta; midfemur with row of dispersed yellow setae



Figs. 10-15. Wing pattern. 10. *Ceratitis acicularis*. 11. *C. pedestris*. 12. *C. anonae*. 13. *C. lobata*. 14. *C. rubivora*. 15. *C. gravinotata.*

along dorsal margin, and longer black setae along ventral margin (Fig. 156) (female unknown) (Gongo (D.R.)) ..... ***inauratipes***

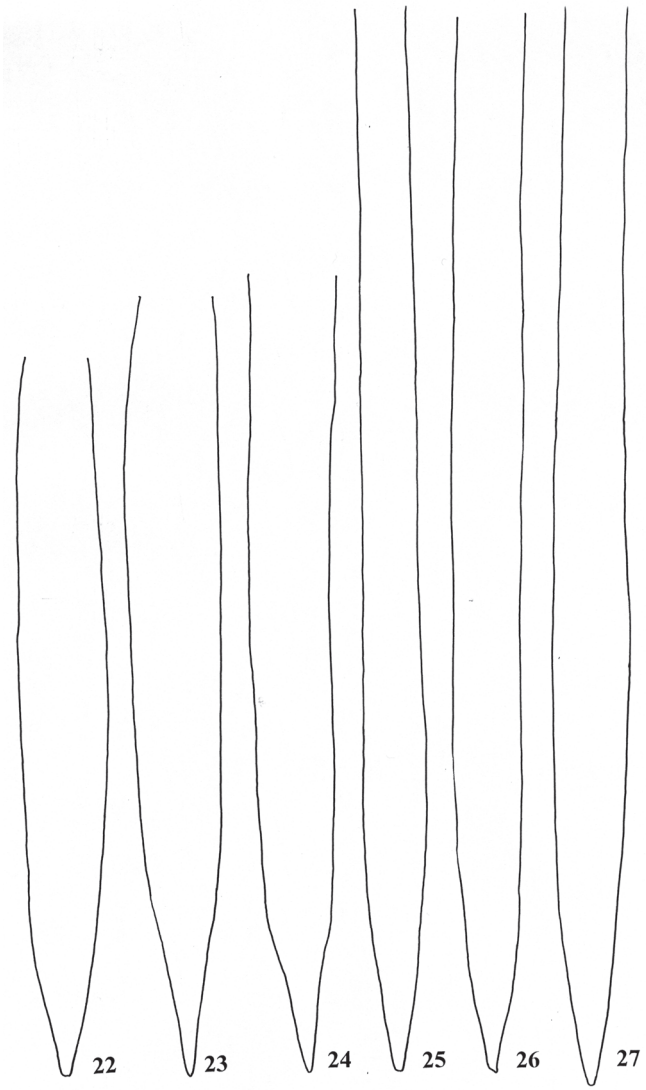
7. Marginal band with large hyaline break along costa extending halfway into cell r_1 (Fig. 17); postpronotal lobe with posterior part darkened, without well defined spot around seta; scutum with two (pairs) distinct gray vittae (Fig. 4) (Madagascar) .. ***argenteostriata*, n. sp.**
-. Marginal band without large hyaline break extending into cell r_1 (Figs. 10, 15); postpronotal lobe with distinct spot around seta; scutum with gray patches, not distinct vittae (Fig. 2) . **8**
8. Medial band present, usually joined with marginal band, sometimes separated (Fig. 15) .. **9**
-. Medial band usually absent (Fig. 10), if weak impression present, then always separated



Figs. 16-21. Wing pattern. 16. *Ceratitis bicincta*. 17. *C. argenteostriata* n. sp. 18. *C. inauratipes*. 19. *C. flexuosa*. 20. *C. querita*. 21. *C. fulicoides.*

from other bands **10**

9. Black basal scutellar spots absent, apical spots separate; male legs strongly modified, with midtibia club-shaped and not feathered (Fig. 212), very slender, except on strongly expanded distal 0.25; aculeus tip broad (Fig. 89) (Madagascar) ..... ***tananarivana***
-. Black basal scutellar spots present, apical spots merged and touching basal spots; male midtibia not club-shaped, with black feathering on distal 0.75 (Fig. 152); aculeus tip slender (Fig. 93) (Ethiopia, Kenya) ..... ***gravinotata***
10. First flagellomere black; male midfemur ventrally with short feathering on distal part (Fig. 168) (female unknown) (Ethiopia) ..... ***nigricornis*, n. sp.**



Figs. 22-27. Aculeus, full length. 22. *Ceratitis colae*. 23. *C. fulicoides*. 24. *C. faceta*. 25. *C. barbata* n. sp. 26. *C. flava* n. sp. 27. *C. acicularis.*

-. First flagellomere yellow to yellowish orange or, if dark orange or brown (*C. roubaudi* and *C. bicincta*), midleg unfeathered **11**

11. Black apical scutellar spots merged, only weakly separated by yellow incisions anteriorly **12**

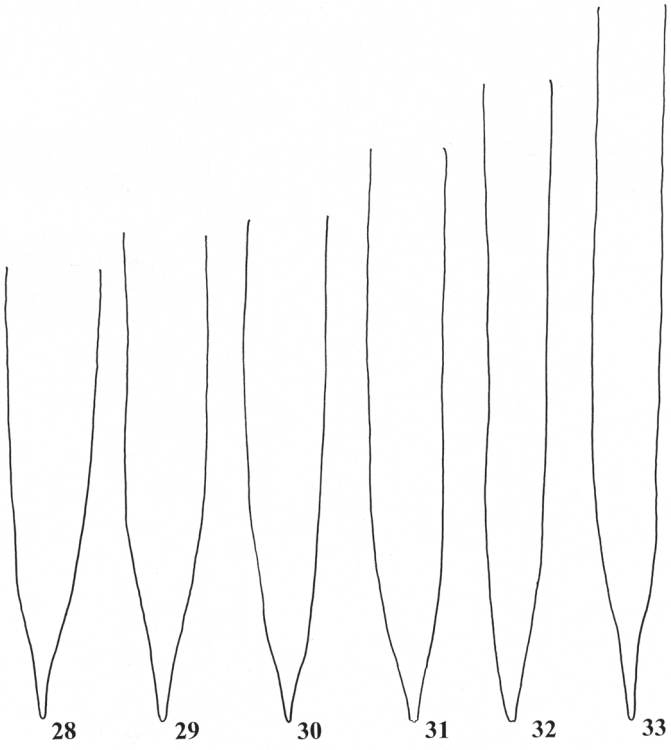
-. Black apical scutellar spots separate **19**

12. Males **13**

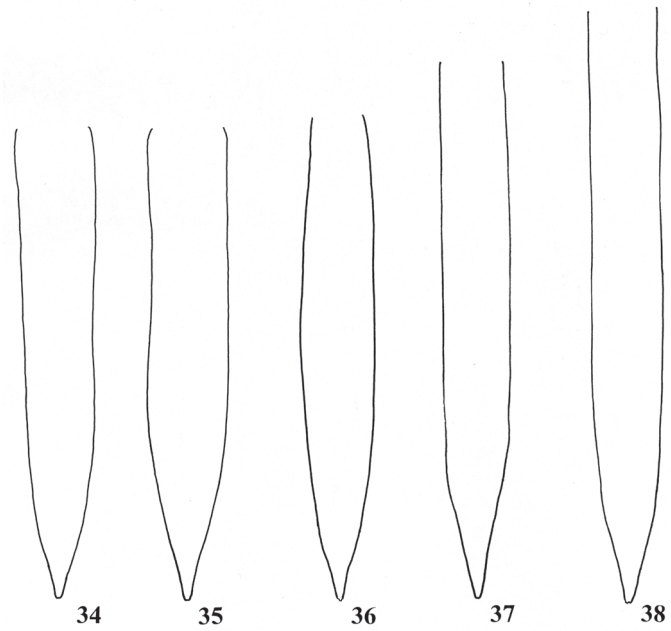
-. Females **16**

13. Legs without feathering (Ghana, Nigeria, Congo (D.R.)) ..... ***bicincta***

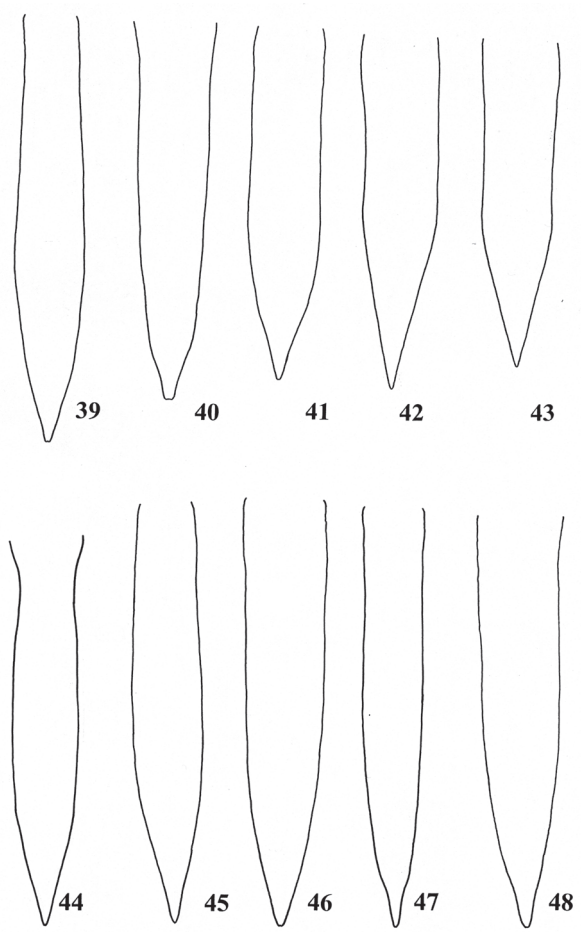
-. Either forefemur or midtibia or midfemur with feathering **14**



Figs. 28-33. Aculeus, full length. 28. *Ceratitis podocarpi*. 29. *C. gravinotata*. 30. *C. roubaudi*. 31. *C. paracolae* n. sp. 32. *C. penicillata*. 33. *C. pedestris.*

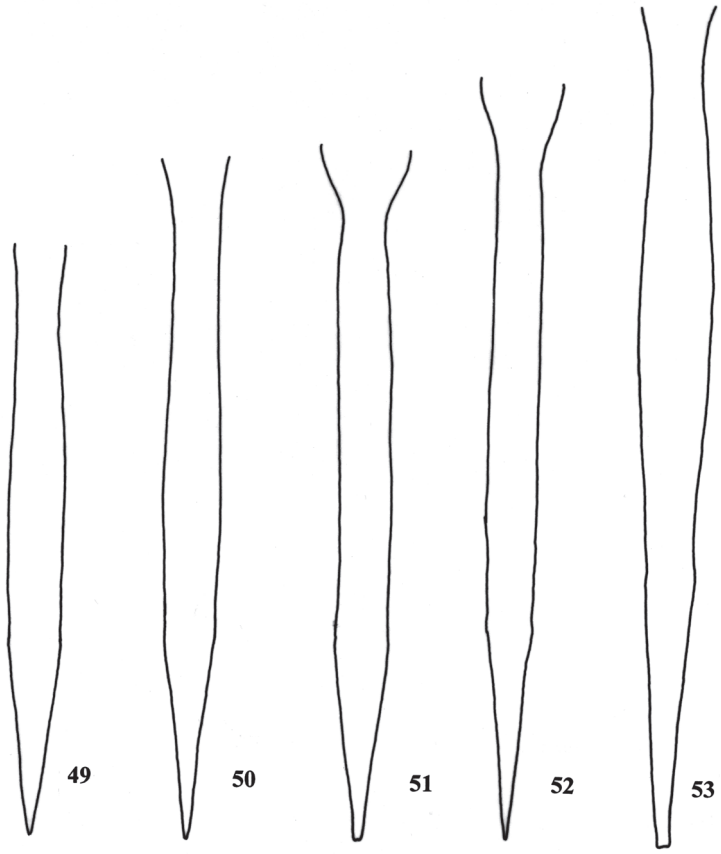


Figs. 34-35. Aculeus, full length. 34. *Ceratitis tripteris*. 35. *C. anonae*. 36. *C. whitei* n. sp. 37. *C. morstatti*. 38. *C. melanopus.*



Figs. 39-48. Aculeus, full length. 39. *Ceratitis rosa*. 40. *C. obtusicuspis* n. sp. 41. *C. fasciventris*. 42. *C. rubivora*. 43. *C. argenteostriata* n. sp. 44. *C. pennitibialis* n. sp. 45. *C. tanana-rivana*. 46. *C. flexuosa*. 47. *C. stipula* n. sp. 48. *C. copelandi* n. sp.

14. Wing apically bilobed (Fig. 13) (Rwanda, Kenya, South Africa) ..... ***lobata***
-. Wing without such lobe **15**
15. Midtibia with feathering; midfemur without row of black curved setae (Fig. 188) (Kenya) ..... ***pennitibialis*, n. sp.**
-. Midtibia without feathering; midfemur with row of black curved setae (Fig. 128) (Kenya) ..... ***curvata***
16. Aculeus short and broad (aculeus ratio 6), tip broad, laterally more or less sinuous (Figs. 44, 90) (Kenya) ..... ***pennitibialis*, n. sp.**
-. Aculeus long and slender (aculeus ratio at least 10), tip slender, straight laterally (Figs. 49, 50, 100, 101) **17**
17. Aculeus tip very slender and elongated (Fig. 99); mesonotum usually dark without distinct marking, yellow markings on scutellum hardly discernible (Ghana, Nigeria, Congo (D.R.)) ..... ***bicincta***
-. Aculeus tip not so elongated (Figs. 100, 101); mesonotum with distinct dark prescutellar marking on thorax, yellow marking on scutellum usually discernible **18**
18. Aculeus with tip flat, narrow (Figs. 50, 101) (Kenya) ..... ***curvata***



Figs. 49-53. Aculeus, full length. 49. *Ceratitis lobata*. 50. *C. curvata*. 51. *C. querita*. 52. *C. bicincta*. 53. *C. pinnatifemur*.

-. Aculeus with tip curved ventrally, broad (Figs. 49, 100) (Rwanda, Kenya, South Africa) ..... ***lobata***

19. Marginal band usually not joining discal band proximally (at most partly joined), interruption distal to vein R_1; apical scutellar spots touching basal spots or almost so; male midtibia with distal half slightly dilated and with dorsal and ventral feathering (Fig. 196) (Ethiopia, Kenya, South Africa) ..... ***podocarpi***

-. Marginal band forming continuous band with proximal part of discal band; apical and basal scutellar spots clearly separated from each other; male midtibia without feathering **20**

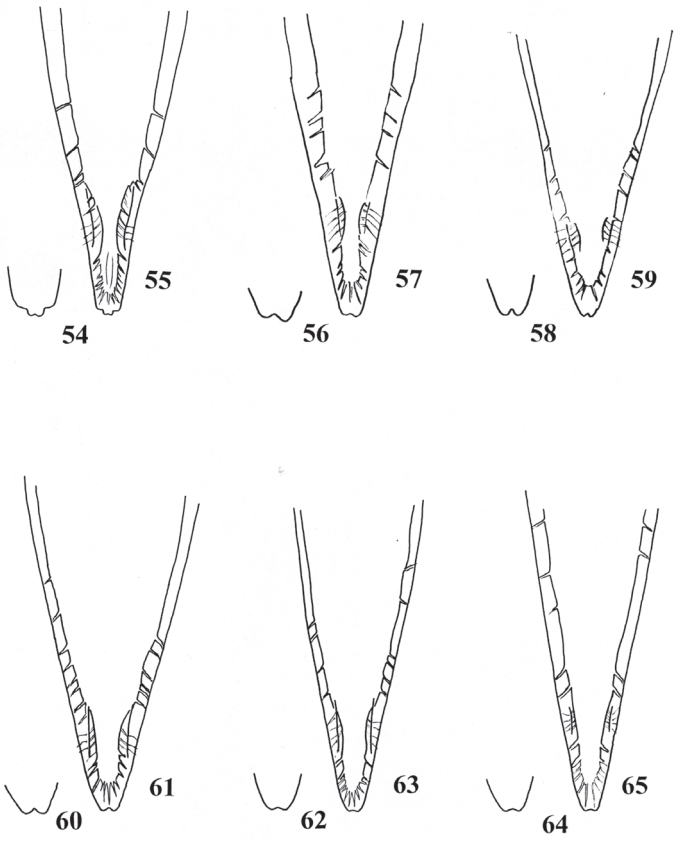
20. Anepisternum with pale pilosity (at most few dark setulae at margins); male forefemur with conspicuous black and white pattern (Fig. 178); aculeus slender, with tip pointed (Fig. 95) (from Ivory Coast and Kenya to Angola and South Africa, Madagascar) ..... ***pedestris***

-. Anepisternum with dark pilosity ventral to anepisternal seta; male forefemur without black and white pattern; aculeus broad or, if slender, with broadened tip **21**

21. Male midfemur with feathering (Fig. 192); aculeus tip broadened (Fig. 97) (Cameroon, Equatorial Guinea, Uganda) ..... ***pinnatifemur***

-. Male legs without any feathering; aculeus tip not broadened (Fig. 92) (Congo (Brazzaville), ?Tanzania) ..... ***C. roubaudi***

22. Wing pattern reduced to isolated spots (Fig. 19); apical scutellar spots small, restricted to



Figs. 54-65. Enlargement of aculeus tip and apical part of aculeus. 54-55. *Ceratitis paracolae* n. sp. 56-57. *C. melanopus*. 58-59. *C. morstatti*. 60-61. *C. colae*. 62-63. *C. penicillata*. 64-65. *C. acicularis.*

apical margin; male midfemur with row of strong short setae along dorsal margin at least on distal half (Fig. 144) (from Ivory Coast and Angola to Kenya) ..... ***flexuosa***

-. One or more wing bands present, not reduced to isolated spots; apical scutellar spots larger; male midfemur without such row of setae along dorsal margin **23**

23. Marginal band joined with anterior part of discal band (Fig. 11) (*C. barbata*, with narrow interruption and bands sometimes narrowly connected, keys out both ways) **24**

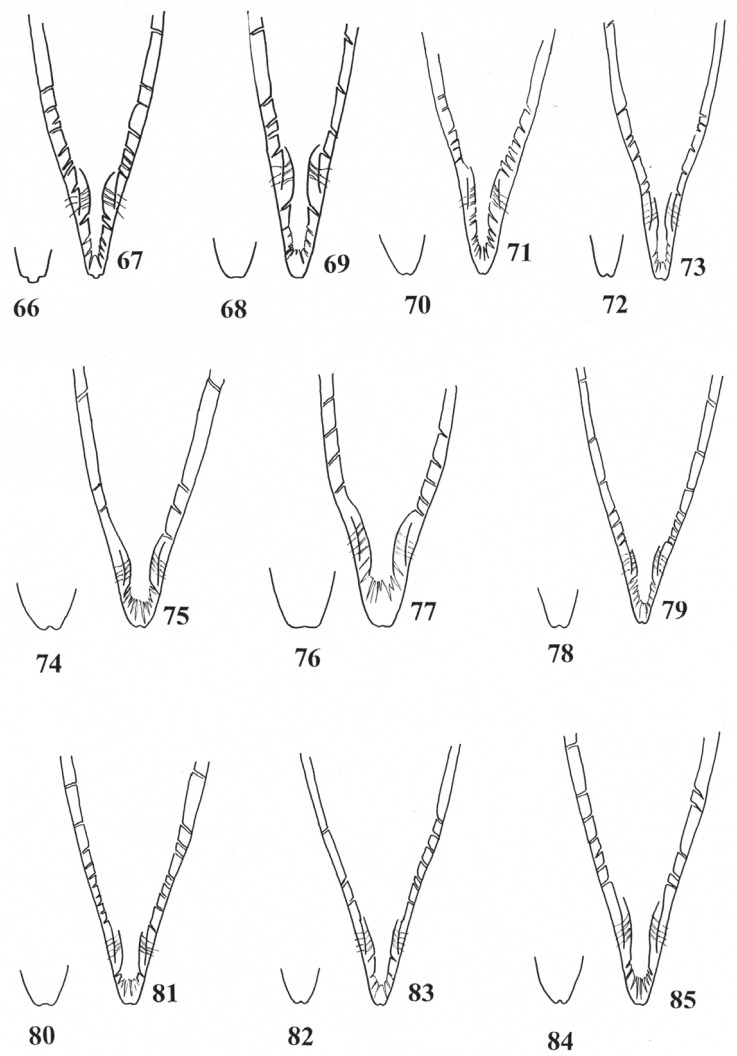
-. Marginal band not joined with discal band (Fig. 10) **27**

24. Anepisternum on ventral half yellow and with few dark setulae ventral to anepisternal seta **25**

-. Anepisternum along ventral margin brown and usually with all setulae pale (if dark setulae present, restricted to ventral margin) **26**

25. Male midfemur ventrally with tuft of black feathering (Fig. 216); aculeus with notch at tip (Figs. 78, 79) (Sierra Leone, Ivory Coast, Nigeria) ..... ***tripteris***

-. Male midfemur without feathering (Fig. 220); aculeus with step at tip (Figs. 66, 67) (Congo

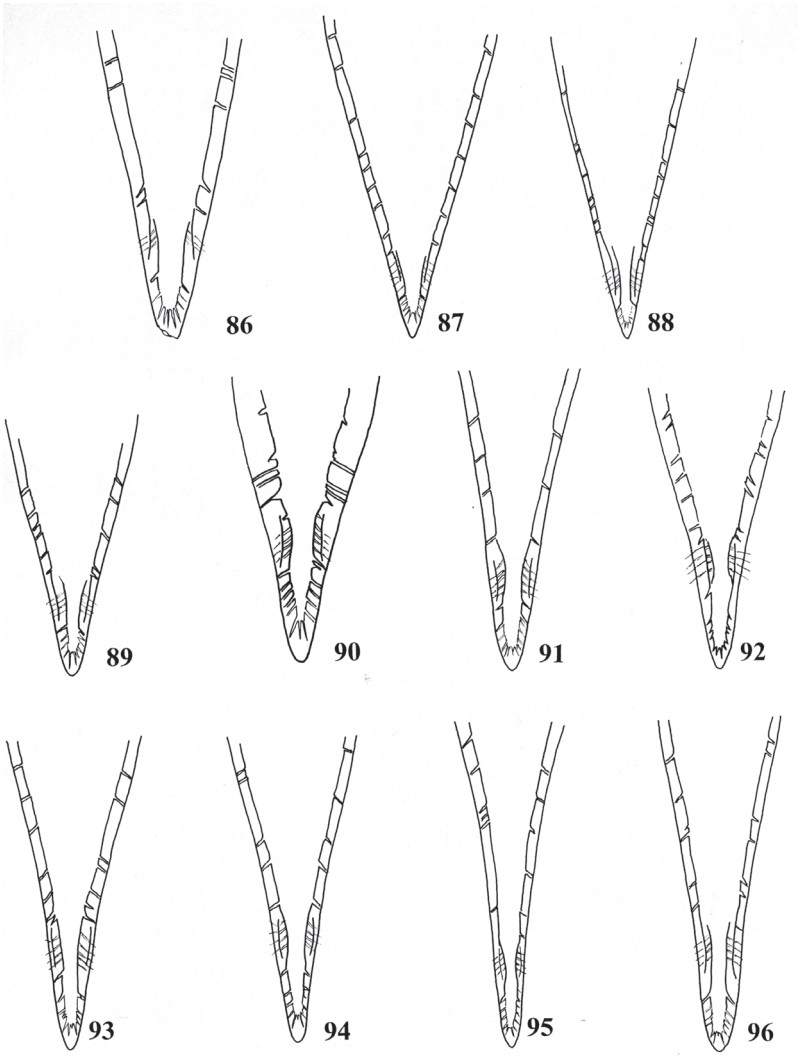


Figs. 66-85. Enlargement of aculeus tip and apical part of aculeus. 66-67. *Ceratitis whitei* n. sp. 68-69. *C. barbata* n. sp. 70-71. *C. copelandi* n. sp. 72-73. *C. stipula* n. sp. 74-75. *C. flexuosa*. 76-77. *C. obtusicuspis* n. sp. 78-79. *C. tripteris*. 80-81. *C. rosa*. 82-83. *C. fasciventris*. 84-85. *C. anonae.*

(D.R.)) ..... ***whitei*, n. sp.**

26. Male midfemur with feathering along entire ventral aspect, denser and shorter at base; midtibia with feathering almost along entire length (Fig. 116); aculeus tip with very weak notch (Figs. 68, 69); medial band usually present as narrow band in both sexes (Ivory Coast, Ghana, Nigeria, Cameroon, Congo (D.R.)) ..... ***barbata*, n. sp.** (part)

-. Male midfemur at most with few longer setulae along extremities; midtibia with feathering at most along distal half (Fig. 184); aculeus tip with more pronounced notch (Figs. 62, 63);



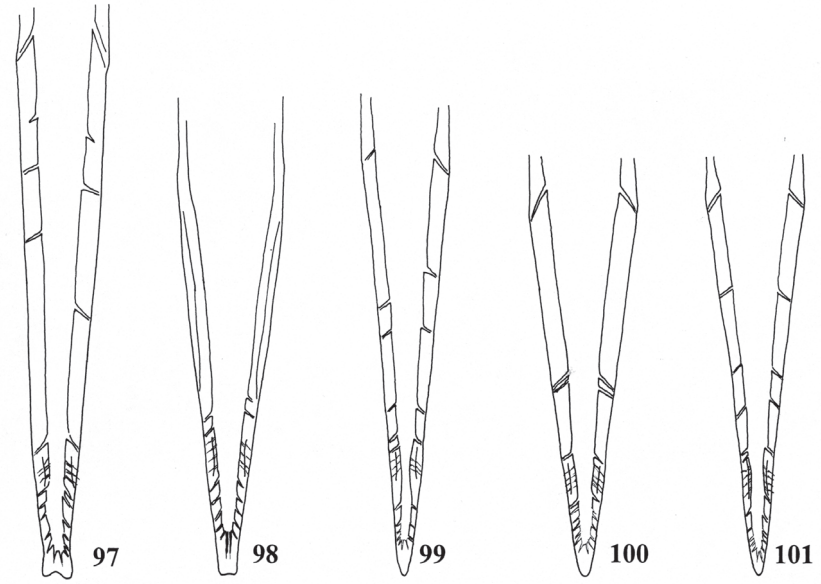
Figs. 86-96. Apical part of aculeus. 86. *Ceratitis flava* n. sp. 87. *C. argenteostriata* n. sp. 88. *C. rubivora*. 89. *C. tananarivana*. 90. *C. pennitibialis* n. sp. 91. *C. faceta*. 92. *C. roubaudi*. 93. *C. gravinotata*. 94. *C. podocarpi*. 95. *C. pedestris*. 96. *C. fulicoides.*

medial band absent in both sexes (West and Central Africa, from Ivory Coast to Congo (D.R.)) ..... ***penicillata***

27. Marginal band reduced and interrupted (Fig. 21); male leg feathering orange (Figs. 146-149) (Congo (D.R.)) ..... ***fulicoides***

-. Marginal band developed over entire length, interruption smaller; male leg feathering dark **28**

28. First flagellomere brown; face yellowish orange; male midleg without feathering (Ghana, Equatorial Guinea) ..... ***melanopus***



Figs. 97-101. Aculeus apical part. 97. *C. pinnatifemur*. 98. *C. querita*. 99. *C. bicincta*. 100. *C. lobata*. 101. *C. curvata.*

-. First flagellomere yellow to orange (if brownish, then male midleg with feathering); face white to yellow **29**
29. Males **30**
-. Females (female of *C. lepida* unknown) **43**
30. Midtibia and midfemur without feathering (West and Central Africa, from Ghana to Congo (D.R.)) ..... ***morstatti***
-. Midtibia at least partly with feathering, midfemur with or without feathering **31**
31. Midfemur with ventral feathering with gap in middle (Fig. 120, 160, 176) **32**
-. Midfemur ventrally without feathering or with continuous feathering **34**
32. Forefemur without distinct black and white pattern, and without patch of densely set short setulae along anteroventral aspect (Fig. 174) (Nigeria, Cameroon) ..... ***paracolae***, **n. sp.**
-. Forefemur with black and white pattern, and with patch of densely set short setulae along anteroventral aspect (Figs. 118, 158) **33**
33. Midfemur with small interruption in ventral feathering, 2-3 setae wide; midtibia with black feathering dorsally along distal 0.9 (Fig. 160) (Ghana) ..... ***lepida***
-. Midfemur with larger interruption in ventral feathering, 6-7 setae wide; midtibia with black feathering dorsally along distal 0.8 (Fig. 120) (West Africa to Central Africa, from Sierra Leone to Congo (D.R.)) ..... ***colae***
34. Midfemur feathered ventrally (Figs. 104, 108, 116, 172, 204, 208) **35**
-. Midfemur not feathered ventrally (Figs. 124, 136, 140, 200) **40**
35. Forefemur completely yellow; midfemur ventral feathering restricted to distal third (Fig. 172) (Kenya) ..... ***obtusicuspis***, **n. sp.**
-. Forefemur partly or completely brown; midfemur ventral feathering more extensive (Figs.

104, 108, 116, 204, 208) **36**
36. Midtibia anteriorly with dispersed short setulae (less than half as long as apical spur) (Figs. 108, 204) **37**
-. Midtibia anteriorly with long, dense and conspicuous setulae (much more than half as long as apical spur, longest about as long as spur) (Figs. 104, 116, 208) **38**
37. Midfemur usually largely yellow, if more blackened then at least basal part yellow, ventral feathering composed of moderately short and well developed setae on distal half, much finer and longer setae on basal half, latter distinctly differing from distal setae (Fig. 204); wing usually with medial band (Fig. 14) (eastern and southern Africa) ..... ***rubivora***
-. Midfemur largely brown, including basal part, ventral feathering composed of long and well developed setae on distal 0.5-0.6, finer but equally long setae on basal 0.4-0.5, latter not distinctly differing from distal setae (Fig. 108); wing without medial band (Fig. 12) (Tropical Africa, from Guinea Conakry to Tanzania) ..... ***anonae***
38. Midfemur ventrobasally with short dispersed dark setulae (Fig. 104), without dense pilosity, ventral feathering dispersed and short; anepisternum usually with at least few dark setulae along ventral margin (Ivory Coast, Angola) ..... ***acicularis***
-. Midfemur ventrobasally with dense group of dark, moderately long setulae, ventral feathering dense and long; anepisternum with completely pale pilosity (Figs. 116, 208) **39**
39. Midfemur ventrobasally densely pilose and feathered (Fig. 116); wing with medial band usually present as narrow band (Ivory Coast, Ghana, Nigeria, Cameroon, Congo (D.R.)) .. .. ***barbata*, n. sp.** (part)
-. Midfemur ventrobasally sparsely pilose, and without feathering (Fig. 208); wing with medial band absent (Guinea, Cameroon, Congo (D.R.), Uganda, Kenya, Tanzania) .... ***stipula*, n. sp.**
40. Foretibia flattened dorsoventrally, white (Fig. 122); midtibia partly flattened, distal 0.4 wider (Fig. 124); frons with silvery shine along longitudinal groove (Kenya, Zimbabwe) .. .. ***copelandi*, n. sp.**
-. Foretibia and midtibia not flattened, yellow or partly black; frons without silvery shine or longitudinal groove **41**
41. Legs and abdomen largely yellow, abdominal tergite 3 with dark band poorly developed, sometimes largely absent; midtibia with feathering along most of length dorsally (Fig. 140) (Mali, Ivory Coast, Congo (D.R.)) ..... ***flava*, n. sp.**
-. Abdominal tergite 3 with distinct brown band; midtibia with feathering along shorter length, occupying at most 0.8 of total length (Figs. 136, 200) **42**
42. Midtibia not broadened, mainly yellow without conspicuous silvery shine, dark feathering extending at most to distal half (Fig. 136) (mainly in western and central Africa south to the Congo/Zambian and Angola/Namibian border, sympatric with *rosa* in Kenya only; Fig. 251) ..... ***fasciventris***
-. Midtibia moderately broadened, with distal 0.66-0.75 black and with conspicuous silvery shine, dark feathering extending at least to distal 0.75 dorsally (Fig. 200) (eastern and southern Africa; Fig. 252) ..... ***rosa***
43. Oviscape long, about as long as or longer than preabdomen; aculeus ratio at least 8 (Figs. 22, 25, 26, 27); (*stipula* and *paracolae* ratio about 7, key out both ways) **44**
-. Oviscape shorter than preabdomen; aculeus ratio at most 6 (Figs. 35, 39, 40, 41, 42)

..... **50**

44. Legs entirely yellow; abdomen largely yellow, at most abdominal tergite 3 with small brown transverse band along posterior 0.25 (Mali, Ivory Coast, Congo (D.R.)) ..... ***flava***, **n. sp.**
-. Legs at least partly dark; abdomen at least with well defined black to brown band occupying more than posterior 0.25 ..... **45**
45. Anepisternum on ventral half blackish, setulae on ventral half and across posterior margin black (West Africa to Central Africa, from Sierra Leone to Congo (D.R.)) ..... ***colae***
-. Anepisternum along ventral margin narrowly dark, setulae pale, at most dark along ventral margin **46**
46. Aculeus tip with shoulder (Figs. 54, 55) (Nigeria, Cameroon) ..... ***paracolae***, **n. sp.**
-. Aculeus tip without shoulder (Figs. 64, 68, 72) **47**
47. Aculeus tip rapidly, then gradually narrowed, lateral margin strongly sinuous (Fig. 73) (Guinea, Cameroon, Congo (D.R.), Uganda, Kenya, Tanzania) ..... ***stipula***, **n. sp.**
-. Aculeus tip gradually narrowed, lateral magin nearly straight (Figs. 65, 69) **48**
48. Oviscape about as long as preabdomen; aculeus ratio less than 10, tip broad (Figs. 37, 59) (West and Central Africa, from Ghana to Congo (D.R.)) ..... ***morstatti***
-. Oviscape at least as long as preabdomen, usually longer; aculeus ratio more than 11 (Figs. 25, 27), tip narrower (Figs. 65, 69) **49**
49. Aculeus tip without distinct apical indentation, notch weak or tip almost straight (Figs. 68, 69); white prescutellar markings conspicuous and merged; interruption between marginal and discal bands narrow, often narrowly bridged; narrow medial band usually present (Ivory Coast, Ghana, Nigeria, Cameroon, Congo (D.R.)) ..... ***barbata***, **n. sp.**
-. Aculeus tip with distinct apical indentation, not straight (Figs. 64, 65); yellowish or white prescutellar markings not pronounced, separate; interruption between marginal and discal bands broad and complete; medial band absent (Ivory Coast, Angola) ..... ***acicularis***
50. Frons with conspicuous median silvery vitta from ocellar triangle to anterior margin (Kenya, Zimbabwe) ..... ***copelandi***, **n. sp.**
-. Frons without such vitta **51**
51. Aculeus evenly tapered, straight laterally; tip pointed without apical notch (Fig. 88); medial band usually present (eastern and southern Africa) ..... ***rubivora***
-. Aculeus not evenly tapered, more or less sinuous laterally; tip with small apical notch; medial band absent **52**
52. Aculeus tip with shoulder (Figs. 54) (Nigeria, Cameroon) ..... ***paracolae***, **n. sp.**
-. Aculeus tip without shoulder (Figs. 72, 76, 81, 83, 85) **53**
53. Aculeus tip blunt, broadened (Figs. 76, 77); anepisternum along ventral margin narrowly darker yellow (Kenya) ..... ***obtusicuspis***, **n. sp.**
-. Aculeus tip narrower (Figs. 72, 81, 83, 85); anepisternum usually with ventral 0.33-0.5 darker yellow or brown **54**
54. Aculeus ratio about 7 (Fig. 47), tip rapidly, then gradually, narrowed, lateral margin more strongly sinuous (Fig. 73) (Guinea, Cameroon, Congo (D.R.), Uganda, Kenya, Tanzania) ..... ***stipula***, **n. sp.**
-. Aculeus ratio 6 or less (Figs. 35, 39, 41), tip wider, lateral margin weakly sinuous (Figs. 81, 83, 85) **55**
55. Anepisternum with few dark setulae medioventrally; forefemur with short dark setulae between ventral setae and posterior row of setae (Tropical Africa, from Guinea Conakry to

Tanzania) ..... ***anonae***

-. Anepisternum pilosity completely pale (rarely with few dark setulae present in some specimens of *C. rosa*); forefemur usually with short pale setulae between ventral setae and posterior row (setulae sometimes partly dark) **56**

56. Black basal scutellar spots present; abdominal tergite 3 with irregular brown band; discal band wide (eastern and southern Africa; Fig. 252) ..... ***rosa***

-. Black basal scutellar spots absent; abdominal tergite 3 with very distinct brown band; discal band narrow (mainly in western and central Africa south to the Congo/Zambian and Angola/Namibian border, sympatric with *rosa* in Kenya only; Fig. 251)..... ***fasciventris***

***Ceratitis* (*Pterandrus*) *acicularis* (Munro)**

(Figs. 10, 27, 64, 65, 102-105, 222)

Pterandrus acicularis Munro, 1969: 420.

Pterandrus acicularis: Cogan and Munro, 1980: 530 (Afrotropical Catalog).

Ceratitis (*Pterandrus*) *acicularis*: Hancock, 1984: 279 (new combination); Freidberg, 1991: 169 (key); Norrbom *et al.*, 1999: 120 (World Catalog); De Meyer, 2001b: 22 (stenophagy, distribution); De Meyer *et al*., 2002: 17 (host check list).

Diagnosis

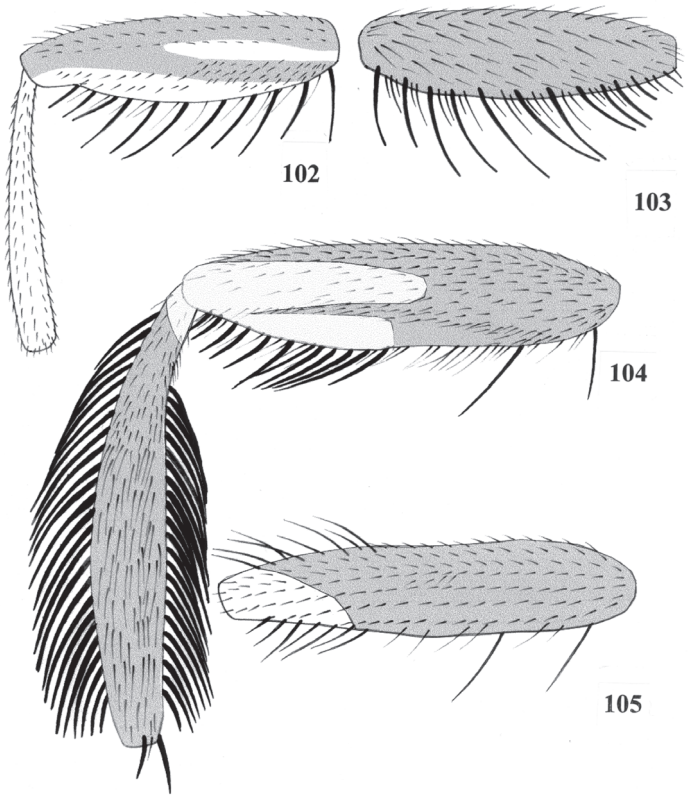
Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum completely pale, ventral margin narrowly dark brown; setulae pale except for few dark setulae usually present along ventral margin; apical black spots of scutellum separate; male midfemur with dispersed feathering ventrally; male midtibia with black feathering along most of its length; wing bands well developed and brown, interruption between marginal and discal bands near vein R_1 clear and complete.

Redescription

Male. Head. Antenna yellow. First flagellomere 2-3 times as long as pedicel. Arista with moderately long rays; ventral rays somewhat shorter and sparser than dorsal rays, especially basally. Frons yellow; with short scattered setulae largely of same color as frons. Frontal setae well developed, occasionally less so. Face yellowish white. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe white, without spot. Scutal pattern similar to Fig. 8, ground color pale gray, with streaks and darker markings but without distinct spots or clearly defined stripes, except prescutellar white markings, separate but with pale area in between. Scapular setae dark. Scutellum grayish white, basally without spots, apically with three separate black spots, extending anteriorly to basal half. Anepisternum completely pale, ventral margin narrowly dark brown; setulae pale except few dark setulae usually present along ventral margin.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly dark. Foreleg (Figs. 102-103): femur anteriorly mainly brownish, only basal and ventral margin yellow, posteriorly largely brown, no distinct bush, only dispersed setulae; ventral setae black. Midleg (Fig. 104): femur anteriorly largely brown, distal end pale; ventrally with dark dispersed setulae, distally somewhat denser but without distinct feathering; tibia broadened; largely brown, with black feathering dorsally along distal 0.9 and ventrally along distal 0.8, anterior



Figs. 102-105. *Ceratitis acicularis*, male legs. 102. Forefemur and foretibia, anterior view. 103. Forefemur, posterior view. 104. Midfemur and midtibia, anterior view. 105. Hindfemur, anterior view.

part covered by short dark setulae. Hindleg (Fig. 105): femur brown on basal 0.8; at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 10; bands brownish. Interruption between marginal and discal bands near vein R_1 clear and complete; discal band sometimes partly interrupted in discal cell; cubital band free; medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu straight.

Abdomen. Mostly Yellow. Tergites 2 and 4 largely pale gray. Tergite 3 with brownish black transverse band along posterior half. Tergite 5 along anterior margin with isolated brownish patches, posterior margin narrowly black. Male epandrium (Fig. 222) in lateral view with posterior lobe of lateral surstylus straight and elongate.

Female. As male except following characters: Legs without feathering, yellow, except femora yellowish orange; forefemur posteroventrally with dark pilosity. Discal band not interrupted. Tergite 5 largely pale yellow across posterior half. Oviscape as long as, or longer than, preabdomen. Aculeus (Figs. 27, 64, 65) at least eight times as long as wide; tip with distinct apical indentation and lateral margin slightly sinuous.

Body length. 5.09 (4.80-5.30) mm; wing length: 5.68 (5.25-6.15) mm.

Material examined

Holotype ♂, IVORY COAST: Bingerville, December 1962, 'ex follicules Cola cordifolia', J. Decelle, (KMMA).

Paratypes: IVORY COAST: same date and locality as holotype (1♀ allotype, 20♂, 12♀; KMMA; 2♂; PPRI; 1♂; BMNH); Zepreghé, Daloa, September 1962, J. Decelle (1♀; KMMA); Eloka, January 1963, (3♂, 3♀; KMMA; 2♀; PPRI; 1♀; BMNH), all 'ex follicules Cola cordifolia', J. Decelle (one ♂ paratype from Bingerville, November 1962, J. Decelle in collection of KMMA, belongs to *C. colae*; another ♀ paratype from the same locality but date September 1963, and also in the collection of KMMA, belongs to *C. penicillata*)

Other material examined: ANGOLA: 3mi SW Salazar, 15.iii.1972, 'leaf litter in coffee forest' (1♂; BMNH). IVORY COAST: same date and locality as holotype, J. Decelle (1♂; KMMA); Zepreghé, Daloa, May 1962, J. Decelle (1♂; KMMA); Eloka, January 1963, 'follicules Cola cordifolia', J. Decelle (2♂; KMMA).

Host plants

Reared from the seed husks of *Cola cordifolia* (Sterculiaceae) (Munro, 1969).

Distribution

Angola and Ivory Coast.

Comments

The Angolan specimen is included here although it differs slightly from the others, having the first flagellomere yellowish orange and the brown markings on the femora somewhat more restricted. Two of the paratypes belong to different species (see material examined). *Ceratitis acicularis*, *C. penicillata*, *C. colae*, *C. lepida* and *C. paracolae,* n. sp. together form a species group characterized by the elongate aculeus and the preference for *Cola* spp. as hosts (but see host plants under *C. colae*).

***Ceratitis* (*Pterandrus*) *anonae* Graham**

(Figs. 12, 35, 84, 85, 106-109, 237)

Ceratitis anonae Graham, 1908: 114.

Ceratitis pennipes Bezzi, 1908: 387. Synonymy by: Silvestri, 1913.

Ceratitis anonae: Bezzi, 1909: 277, 279 (key; also as *C. pennipes*); Graham, 1910: 162; Silvestri, 1913: 61 (West Africa, biology).

Pterandrus anonae: Bezzi, 1918: 231 (new combination); Bezzi, 1923: 526 (collection MNHN); Bezzi, 1924b: 99 (key); Munro, 1969: 423 (Ivory Coast); Cogan and Munro, 1980: 530 (Afrotropical Catalog).

Ceratitis (*Pterandrus*) *anonae*: Munro, 1933a: 10 (Congo (D.R.)); Hancock, 1984: 279 (new combination); Freidberg, 1991: 169 (key); White and Elson-Harris, 1992: 302 (pest status); Norrbom *et al.*, 1999: 120 (World Catalog); De Meyer, 2001b: 223 (polyphagy, distribution); De Meyer *et al*., 2002: 17 (host check list).

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral 0.33-0.5 brown; setulae pale; apical black spots of scutellum

separate; male midfemur with black feathering ventrally along entire length, male midtibia with black feathering along distal 0.8-0.9; wing bands well developed and yellowish brown, interruption between marginal and discal bands near vein R_1 clear and complete.

Redescription

Male. Head. Antenna yellow. First flagellomere three times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons pale, sometimes completely yellow, center yellow; with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face white, sometimes yellowish white. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe white, sometimes yellowish white; without spot. Scutal pattern similar to Figs. 7 and 8: ground color ash-gray; with streaks and darker markings but without distinct spots or clearly defined stripes except prescutellar white markings separate, sometimes with pale area in between. Scapular setae dark. Scutellum white, sometimes yellowish white, basally without spots, apically with three separate black spots, extending anteriorly to basal 0.33, sometimes only to basal half. Anepisternum on ventral 0.33-0.5 brown; setulae pale.

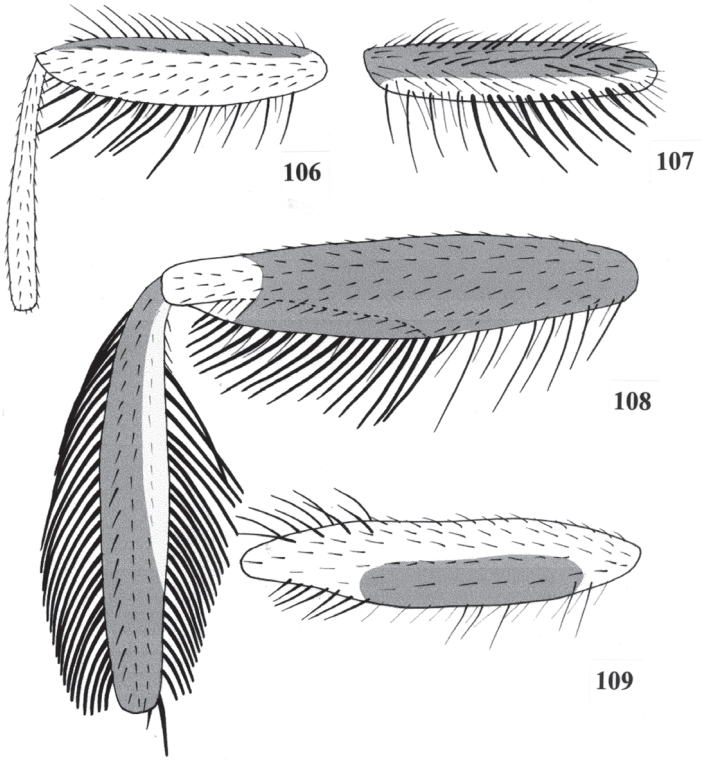
Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly dark. Foreleg (Figs. 106-107): femur dark anteriorly along entire dorsal margin, posteriorly along dorsal 0.66, with poorly developed bush of dispersed long dark setulae along entire length, posterodorsal setulae longer; ventral setae dark. Midleg (Fig. 108): femur largely brownish black, anteriorly with silvery shine when viewed from certain angle, only distal end pale; ventrally with dark feathering along entire length, basally somewhat less dense; tibia broadened; largely brownish black with silvery shine when viewed from certain angle, with black feathering dorsally along distal 0.9 and ventrally along distal 0.8. Hindleg (Fig. 109): femur dark brown except distally, at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 12; markings yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; discal band often partly or completely interrupted in discal cell; cubital band free; medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Border between tergite 1 and 2 narrowly black. Tergites 2 and 4 with pale gray band occupying almost entire tergite, at most narrowly yellow anteriorly. Tergite 3 with distinct brownish black band along posterior half; rarely interrupted medially. Tergite 5 with basal 0.33 brownish, usually divided medially into two spots; posteriorly narrowly brownish. Male epandrium (Fig. 237) in lateral view with lateral surstylus curved, posterior lobe short.

Female. As male except following characters. Anepisternal pilosity on ventral 0.33 partly dark, especially centrally. Legs without feathering; femora yellow, forefemur posteriorly, and midfemur and hindfemur anteriorly on basal 0.66 often with brownish streaks; sometimes femora completely yellowish brown; forefemur posteroventrally with dark pilosity. Wing with discal band complete. Oviscape shorter than preabdomen. Aculeus (Figs. 35, 84, 85) at most six times as long as wide; tip with distinct apical indentation and lateral margin slightly sinuous.

Body length. 5.06 (4.35-5.90) mm; wing length: 5.15 (4.45-5.75) mm.



Figs. 106-109. *Ceratitis anonae*, male legs. 106. Forefemur and foretibia, anterior view. 107. Forefemur posterior view. 108. Midfemur and midtibia, anterior view. 109. hindfemur, anterior view.

Material examined

Lectotype of *anonae* (here designated) ♂, GHANA: Ashanti, 7.ix.1907, ' "bred from fruit of Soursop (Anona [sic] acida)" (note by donor)', W.M. Graham (BMNH) [label on type material indicates *Annona acida*, while original description mentions *Annona muricata*]. Paralectotype (here designated) ♀, same data and locality as lectotype (BMNH).

Lectotype of *C. pennipes* (here designated) ♂, CONGO (D.R.): Kinchassa [=Kinshasa], November 1896, Waelbroeck (KBIN). Paralectotype (here designated) ♀, CONGO (D.R.): Boma, M. Tschoffen (KBIN).

Other material examined: CAMEROON: Baboua 12 m W, 6.vi.1951, 'McG156A' [= 'ex *Anona senegalensis'* according to Munro's archives], J. McGough (2♂; USNM); Bafoussan, 5.ix.1982, ex ripe coffee arabica berries, G. Steck (5♂, 2♀; TAMU); Ekona, 19.v.1938, H. Buhr (1♀; BMNH); 20.v.1938, H. Buhr (1♀; MNHU); Kumba, 20.x.1949, H. Oldroyd (1♀; BMNH); Ottotomo forest, 2.ix.1951, J. McGough (2♂; PPRI); Yaoundé, June 1936, 'bred from avocado' (4♂, 1♀; USNM); 'bred from Myrianthus arboreus' (1♂, 1♀; USNM), all Van Zwaluwenburg and McGough; 21-30.vii.1936, 'ex Guttifaera larger fruit', J. McGough (3♂; USNM); 6.vi.1951, 'McG157' [=ex Surinam cherry according to Munro's archives], J. McGough (2♂, 2♀; USNM); nr Yaoundé, 29.v-8.vi.1936, 'from foliage', Van Zwaluwenburg and McGough (2♂; USNM). CENTRAL AFRICAN REPUBLIC: Baboua (12 mi W), 6.vi.1951, J. McGough (1♀; USNM). CONGO (D.R.): Bamania, Tshuapa, May 1952 (1♂;

KMMA); 1968 (1♀; KMMA), both R.P.Hulstaert; Barumbu, 7.xi.1920, 'fruit cacao' (1♂; KMMA); July 1925, 'cacoyer' (3♂, 6♀; KMMA) all L.J. Ghesquière; Basoko, May 1948 (1♀; KMMA); August 1948 (1♂, 1♀; KMMA); January 1949 (1♀; KMMA); May 1949 (1♀; KMMA); June 1949 (1♂; KMMA), all P.L.G. Benoit; Bikoro, Lac Tumba, 1949 (4♂; KMMA); 1949, 'sur Anona manii' (2♂, 1♀; KMMA), all M. Mamet; Banningville, riv. Bas-Kwango, April 1945, A. Fain (1♂; KMMA); Bokuma, Equateur, December 1951, P. Lootens (1♂; KMMA); Eala, 1933 (1♂, 12♀; KMMA); July 1933 (2♀; KMMA); 30.viii.1933 (1♂, 2♀; KMMA), all A. Corbisier; June 1935 (8♂; KMMA); June 1935, 'dans des fruits de Myrianthus arborea' (2♂, 11♀; KMMA); August 1935 (3♂; KMMA); April 1936, (1♀; KMMA), all J. Ghesquière; 20.i.1937 (1♂; KMMA); 20.i.1937, 'ex fruits de Cynometra' (1♀; KMMA); 8.ii.1938, 'ex fruits de Mimusops' (2♂; KMMA); 30.iii.1938, 'ex fruits de bonkoko' (1♀; KMMA); 4.iv.1938, 'ex fruits de Mimusops' (1♀; KMMA), all G. Couteaux; 7.vi.1938, 'récolté sur oranger', J. Ghesquière (1♀; KMMA); Kamaiembi, Luebo, 17.ix.1921, H. Schouteden (1♀; KMMA); Katompe, February 1935, C. Seydel (1♀; KMMA); Leopoldville [=Kinshasa], 26.v.1957, P. Jobels (1♀; KMMA); Kisantu, 12.ii.1924 (1♂, 7♀; KMMA); 12.ii.1924, 'mangues, courges, pêches, etc.' (3♂, 15♀; KMMA), all P. Gillet; Lukolela, left bank Congo r., 1°5'S, 16.xii.1930 (4♂; AMNH; 1♂; PPRI); 13.i.1931 (1♂, 1♀; AMNH; 1♂; PPRI), all J.P. Chapin; Lusambo, 1.ii.1922 (1♀; KMMA); December 1924, 'goyave' (14♂ 12♀; KMMA), all L.J. Ghesquière; Mayidi, 1945, P. Van Eyen (1♀; KMMA); Mayumbe, 7.vi.1918, R. Mayné (1♀; KMMA); Mulungu, Kivu, November 1938 (1♂; KMMA); November 1938, 'sur Aberia' (1♂; KMMA), all Hendrickx; Nyangwe, 7.vi.1918, R. Mayné (1♀; KMMA); Parc National de Garamba, 15.vi.1951-23.vii.1952 (37♂, 61♀; KMMA); Stanleyville [=Kisangani], March 1925, J. Ghesquière (1♀; KMMA); Ubangi, Nouvelle Anvers, 9.xi.1952, P. Basilewsky (2♂, 1♀; KMMA); Yangambi, 30.v.1950, E.C. Buyck (1♂; PPRI); December 1950, 'ex Terminalia catappa', J. McGough (2♀; USNM); 4.xii.1950, 'McG142'[=ex *Omaralia calycina* according to Munro's archives], J. McGough (1♀; USNM); 18.ii.1951, 'McG148' [=ex *Myrianthus arboreus* according to Munro's archives] (2♀; PPRI; 1♂, 2♀; USNM), both J. McGough; 20.ii.1951, 'McG131' [=*Terminalia catappa* according to Munro's archives], J. McGough (1♂; MHNG; 1♀; USNM); 28.ii.1951, 'McG149' [=*Pancovia laurentii* according to Munro's archives], Clancy and McGough (1♂, 1♀; USNM); 5.iii.1951, Clancy and McGough (1♀; PPRI; 1♀; MHNG); 15.iv.1950, 'citrus verger D.E.P.D.' INEAC (3♂; KMMA); 26.vi.1952, (2♂; KMMA); 10.vii.1952 (9♂, 9♀; KMMA); 12.vii.1952 (6♂, 8♀; KMMA); 14.vii.1952 (2♀; KMMA); 30.ix-6.x.1952 (2♀; KMMA), all K. Schedl; 18.iv.1958, 'citrus verger D.E.P.D.' INEAC (5♀; KMMA); October 1959, 'ex fruit Nephelium cappaceum' (1♂; KMMA); November 1959, 'récolté sur caféier' (2♂; KMMA); 20.i.1960 (2♂, 2♀; KMMA); 20.i.1960, 'récolté sur caféier' (1♂; KMMA), all J.Dubois. GABON: Kougouleu, 17.vii.1985, 'fruits goyave', A. Pauly (1♀; TAUI); Léconi, January 1985, A. Pauly (1♂; TAUI); Makokou, Ipassa, 21.xii.1974, J. David (1♀; MNHN). GHANA: Aburi, 1922, 'from fruits of Antiaris africana', W.H. Patterson (1♀; BMNH); Asuansi, 14.iv.1932, 'on grapefruit', G.S. Cotterell (1♂; BMNH); Obuasi, 1.vii.1907, 'caught on leaf', W.Graham (1♂; BMNH); Teppah, 30.xii.1946, J. Bowden (1♂; NMSA). EQUATORIAL GUINEA: Uelleburg, June-August 1908, S.G. Tessmann (1♂, 2♀; MNHU). GUINEA CONAKRY: Macenta, October-November 1953, R. Pijol (1♂; MNHN). IVORY COAST: Divo, 28.xi.1963, J. Decelle (1♀; KMMA); Korhogo, Lataha Res. Stn., 19.vii.1995, 'on mangoes', N. Kouama (1♂; BMNH); Koun-Abronso, May 1962, J. Decelle (1♂; KMMA). KENYA: Migori, 26.v.1995,

'on guava' (2♂, 2♀; ICIPE); Koru, W. Kenya, August 1995, 1100m, 'emerged from Coffea canephora berries', Vaamonde (1♂; BMNH); Kakamega forest, 14.i.1996, I. Yarom and A. Freidberg (5♀; TAUI); Nairobi, March 1938, 'caught on Croton' (1♀; BMNH). MALI: Madina, 28.vi.2000, J.F. Vayssières (1♂; CIRAD). NIGERIA: Olokomeji Ibadan (1♂, 5♀; USNM); Olokomeji, 1913, Silvestri [identified as *colae*] (1♂; BPBM). SAO THOME: 28.v.1973, 'cacao' (8♂, 2♀; BMNH); October 1973 (2♂, 1♀; BMNH), all J. Devron. TOGO: Tové Exp'l Farm, 6.i.1982, ex fruit Chrysophyllum sp., G. Steck (1♂; FSCA; 3♂, 1♀; TAMU). UGANDA: unknown locality, F. Bianchi (3♀; USNM); Budonga, May 1936, 'Myrianthus arboreus', F. Bianchi (9♂, 16♀; USNM); Entebbe, F.W. Edwards (1♀; BMNH); Kamengo, 8.ix.1949. V. van Someren (1♂; BMNH); Masindi, April 1936, 'on avocado', F. Bianchi (3♂, 2♀; USNM).

WEST AFRICA [country unknown]: Uamgebiet [=Uam Region], Bosum, 1-10.v.1914, Tessmann (1♂; MNHU).

Host plants

Avocado (*Persea americana*), cacao (*Theobroma cacao*), guava (*Psidium guajava*), arabica coffee (*Coffea arabica*), robusta coffee (*Coffea canephora*) and mango (*Mangifera indica*). Furthermore, from *Aberia* (=*Dovyalis*) sp., *Annona muricata* (as *A. acida* soursop from HT), *Annona manii*, *Annona senegalensis* (uncertain), *Antiaris africana*, *Chrysophyllum* sp., *Cynometra* sp., *Eugenia uniflora*, *Guttifaera* sp., *Mimusops* sp., *Myrianthus arboreus*, *Omaralia calycina*, *Nephelium cappaceum*, *Pancovia laurentii*, *Terminalia catappa*, and 'bonkoko' (scientific name unknown). Also collected from orange and grapefruit trees but rearing records from these plants are unconfirmed. White and Elson-Harris (1992) furthermore record the species from *Psidium littorale* (requires confirmation). For a full discussion on host plants, see De Meyer *et al.* (2002).

Distribution

Cameroon, Central African Republic, Congo (D.R.), Equatorial Guinea, Gabon, Ghana, Guinea Conakry, Ivory Coast, Kenya, Mali, Nigeria, Sao Thomé, Togo, Uganda. Also recorded from Congo (Brazzaville) and Tanzania (Cogan and Munro, 1980).

Comments

C. anonae belongs to the *anonae* group and subgroup of species that include *C. rosa* and *C. fasciventris*, among others. Males can be easily distinguished by the feathering of the midleg, but females are more difficult to distinguish. A full review of this matter is given in the general discussion following the species treatments.

Ceratitis (*Pterandrus*) *argenteostriata* De Meyer and Freidberg, n. sp.

(Figs. 4, 17, 43, 87, 110-113, 247)

Diagnosis

Postpronotal lobe white with dark area posterior to postpronotal seta; scutal pattern with distinct shining silvery vittae; anepisternum on ventral half brown or black, setulae pale; apical black spots of scutellum joined; male midfemur with black feathering along distal half ventrally; male midtibia with black feathering along distal 0.75-0.80; wing bands well developed and brown, large marginal hyaline spot around apex of vein R_{2+3}; medial band present, free.

Description

Male. Head. Antenna yellow. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays basally. Frons white, dorsal part more yellow, rarely completely yellow; with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face whitish. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe white anteriorly, with large dark area posterior to postpronotal seta. Scutal pattern as in Fig. 4: ground color black, microtrichose areas with silvery shine, forming two (pairs) distinct vittae; prescutellar white markings separated by paler brownish area. Scapular setae dark, in one specimen medial scapular pale. Scutellum basally yellowish white, without black spots, apically with three joined black spots, extending anteriorly to basal 0.33, weakly incised. Anepisternum on ventral half brown or black; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 110-111): femur anterodorsal half black, posteriorly largely black except ventrobasally, with dispersed dark setulae along entire length but without distinct bush, posterodorsal setulae longer; ventral setae dark. Midleg (Fig. 112): femur extensively darkened anteromedially, with silvery shine; ventrally with black feathering along distal half, basally with few dispersed long pale or dark setulae; tibia moderately broadened; largely blackish except basally, silvery shine when viewed from certain angle; with black feathering along distal 0.8 dorsally and 0.75 ventrally, with second row of short black setulae anterior to ventral row. Hindleg (Fig. 113): femur at apical 0.33 with long thin setae dorsally and ventrally.

Wing. Pattern as in Fig. 17; bands brown. Marginal band broadly separated from discal band around apex of vein R_1 and with large marginal hyaline spot around apex of vein R_{2+3}; cubital and medial bands free; crossvein R-M proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Predominantly yellow. Margin between tergites 1 and 2 largely brown. Tergites 2 and 4 with pale gray band along posterior half. Tergite 3 largely brown. Tergites 4 and 5 with brown band along anterior half, sometimes interrupted in middle. Posterior margin of tergite 5 narrowly brown. Setation typical for subgenus. Male epandrium (Fig. 247) in lateral view with posterior lobe of lateral surstylus slender and pointed.

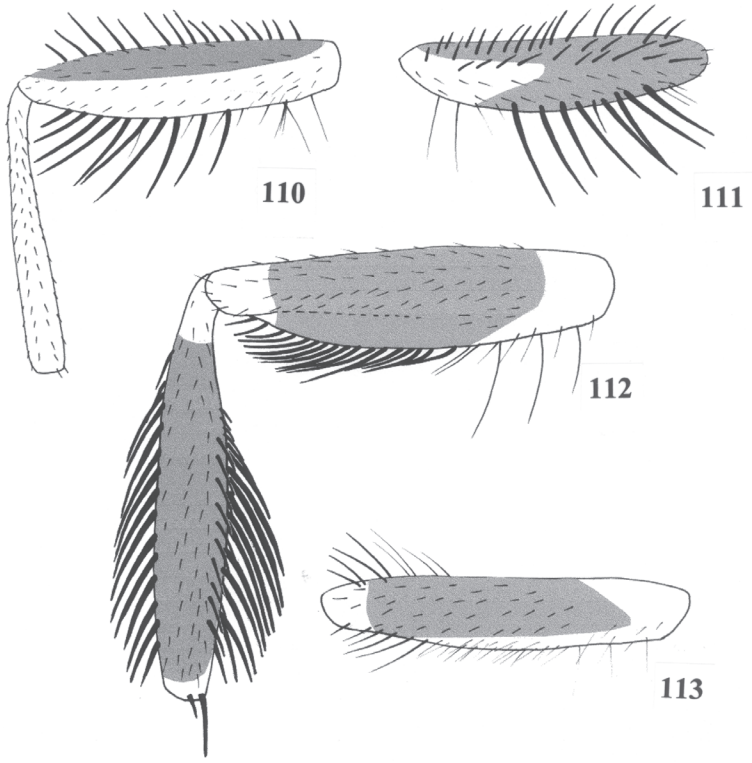
Female. As male except following characters: Antenna darker. Crossvein DM-Cu oblique posterobasally. Legs without feathering, setulae dark; femora darker brown on median part; forefemur posteroventrally with dark setulae. Oviscape slightly shorter than preabdomen. Aculeus (Figs. 43, 87) at most five times as long as wide; tip pointed and lateral margin straight.

Body length. 4.42 (3.70-5.25) mm; wing length: 4.88 (4.30-5.45) mm.

Material examined

Holotype ♂, MADAGASCAR: Andrianpamaky East, trimedlure trap, J. Ravololon-andrianina and C. Raoelijaona (KMMA).

Paratypes: MADAGASCAR: Andrianpamaky West, (1♀ allotype; KMMA; 1♂; CIRAD); 1.ii.1999, in Diospyros kaki orchard, trimedlure trap (1♂; BMNH); Antanetibe, 1.ii.1999, in Diospyros kaki orchard, trimedlure trap (1♂; DPVM), all J. Ravololonandrianina and



Figs. 110-113. *Ceratitis argenteostriata* n. sp., male legs. 110. Forefemur and foretibia, anterior view. 111. Forefemur, posterior view. 112. Midfemur and midtibia, anterior view. 113. Hindfemur, anterior view.

C. Raoelijaona; Rt 7, 35km S Ambositra, 27.iv.1991, A. Freidberg and F. Kaplan (1♂, 1♀; TAUI).

Etymology

An adjective composed of the Latin argenteus (meaning silvery) and striatus (meaning striped) and referring to the longitudinal stripes on the scutum.

Host plants

Some of the type material was collected in a *Diospyros kaki* (Ebenaceae) orchard but none of the specimens was actually reared from this plant.

Distribution

Madagascar.

Comments

The conspicuous banding on the scutum distinguishes *C. argenteostriata* from any other species of the genus. It is perhaps related to *C. rubivora*, based on the shape of the aculeus, the similar femoral feathering in the male, and the wing pattern (medial band present). In De Meyer *et al.* (2002: 45) it is listed under the undescribed species 'AR'.

Ceratitis (*Pterandrus*) *barbata* De Meyer and Freidberg, n. sp.

(Figs. 25, 68, 69, 114-117, 238)

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum along ventral margin yellowish brown, setulae pale; apical black spots of scutellum separate; male midfemur ventrally with dark feathering along entire length, basally with dense tuft of dark setulae; male midtibia with black feathering along most of its length dorsally and along distal 0.6 ventrally; wing bands well developed and yellowish brown, interruption between marginal and discal bands near vein R_1 narrow and often incomplete; medial band present, short and sometimes obscured.

Description

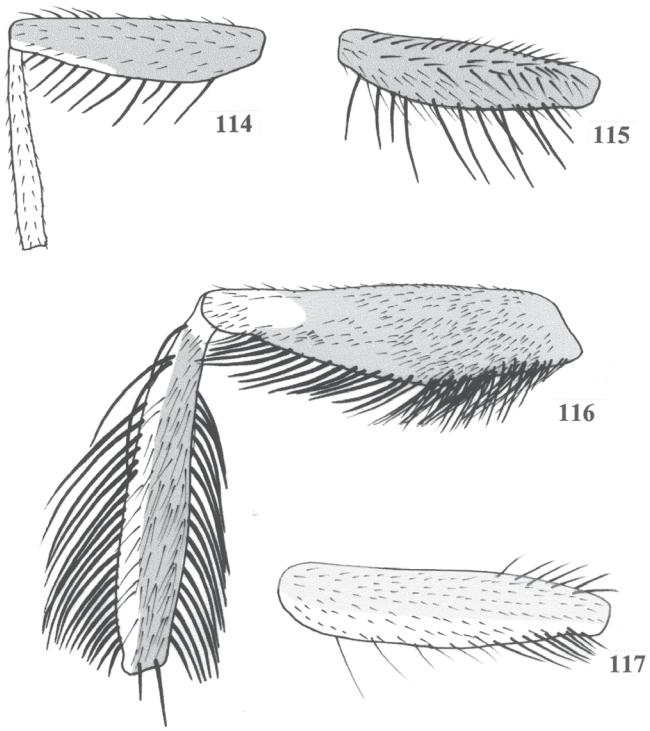
Male. Head. Antenna yellow. First flagellomere 2-3 times as long as pedicel. Arista with short rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons yellow, sometimes with darker center; with short scattered setulae of same color as frons. Frontal setae well developed. Face white, gena with dark patch. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe yellowish white; without spot. Scutal pattern similar to Fig. 8 except prescutellar marking more pronounced; ground color gray with orange tinge; with streaks and darker markings but without distinct spots or clearly defined stripes except prescutellar white markings merged. Scapular setae dark. Scutellum yellowish white, basally without spots, apically with three separate black spots, extending anteriorly to basal half. Anepisternum along ventral margin yellowish brown; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly dark. Foreleg (Figs. 114-115): femur brown; posteriorly with poorly developed bush of dispersed long dark setulae along entire length, posterodorsal setulae longer; ventral setae dark. Midleg (Fig. 116): femur largely brown except distally pale; ventrally with dark feathering along entire length, basally developed into dense tuft of dark setulae; anteroventrally with short but conspicuous dark setulae except on pale part; tibia broadened; largely yellowish brown with extremities pale, with weak silvery shine when viewed from certain angle; with black feathering dorsally along distal 0.9 and ventrally along distal 0.6, anteriorly with short to moderately long setulae, second row with shorter setulae present anterior to dorsal feathering. Hindleg (Fig. 117): femur dark brown on dorsal half except distally; with longer setulae dorsally and ventrally at apical 0.25.

Wing. Pattern similar to Fig. 15 except differences noted below; bands yellowish brown. Interruption between marginal and discal bands narrow, often incomplete; cubital band free; medial band short and narrow, sometimes obscured; crossvein R-M just proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu variable.

Abdomen. Mostly yellow. Border between tergites 1 and 2 with orange-brown patches. Tergites 2 and 4 with pale gray band occupying almost entire tergite, at most narrowly yellow anteriorly. Tergite 3 with distinct brownish black band along posterior half. Tergite 5 anteriorly with two brown spots, posterior margin narrowly brownish. Male epandrium (Fig. 238) in lateral view with posterior lobe of lateral surstylus elongate, tip slightly curved.



Figs. 114-117. *Ceratitis barbata* n. sp., male legs. 114. Forefemur and foretibia, anterior view. 115. forefemur, posterior view. 116. Midfemur and midtibia, anterior view. 117. Hindfemur, anterior view.

Female. As male except following characters. Frons sometimes completely pale. Anepisternum at most with few dark setulae along ventral margin posteriorly. Legs without feathering; orange-brown; forefemur posteroventrally with dark setulae. Oviscape at least as long as preabdomen. Aculeus (Figs. 25, 68, 69) very long, at least 11 times as long as wide; tip without distinct apical indentation, notch weak or tip almost straight; lateral margin weakly sinuous.

Body length. 5.68 (5.30-6.40) mm; wing length: 6.21 (5.75-6.50) mm.

Material examined

Holotype ♂, CAMEROON: Tinto, S.G. Ziemann (MNHU).

Paratypes: CAMEROON: same locality as holotype (♀ allotype; MNHU; 1♀; KMMA; 1♀; BMNH). IVORY COAST: unknown locality, 1962 (2♂, 5♀; TAUI; 1♀; KMMA).

Other material (not included in type series) CONGO (D.R.): Yangambi, 26.6.1952, Schedl (2♀; KMMA). GHANA: Accra, 18.ix.1943 (1♂; USNM). NIGERIA: Ibadan, 30.viii.1984 (1♂; TAUI).

Etymology

An adjective, after the Latin barbatus (meaning bearded) and referring to the distinct pilosity at the basal part of the midfemur.

Host plants

Unknown.

Distribution

Cameroon, Congo (D.R.), Ghana, Ivory Coast and Nigeria.

Comments

C. barbata is closely related to *C. anonae* and *C. stipula*, resembling these species in most male characters. The three species can be distinguished by small differences in leg pilosity, anepisternal coloration and wing pattern. Despite the similarity of females *C. barbata* to females *C. acicularis* (the key differences used to separate these two species are minor), females associated with correctly identified males were assumed to be *C. barbata*. Males of *C. barbata* differ clearly from males of *C. acicularis.* The male from Accra, Ghana, resembles in most respects the other males. But the midlegs are partly obscured, and the diagnostic character regarding the pilosity of the basal part of the femur cannot be confirmed. The females from Congo (D.R.) are not associated with male specimens. All three specimens, therefore, are not included in the type series.

***Ceratitis* (*Pterandrus*) *bicincta* Enderlein**

(Figs. 3, 16, 52, 99, 228)

Ceratitis bicincta Enderlein, 1920: 349.

Trirhithrum bicinctum: Bezzi, 1924b: 106 (new combination); Munro, 1934: 479 (review); Cogan and Munro, 1980: 531 (Afrotropical Catalog); Norrbom *et al.*, 1999: 229 (World Catalog).

Ceratitis (*Pterandrus*) *bicincta*: Hancock and White, 1997: 196 (new combination); De Meyer *et al*., 2002: 20 (host check list).

Diagnosis

Postpronotal lobe with a spot; scutal pattern shiny black or brown, with indistinct dark yellow patches; anepisternum on ventral half brown, setulae pale except ventral to anepisternal seta where few dark setae present, more extensively so in female; basal and apical black spots of scutellum merged; male legs without feathering; wing bands well developed and brown, marginal band forming continuous band with anterior part of discal band.

Redescription

Male. Head. Antenna yellowish orange. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; basoventral rays shorter and sparser than basodorsal rays. Frons convex; yellow, in middle and at frontofacial angle with darker patches, the latter extending partly downwards along medial eye margin; with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face white. Genal seta and setulae black or dark reddish, latter poorly developed. Occiput with dorsal 0.33 dark.

Thorax. Postpronotal lobe dark yellow, with black spot. Scutal pattern as in Fig. 3: shiny black or brown, microtrichose areas silvery with ashgray shine, along sutural line indistinct dark yellow patches, prescutellar yellow markings separate but with pale area in between. Scapular setae dark. Scutellum yellowish white, basally with two merged dark spots, apically with three merged black spots, weakly incised, extending anteriorly to basal spots or almost so; rarely almost completely black except basally near lateral margins with paler spot (as in female). Anepisternum on ventral half brown; setulae pale, except ventral to anepisternal seta where few dark setae.

Legs. Yellow; without any feathering except midfemur along ventral margin with few longer pale setulae distally, hindfemur at apical 0.33 with longer setulae ventrally and dorsally, but never distinct feathering. Pilosity mainly pale; forefemur posterior row with dark setulae basally, ventral spines mix pale and dark.

Wing. Pattern as in Fig. 16; bands brown. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Tergite 1 yellowish with brown patches across posterior margin; tergites 2 and 4 anteriorly brown, with silvery transverse band along posterior half; tergite 3 completely brownish black; tergite 5 yellowish brown in the middle, apices dark brown. Setation and banding typical for subgenus. dark brown. Male epandrium (Fig. 228) in lateral view distinctly broadened; base of lateral surstylus broadened, posterior lobe of lateral surstylus curved.

Female. As male except for the following characters. Antenna sometimes more brownish, especially center of third segment. Frons often with short scattered setulae largely of same color as frons. Genal seta and setulae black and well developed. Postpronotal spots usually larger, occupying most of the postpronotal lobe so that it appears to have largely the same color as scutum. Scutal pattern darker and sometimes more shiny black, spots strongly reduced (similar to Fig. 1); occasionally with largely black pilosity. Scutellum sometimes largely shiny black, except dark yellow basal spots near lateral margin. Anepisternal pilosity more extensively dark ventral to anepisternal seta. Legs yellow except femora brown, tibiae partly yellowish brown; without any feathering. Pilosity mixed pale and dark; forefemur with posterior row and ventral spines dark. Abdominal tergite usually darker than in male. Oviscape shorter than preabdomen, partly black colored. Aculeus (Figs. 52, 99) at least 10 times longer than wide; tip blunt, and with lateral margin straight.

Body length. 4.06 (3.75-4.40) mm; wing length: 4.23 (4.05-4.55) mm.

Material examined

Holotype ♀, GHANA: Accra, Ungar (MNHU).

Other material examined: CONGO (D.R.): Yangambi, October-November 1949, 'IP 127' [=ex *Maba laurentii* according to Munro's archives], E.C. Buyckx (8♂, 10♀; PPRI). GHANA: Tafo, 9.vi.1957, 'light', V.F. Eastop (1♀; BMNH); Accra, March 1921, J.W. Scott Macfie (1♀; BMNH). NIGERIA: Olokemeji, 6.v.1936, 'swept', Van Zwaluwenburg and McGough (1♂; PPRI).

Host plants

Material from Congo (D.R.) was reared from *Diospyros* [as *Maba*] *laurentii* (Ebenaceae).

Distribution

Congo (D.R.), Ghana and Nigeria.

Comments

This species was originally described from a single female specimen from Ghana, and was furthermore known from a few female specimens from the same country. The material studied includes a long series from Yangambi (Congo D.R.) of which the females are in most aspects

identical to the material from Ghana, except the scutal and scutellar patterns are paler. Aculeus shape is identical too. The same series also includes several males, enabling us to describe the hitherto unknown male of *C. bicincta*. Males are generally paler than the females. *Ceratitis bicincta* belongs to the *faceta* subgroup (see general discussion), characterized by the mainly dark thorax and abdomen and elongated aculeus. All the species of the subgroup were transferred recently by Hancock and White (1997) from *Trirhithrum* and *Trirhithromyia* to *Pterandrus*.

Ceratitis (*Pterandrus*) *chirinda* (Hancock)

Trirhithromyia chirinda Hancock, 1985: 296.
Ceratitis (*Pterandrus*) *chirinda*: Hancock and White, 1997: 196 (new combination).
Neoceratitis chirinda: Norrbom *et al.*, 1999: 120 (World Catalog).

Diagnosis

Postpronotal lobe with a spot; scutal pattern shiny brownish black with center largely gray-microtrichose; anepisternum on ventral half brownish black; basal and apical black spots of scutellum merged; male legs without any feathering; wing bands well developed and brown, marginal band forming continuous band with anterior part of discal band; cubital band joining junction of marginal and discal band.

Description (based upon original and modified according to the current terminology)

Male. Head. Antenna dark orange. Arista with long rays (but figure in Hancock, 1985 shows short rays). Frons convex; yellow, becoming red-brown anteriorly. Frontal setae well developed. Face yellow, gena darker. Genal seta and setulae black, latter well developed.

Thorax. Postpronotal lobe whitish, with black spot. Scutal pattern shiny brownish black, with dark pilosity; center largely gray-dusted; yellow prescutellar spots present but inconspicuous. Scapular setae dark. Scutellum yellow, basally with two merged dark spots, forming a dark border; apically with three merged black spots extending anteriorly to basal 0.33 to 0.25, weakly incised. Anepisternum on ventral half brownish black.

Legs. Yellowish orange except femora brown, tibiae basal half partly brown; without any feathering.

Wing. Pattern as in Fig. 20; bands brown. Marginal band forming continuous band with anterior part of discal band; cubital band joining junction of marginal and discal band; medial band absent; crossvein R-M just proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique posterobasally.

Abdomen: Shiny black. Tergites 2 and 4 across posterior half with silvery band. Setation and banding typical for subgenus.

Female: Unknown.

Body length: 4.3mm; wing length: 4.5mm.

Material examined

Holotype (not examined) ♂, ZIMBABWE: Mt. Silinda, 12.vi.1984, trimedlure trap, I. Bampton (Natural History Museum Bulawayo, Zimbabwe).

Host plants

Unknown.

Distribution

Zimbabwe.

Comments

This species is only known from the type material which could not be studied. Originally placed in *Trirhithromyia*, it was recently transferred to *Pterandrus* by Hancock and White (1997). It seems to be closely related to, if not synonymous with, *C. querita*. The differences listed in the key are weak and perhaps represent variation. Both species belong to the *faceta* subgroup, which is characterized by the mainly dark thorax and abdomen. The male legs in both species are without feathering, and the scutellar markings are similar. In addition they have the same wing pattern, which is unlike that found in other *Pterandrus* species. Furthermore, a specimen from Mt. Selinda (in the PPRI collection) was identified by the authors as *C. querita*, so the two species are sympatric and even occur at the same locality. A study of the type material of *C. chirinda* is necessary to unambiguously place this species.

***Ceratitis* (*Pterandrus*) *colae* Silvestri**

(Figs. 8, 22, 60, 61, 118-121, 224)

Ceratitis colae Silvestri, 1913: 63.

Pterandrus colae: Bezzi, 1918: 231 (new combination); Bezzi, 1924b: 99 (key); Munro, 1969: 418 (Ivory Coast); Cogan and Munro, 1980: 531 (Afrotropical Catalog).

Ceratitis (*Pterandrus*) *colae*: Hancock, 1984: 279 (new combination); Freidberg, 1991: 169 (key); White and Elson-Harris, 1992: 304 (pest status); Norrbom *et al.*, 1999: 120 (World Catalog); De Meyer, 2001b: 221 (stenophagy, distribution); De Meyer *et al*., 2002: 27 (host check list).

Diagnosis

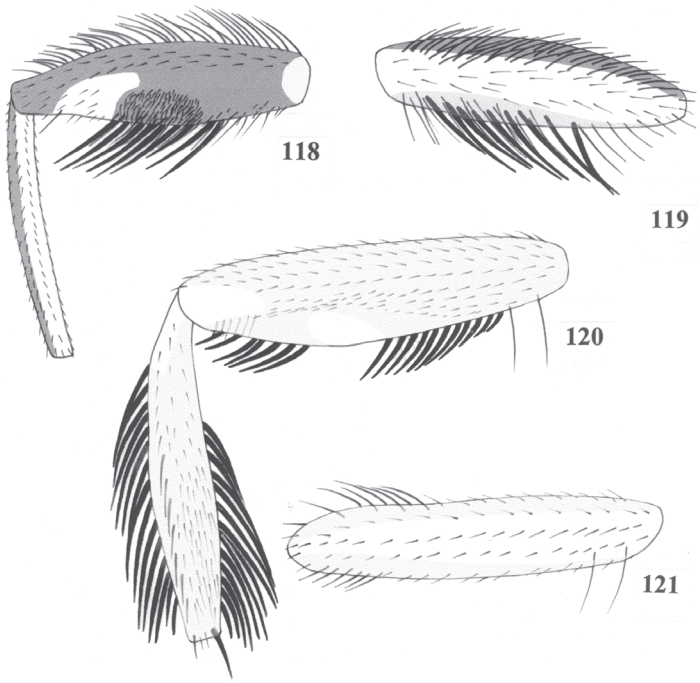
Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral half brownish black, setulae on ventral half black, ventral to anepisternal seta with longer black setulae; apical black spots of scutellum separate; male midfemur ventrally with dark feathering along entire length except for median interruption; male midtibia with black feathering along most of its length dorsally and along distal 0.66 ventrally; wing bands well developed and yellowish brown or brown, interruption between marginal and discal bands near vein R_1 clear and complete.

Redescription

Male. Head. Antenna yellowish orange to orange. First flagellomere with dorsal margin sometimes brown; 2-3 times as long as pedicel. Arista with moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons convex or flat; yellow to orange; with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face yellow; gena brown, partly continued along ventral margin of face but not in median part; mouthparts with apex partly darkened but not completely black (as in lepida). Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe white, without spot. Scutal pattern as in Fig. 8: ground color dark gray with silvery shine; with streaks and darker markings but without distinct spots or clearly defined stripes, except prescutellar yellow markings, which are separate. Scapular setae dark. Scutellum white, basally without spots, apically with three separate black spots, extending to half-way. Anepisternum on ventral half brownish black; setulae on ventral half black, ventral to anepisternal seta with longer black setulae.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly dark. Foreleg (Figs. 118-119): coxa brown, occasionally almost black; femur anteriorly with contrasting black/white pattern, basally pale yellow; white spot turns silvery when viewed from certain angle, anteroventrally with bush of short dark setulae in median half; posteriorly slightly darkened along dorsal and ventral margin; with dispersed and poorly developed bush of long dark setulae along entire length, posterodorsal setulae longer; ventral setae dark; tibia anteriorly slightly darkened. Midleg (Fig. 120): femur anteriorly yellow to yellowish brown; anteroventrally with conspicuous silvery patch, distally with inconspicuous one; ventrally with dark feathering along entire length except for interruption (6-7 setae wide) in median part; tibia broadened; yellow, silvery shine when viewed from certain angle; with black feathering dorsally along distal 0.8 and ventrally along distal 0.66, anteriorly with dispersed short setulae, in front of dorsal row forming an irregular second one. Hindleg (Fig. 121): femur at apical 0.25 with longer setulae dorsally and ventrally.



Figs. 118-121. *Ceratitis colae*, male legs. 118. Forefemur and foretibia, anterior view. 119. Forefemur posterior view. 120. Midfemur and midtibia, anterior view. 121. Hindfemur, anterior view.

Wing. Pattern as in Fig. 10; bands brown or yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band absent; crossvein R-M proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally, or straight.

Abdomen. Mostly yellow. Tergite 1 with small brown patches at posterior margin. Tergites 2 and 4 with silvery transverse band along posterior half. Tergite 3 with brown transverse band along posterior 0.33, sometimes interrupted in middle. Tergite 5 with yellowish brown patches along anterior part and weak silvery band posteriorly. Sometimes abdomen with general darker brown appearance. Setation and banding typical for subgenus. Male epandrium (Fig. 224) in lateral view with posterior lobe of lateral surstylus elongate, apical end curved.

Female. As male except for the following characters: Legs without feathering; yellow, femora darker; forefemur posteroventrally with dark pilosity. Wing usually with darker banding. Abdominal tergite 5 with distinct silvery band posteriorly. Oviscape almost as long as preabdomen. Aculeus (Figs. 22, 60, 61) at least eight times longer than wide; tip with distinct apical indentation and lateral margin slightly sinuous.

Body length. 4.95 (4.30-5.50) mm; wing length: 5.19 (4.25-5.90) mm.

Material examined

Lectotype ♂, GHANA: Aburi, 1913 (PPRI) (designated by Munro, 1969: 419).

Paralectotype ♀, same date and locality as lectotype (PPRI).

Other material examined: CAMEROON: W. Province, Bafoussam, 13-14.vii.1982, 'ex cola fruit', G.J. Steck (1♂, 1♀; FSCA; 4♂, 4♀; TAMU; 2♂, 2♀; TAUI); N'Kongsamba 'marché', 5.x.1982, 'ex cola fruit', G.J. Steck (1♂, 1♀; TAUI); Ntui, February 1969 (2♀; MHNG); Yaoundé, June 1936, 'bred from Conopharyngia sp.', Van Zwaluwenburg and McGough (1♀; USNM). GHANA: Aburi, 1913, F. Silvestri (2♂, 2♀; IZUSN); 1912-1913, W.H. Patterson (1♂, 3♀; BMNH); March 1932, G.S. Cotterell (5♂, 1♀; PPRI); Tafo, 18.xi.1995, trimedlure coffee, Steck and McPheron (4♂; FSCA). IVORY COAST: Bingerville, August 1961, 'ex fruit de Cola nitida' (1♂, 2♀; KMMA); November 1962 [as paratype of *C. acicularis*] (1♂; KMMA), all J. Decelle; Tai, December 1986 'Cola nitida Plantation 30 ans sud de Tai' 'ex larva fruits', G Couturier (1♂, 2♀; TAUI). SIERRA LEONE, Njala, 4.vii.1926, 'ex seed coat Kola' (1♂; PPRI); June 1926, 'ex seed coat Kola' (1♀; BMNH); January 1931, 'kola' (2♂; BMNH), all E. Hargreaves. TOGO: Sodo Forest, 2-21.i.1982, G. Steck (1♂; TAUI).

One ♀ specimen from 'Guinea' (unknown locality, Westermann (MNHU)) corresponds with the description given below except that the dark setulae ventral to the anepisternal seta are missing; another ♀ specimen Nigeria (Ibadan, 30.x.1933, F.D. Golding (PPRI)) is heavily damaged but also seems to belong here. Both are placed here tentatively.

Host plants

Recorded from *Cola* spp. (Sterculiaceae). It was reared from *Cola acuminata* (Sierra Leone, and apparently also type material from Ghana and Cameroon (see Silvestri, 1913) but see comments above), and *Cola nitida* (Ivory Coast). There is one female specimen in the material examined that bears a label indicating it was bred from *Conopharyngia* (=*Tabernaemontana* (Apocynaceae)). The specimen is similar in external morphology and aculeus shape to all other material. This host plant should be reconfirmed but is plausible given the association found in

the closely related species *C. lepida* (cf. below). Material from Ghana was collected with a trimedlure trap among coffee but *C. colae* has not been reared from that plant.

Distribution

Cameroon, Ghana, Ivory Coast, Sierra Leone, Togo, and probably also Nigeria (cf. material examined). The origin of the specimen from 'Guinea' is unclear since this could also refer to Ghana. Also recorded from Congo (D.R.) (Cogan and Munro, 1980).

Comments

This species was described by Silvestri from an unspecified number of specimens originating from Aburi (Ghana) and Victoria (Cameroon). Munro (1969) designated a lectotype and paralectotype from the specimens deposited by Silvestri in the PPRI collections. The material studied from the IZUSN collection may belong to the original syntype series although there are no labels indicating this. There is an additional, poorly preserved, female specimen in the latter collection, labeled 'Vittoria [=Victoria] Cameroon 1913', which could also belong to the original syntypic series. However, it appears to be *C. anonae,* not *C. colae*. The whereabouts of any remaining syntypes are unknown.

The identity of *C. colae* cannot be established unambiguously from the original description, and our concept of this species is based on the lectotype designated by Munro (1969). As noted by Munro (1969), Silvestri's (1913) illustration of the midleg is erroneous in that the feathering on the midfemora does not show the interruption typical for this species, nor does it match any of the other *Cola* infesting species. Male specimens deposited in the Silvestri collection at IZUSN match the concept of *C. colae* used here.

Ceratitis colae, *C. lepida* and *C. paracolae,* n. sp form a distinct monophyletic group characterized by traits of the forefemur, the anepisternal pilosity, and the ventral cephalic margin. These three species, plus *C. acicularis* and *C. penicillata* form the *colae* subgroup, which is characterized by the elongated aculeus and preference for *Cola* spp. as hosts (but see the host plant section below).

***Ceratitis* (*Pterandrus*) *copelandi* De Meyer and Freidberg, n. sp.**

(Fig. 48, 70, 71, 122-125, 249)

Diagnosis

Frons with median silvery vitta; postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral half brownish yellow, setulae pale; apical black spots of scutellum separate; male foretibia flattened dorsoventrally and expanded laterally; male midtibia partly flattened dorsoventrally and broader distal 0.4; wing bands well developed and yellowish brown or brown, interruption between marginal and discal bands near vein R_1 clear and complete; medial band present and free.

Description

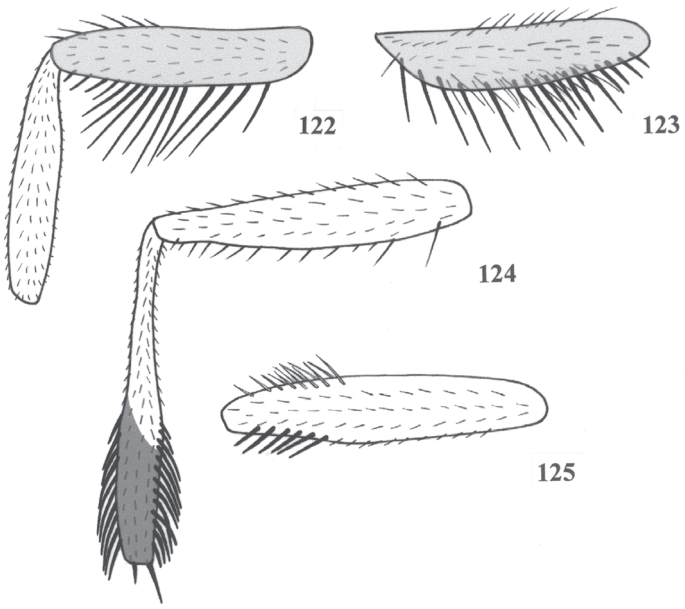
Male. Head. Antenna yellow or orange (first flagellomere partly brown in Zimbabwe specimen). First flagellomere three times as long as pedicel. Arista with short rays; ventral rays slightly shorter and sparser than dorsal rays, especially basally. Frons convex with longitudinal depression, occellar triangle at slight elevation but not distinct protuberance as in *C. tananarivana*; frons orange, with median silvery vitta from ocellar triangle along depression

to anterior margin, especially visible well when viewed from anteroventral angle; with short scattered setulae largely of same color as frons. Frontal setae intermediate in size between anterior and posterior orbital setae. Face yellowish white. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe white, unspotted. Scutal pattern similar to Fig. 8 but with darker ground color, blackish; with streaks and darker markings but without distinct spots or clearly defined stripes except yellowish prescutellar markings, which are separate but with pale area in between; microtrichial pattern silvery gray; pilosity pale. Scapular setae black. Scutellum yellowish white, basally without spots, at most slightly darker coloration, occasionally more pronounced; apically with three separate black spots, covering apical 0.6. Anepisternum on ventral half brownish yellow; with pale pilosity (not as dense and silvery as in *C. tananarivana*).

Legs. Yellow (in Zimbabwe specimen more yellowish orange) except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 122-123): femur darkened; posteriorly with black and pale setulae; ventral setae long and black; tibia slightly flattened dorsoventrally and expanded laterally, white (in Zimbabwe specimen darker), with short white setulae. Midleg (Fig. 124): tibia partly flattened dorsoventrally, distal 0.4 broader; tibia mostly yellow but broadened part blackish, weakly silvery when viewed from certain angle, anteriorly with pale setulae; with black feathering dorsally and ventrally on distal 0.4; tarsi normal. Hindleg (Fig. 125): femur at apical 0.25 with longer pale setae dorsally, and dark setae ventrally.

Wing. Pattern as in Fig. 14; bands yellowish brown to brown. Interruption between marginal and discal bands around end of vein R_1 clear and complete; cubital band free; medial band free



Figs. 122-125: *Ceratitis copelandi* n. sp., male legs. 122. Forefemur and foretibia, anterior view. 123. Forefemur, posterior view. 124. Midfemur and midtibia, anterior view. 125. Hindfemur, anterior view.

but narrower than in figure 14, in some Kenyan specimens poorly developed; crossvein R-M just proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu slightly oblique anterodistally.

Abdomen. Tergites mainly dark brown, tergite 5 sometimes partly yellowish brown. Tergites 2 and 4 silvery across posterior half. Male epandrium (Fig. 249) in lateral view moderately broadened; with posterior lobe of lateral surstylus short and slightly curved.

Female. As male except for the following characters: Ocellar triangle not on elevation. Frontal longitudinal depression weak, but with distinct silvery vitta present. Legs without feathering; pilosity of forefemur mixed white and dark. Oviscape shorter than preabdomen. Aculeus (Figs. 48, 70, 71) at most six times longer than wide; tip with distinct apical indentation and lateral margin slightly sinuous.

Body length. 4.40 (4.20-4.60) mm; wing length: 4.90 (4.45-5.50) mm.

Material examined

Holotype ♂, KENYA: Kericho road, 14.viii.2000, '822', ex *Dovyalis abyssinica*, R.S. Copeland (NMK).

Paratypes: KENYA: same locality and data as holotype (♀ allotype; NMK; 1♂, 1♀; ICIPE; 1♂, 1♀; KMMA; 1♂, 1♀; TAUI; 1♂, 1♀; PPRI); Kakamega forest, 26.ii.2000, '540', ex *Synsepalum brevipes*, R. Copeland (1♂; ICIPE; 1♂; USNM); Nairobi, 25.x.2001, '1472', ex *Chrysophyllum viridifolium* (1♂; ICIPE; 1♀; USNM). ZIMBABWE: Vumba Mts, 14.i.1937, Major Drysdale (1♂; PPRI).

Etymology

Named in honor of Dr. Robert S. Copeland (ICIPE/TAMU) who collected and reared this and many other *Ceratitis* species in Kenya.

Host plants

The type material from Kenya was reared from *Synsepalum brevipes* (Sapotaceae), in which it co-occurred with *C. anonae*, *C. fasciventris*, and *C.* (*Ceratalaspis*) *connexa* (Bezzi), as well as from *Dovyalis abyssinica* (Flacourtiaceae) and *Chrysophyllum viridifolium* (Sapotaceae).

Distribution

Kenya, Zimbabwe.

Comments

This species is closely related to the Madagascan species, *C. tananarivana*, based on the similarities in unique characters such as the coloration of the frons and the shape of the foretibia and midtibia. The Zimbabwe specimen slightly differs from the Kenya specimens, but this is considered intraspecific variation. The position of *C. copelandi* and *C. tananarivana* is unclear with respect to other *Pterandrus* species. In De Meyer *et al.* (2002: 45) this species is listed under the undescribed species 'CO'.

Ceratitis (*Pterandrus*) *curvata* (Munro)

(Figs. 50, 101, 126-129, 229)

Pterandrus curvatus Munro, 1937: 6.

Pterandrus curvatus: Cogan and Munro, 1980: 531 (Afrotropical Catalog); *Ceratitis* (*Pterandrus*) *curvata*: Hancock, 1984: 279 (new combination); Freidberg, 1991: 169 (key); Hancock and White, 1997: 196 (taxonomy, hosts); Norrbom *et al.*, 1999: 120 (World Catalog); De Meyer *et al*., 2002: 30 (host check list).

Diagnosis

Postpronotal lobe with a brown spot; scutal pattern brown to black with distinct spots; anepisternum on ventral half brown, setulae pale except ventral to anepisternal seta dark; basal and apical black spots of scutellum merged; male forefemur anteroventrally with dense comb of silvery setulae along entire length, male midfemur anteriorly with row of long black flattened setulae along dorsal distal half; wing bands well developed and brown, marginal band forming continuous band with anterior part of discal band.

Redescription

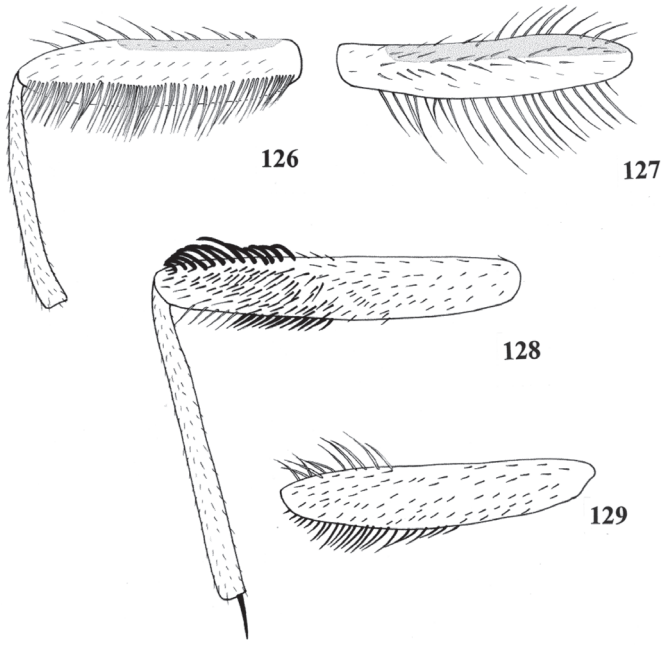
Male. Head. Antenna yellow to yellowish orange. First flagellomere three times as long as pedicel. Arista with short to moderately long rays, basoventral rays shorter and sparser than basodorsal rays. Frons convex (rarely more flat and slightly projecting at frontofacial angle); yellow, darker spots near frontofacial angle and sometimes in center; with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face yellowish white. Genal seta pale or more reddish; genal setulae pale, poorly developed. Occiput on dorsal part yellowish brown to brown colored except along dorsal margin.

Thorax. Postpronotal lobe yellow, with brown spot. Scutal pattern similar to Fig. 2: ground color brown, occasionally black, microtrichose areas silvery with ashgray shine, spots brownish black or black except poorly developed sutural yellow spots, prescutellar yellow markings separate. Scapular setae dark. Scutellum yellowish white, basally with two merged dark spots, apically with three merged black spots, weakly incised, extending anteriorly to basal spots or almost so. Anepisternum on ventral half brown; setulae pale, except ventral to anepisternal seta dark.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 126-127): coxa with tuft of silvery setulae; femur yellow except dorsally on basal half slightly darker, anteroventrally with dense comb of silvery setulae along entire length; posteriorly with poorly developed bush of long palish setulae along entire length, posterodorsal setulae and row of dorsal setulae on distal half longer, basally darker setulae; ventral setae pale. Midleg (Fig. 128): femur anteriorly with short but conspicuous dense black pilosity; along dorsal distal half with row of longer black flattened setulae, gradually shortening towards apical end, with silvery patch on distal 0.33 (largely obscured by dark pilosity); ventrally with dispersed dark setulae. Hindleg (Fig. 129): femur at apical 0.33 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 11; bands brownish. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Tergite 1 yellowish orange with brown patches across posterior margin; tergites 2 and 4 anteriorly brown, with silvery transverse band along posterior half; tergite 3 completely dark brown; tergite 5 orange brown. Setation and banding typical for subgenus. Male



Figs. 126-129. *Ceratitis curvata*, male legs. 126. Forefemur and foretibia, anterior view. 127. forefemur, posterior view. 128. Midfemur and midtibia, anterior view. 129. Hindfemur, anterior view.

epandrium (Fig. 229) in lateral view distinctly broadened; posterior lobe of lateral surstylus with base broadened, apical end sharply pointed.

Female. As male except for the following characters: First flagellomere 2-3 times as long as second, more orange colored. Genal seta and setulae dark, latter well developed. Postpronotal spot more distinct. Legs without feathering; yellow except femora brownish; pilosity and ventral setae forefemur dark. Oviscape shorter than preabdomen. Aculeus (Figs. 50, 101) at least 10 times longer than wide; tip flat in lateral view, pointed, and with lateral margin straight.

Body length. 3.97 (3.75-4.20) mm; wing length: 4.36 (4.20-4.70) mm.

Material examined

Holotype ♂, KENYA: Nairobi, December 1936, ex Strychnos [= *Strychnos usambarensis* according to Munro, 1937], V. van Someren (BMNH).

Paratypes: KENYA: Nairobi, December 1936 (allotype ♀; BMNH; 1♂; NMK); June 1936 (1♀; PPRI; 1♀; USNM); January 1937 (1♂, 1♀; PPRI; 1♀; NMK); April 1937 (1♂; NMK), all V. van Someren, 'bred ex Strychnos' [= *Strychnos usambarensis* according to Munro, 1937]; Karura, June 1936, 'bred ex Acokanthera' [= *Acokanthera schimperi* according to Munro, 1937], V. van Someren (1♂; USNM).

Other material examined: KENYA: Nairobi, July 1949 (2♂, 1♀; PPRI; 5♀; USNM), all Skinner and McGough; 25.v.1950, 'McG86' [=*Strychnos reticulata* according to Munro's archives], J. McGough (1♀; USNM); June 1950 'ex Strychnos reticulata', McGough (5♂, 1♀;

NMK); Kwale, June 1948, V. van Someren (1♀; BMNH); Emali Range, Sultan Hamud, March 1940, 4900-5900ft, V. van Someren (1♂; BMNH).

Host plants

Bred from *Strychnos usambarensis* and *S. reticulata* (Loganiaceae). One specimen is labeled as being reared from *Acokanthera schimperi* (Apocynaceae). It is to be confirmed whether this is a true record or a mislabelling.

Distribution

Kenya.

Comments

Only known from Kenya, *C. curvata* forms a monophyletic group with *C. lobata* based on the characteristic pilosity of the male forefemur and the scutal pattern. The females of the two species are very similar in external morphology (the anepisternum is somewhat darker in *C. curvata*, but this does not seem to be a reliable character). However, they can be separated by some minor differences in the shape of the aculeus that appear to be consistent: 1. The apex of the aculeus is somewhat broader in *C. lobata* than in *C. curvata,* with the subapical notches slightly more pronounced in the former; 2. In lateral view, the aculeus tip is slightly curved ventrally in *C. lobata*, whereas it is straight in *C. curvata*.

***Ceratitis* (*Pterandrus*) *faceta* Enderlein**

(Figs. 1, 24, 91, 130-133)

Ceratitis faceta Enderlein, 1920: 349.

Trirhithrum facetum: Bezzi, 1924b: 106 (new combination); Munro, 1933a: 6 (male); Munro, 1934: 479 (review); Cogan and Munro, 1980: 531 (Afrotropical Catalog); Norrbom *et al.*, 1999: 229 (World Catalog).

Ceratitis (*Pterandrus*) *faceta*: Hancock and White, 1997: 196 (new combination).

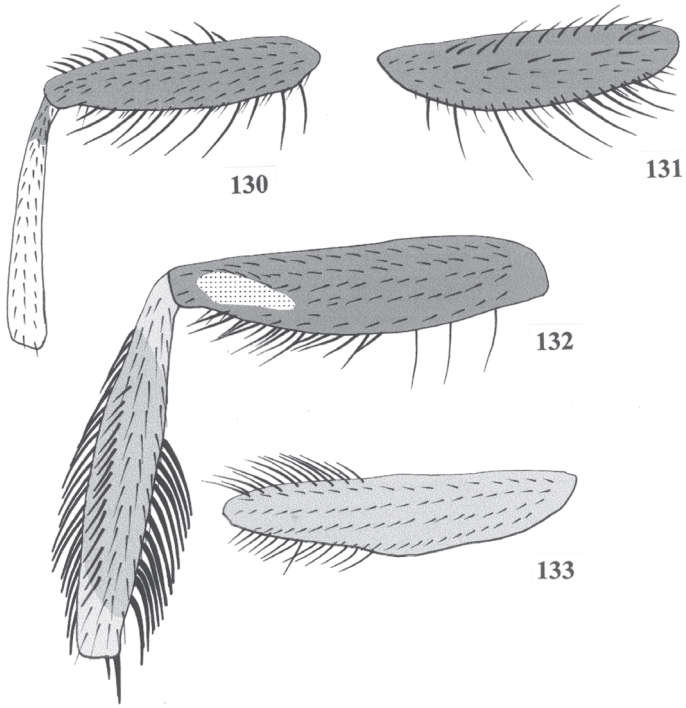
Diagnosis

Postpronotal lobe with a large black spot occupying most of the postpronotal lobe; scutal pattern shiny black without spots; anepisternum on ventral half brown, setulae pale except ventral to anepisternal seta dark, in female along ventral part; scutellum shiny black; male midtibia with black feathering along dorsal 0.9 and ventral 0.66; wing bands well developed and brown, marginal band forming continuous band with anterior part of discal band.

Redescription

Male. Head. Antenna yellowish orange. First flagellomere three times as long as pedicel. Arista with short rays; basoventral rays shorter and sparser than basodorsal rays. Frons convex; yellow; with short scattered setulae largely of same color as frons. Frontal setae well developed. Face white. Genal seta and setulae black, latter poorly developed. Occiput mainly dark, ventral margin only pale.

Thorax. Postpronotal lobe dark yellow, large black spot occupying most of the postpronotal lobe so that it appears to have largely the same color as scutum. Scutal pattern as in Fig. 1: shiny black, with dark pilosity; no streaks or spots, sutural lines more brownish. Scapular setae dark. Scutellum shiny black; basally near lateral margins with paler spot. Anepisternum on ventral



Figs. 130-133. *Ceratitis faceta*, male legs. 130: Forefemur and foretibia, anterior view. 131. Forefemur, posterior view. 132. Midfemur and midtibia, anterior view. 133. Hindfemur, anterior view.

half brown, with conspicuous silvery shine when viewed from front; pilosity pale except ventral to anepisternal seta where few setulae dark.

Legs. Largely dark; coxa, trochanter, femur, basal 0.33 of foretibia and hindtibia and whole of midtibia black, otherwise yellow; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 130-131): femur without bush posteroventrally, only few dispersed dark setulae. Midleg (Fig. 132): femur anteriorly with yellow oblique line on distal 0.33, silvery when viewed from certain angle; ventrally silvery when viewed from certain angle, on distal half with black setulae; tibia moderately broadened, with black feathering along dorsal 0.9 and ventral 0.66; anteriorly with second row of short black setulae along median half. Hindleg (Fig. 133): femur at apical 0.33 with longer black setulae dorsally and ventrally; forming relatively dense feathering ventrally.

Wing. Pattern as in Fig. 11; bands brown. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Shiny black. Tergites 2 and 4 with silvery band along respectively posterior half and 0.66. Setation and banding typical for subgenus. (Male terminalia not dissected)

Female. As in male except for the following characters. Antenna orange. Frons darker colored, orange. Genal setulae well developed. Anepisternum with dark pilosity on ventral part, without

conspicuous silvery shine. DM-Cu crossvein straight. Legs without feathering; yellow, tibia darkened on basal part, femora dark brown; forefemur posteroventrally with dark pilosity. Ovipositor shorter than preabdomen; Aculeus (Figs. 24, 91) at least 10 times longer than wide; tip pointed and lateral margin slightly concave.

Body length. 4.57 (4.45-4.70) mm; wing length: 4.80 (4.70-4.90) mm.

Material examined

Holotype ♀, EQUATORIAL GUINEA: Uelleburg, June-August 1908, S.G. Tessmann (MNHU).

Other material examined: CONGO (D.R.): Lukolela, left bank Congo river, 1°5'S, 13.i.1931, J.P. Chapin, 'Ac 31300' (1♂; AMNH); Yangambi, 26.ix.1949, 'IP 101', E.C. Buyckx (1♂, 1♀; PPRI).

Host plants

Unknown.

Distribution

Congo (D.R.), Equatorial Guinea.

Comments

This species was described from a female holotype, and later Munro (1933a) described the male. In the unidentified material of the PPRI collection we found a male and a female from Yangambi that agree with these descriptions. *Ceratitis. faceta*, *C. bicincta, C. querita*, and *C. inauratipes* together form a monophyletic group (the *faceta* subgroup) based on the largely shining black scutum, scutellum and abdomen. However the shape of the aculeus is unlike that found in other species of this subgroup, and resembles more the shape found in the *gravinotata* subgroup (see the general discussion for further details)

Ceratitis (*Pterandrus*) *fasciventris* (Bezzi)

(Figs. 7, 41, 82, 83, 134-137, 239, 251)

Pterandrus rosa var. *fasciventris* Bezzi, 1920: 228.

Pterandrus rosa var. *fasciventris*: Cogan and Munro, 1980: 531 (Afrotropical Catalog); De Meyer, 2001b: 223 (polyphagy, distribution); Norrbom *et al.*, 1999: 121 (World Catalog).

Pterandrus flavotibialis Hering, 1935: 158. Synonymy by: Cogan and Munro, 1980? (see De Meyer, 2001a).

Pterandrus rosa: Munro, 1956: 467 (Rwanda).

Ceratitis (*Pterandrus*) *rosa*: Hancock, 1984: 279 [partim]; Hancock, 1987: 56 (Zambia); White and Elson-Harris, 1992: 306 [partim] (pest status).

Ceratitis (*Pterandrus*) *fasciventris*: De Meyer, 2001a: 56 (redescription, status revised); Hancock *et al.*, 2001: 44 (Namibia); De Meyer *et al*., 2002: 31 (host check list).

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral half yellowish brown, setulae pale; apical black spots of scutellum separate; male midtibia with dark feathering along distal half; wing bands well developed and brown or yellowish brown, interruption between marginal and discal bands near vein R_1 clear and complete.

Redescription

Male. Head. Antenna yellowish orange. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons yellow; with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face yellowish white. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe yellowish white, without spot. Scutal pattern as in Fig. 7: ground color dark gray, sometimes with orange tinge; with streaks and darker markings but without distinct spots, except prescutellar white separate markings, usually with paler gray area in between, occasionally merged. Scapular setae dark. Scutellum yellowish white, basally usually without dark spots, rarely with two separate spots; apically with three separate dark spots, extending anteriorly to basal half, sometimes to basal 0.33. Anepisternum on ventral half yellowish brown; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 134-135): at most slightly darker yellow anteriorly; femur without bushy feathering posteriorly, only row of dispersed, long and usually black setulae posteriorly, setulae shorter and pale posterodorsally and posteroventrally; ventral setae black. Midleg (Fig. 136): femur with dispersed pale setulae at base ventrally; tibia not broadened; anteriorly with inconspicuous silvery shine on distal half when viewed from certain angle; ventrally and dorsally with dark feathering along distal half. Hindleg (Fig. 137): femur at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 10; bands brown or yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band absent; crossvein R-M opposite middle of discal cell, sometimes just proximal to middle. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergites 2 and 4 with pale gray band on posterior half, anterior margin sometimes with narrowly brownish colored. Tergite 3 with distinct brownish black transverse band along posterior half; rarely more complete brown. Tergite 5 with basal half brownish, sometimes divided medially into two spots, or only narrowly brownish along anterior margin. Male epandrium (Fig. 239) in lateral view with posterior lobe of lateral surstylus short and straight, anterior lobe well pronounced.

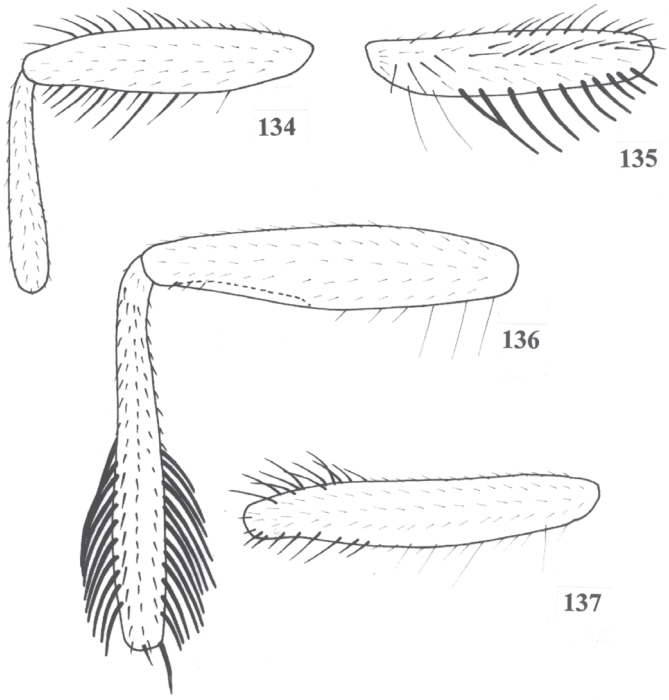
Female. As male except for the following characters: Anepisternum on ventral half brown or yellowish brown. Crossvein DM-Cu variable. Legs without feathering; forefemur with posterodorsal row usually partly dark; forefemur posteroventrally with pale pilosity. Oviscape shorter than preabdomen. Aculeus (Figs. 41, 82, 83) at most six times longer than wide; tip with distinct apical indentation and lateral margin slightly sinuous.

Body length. 4.47 (3.95-5.15) mm; wing length: 4.96 (4.45-5.75) mm.

Material examined

Lectotype of *fasciventris* (designation by De Meyer, 2001a) ♂, UGANDA: 17.viii.1911, G. Gowdey (BMNH). Paralectotype ♀: same date and locality as lectotype (BMNH).

Lectotype of *flavotibialis* (designation by De Meyer, 2001a) ♂, CONGO (D.R.): Rutshuru, November 1934, 'Nr D 7376', C. Seydel (BMNH). Paralectotype ♀: same date and locality as lectotype (BMNH).



Figs. 134-137. *Ceratitis fasciventris*, male legs. 134. Forefemur and foretibia, anterior view. 135. Forefemur, posterior view. 136. Midfemur and midtibia, anterior view. 137. Hindfemur, anterior view.

Other material examined: ANGOLA: Bruco, 26.ii-2.iii.1972 (1♂; BMNH). CONGO (Brazzaville): Banane [unknown as locality], 25.ii.1986, A. Delobel (1♂; TAUI). CONGO (D.R.): Bobandana, Kivu, December 1937, J. Ghesquière (1♂, 1♀; KMMA); Elisabethville [=Lubumbashi], February 1958, 'à la lumière', C. Seydel (1♂; KMMA); Ituri, Logo, 15.vi.1937, H.J. Brédo (1♂, 1♀; KMMA); Katompe, Katanga, February 1935, 'D. 7376', C. Seydel (1♂, 2♀; KMMA); Mahagi, 11.xii.1959, 'récolté sur caféier', J. Dubois (1♂; KMMA); Mulungu, 6.vii.1938, Hendrickx (2♂, 5♀; KMMA, also 2♀ specimens with extra label 's/ Eryobotrya japonica'); November 1938, Hendrickx (12♂, 16♀; KMMA); Parc National de Garamba, II/id/10, 11.ix.1951, '2419' (1♂; KMMA); II/fd/17, 3.iv.1952, '3279' (1♂; KMMA), both De Saeger; Rutshuru, 26.xii.1933, 1285m, G.F. de Witte (1♂, 1♀; KMMA); 29-30.xii.1933, 1285m, G.F. de Witte (1♂; KMMA); 2.vii.1935, G.F. de Witte (3♀; KMMA); 24.iv.1936, L. Lippens (1♂; KMMA); 19.v.1936, L. Lippens (2♂; KMMA); Rutshuru (riv. Musugereza), 10.vii.1935, 1100m, G.F. de Witte (1♀; KMMA); Rwankwi, 23.xii.1943 (1♀; KMMA); 31.iii.1946 (1♀; KMMA), both J. Leroy; Tshengelero (nr Munagana), 21.viii.1934, 1750m, G.F. de Witte (1♀; KMMA). ETHIOPIA: Kaffa, Badabuna forest, 17.xi.1964, 'ex coffee berry', D. Greathead (1♂; BMNH); Limu, Buntu, 19.xi.1964, 'on coffee', D. Greathead (1♀; BMNH); Yrgalem, 11.v.1961, 'at lighted tent', L.W. Teller (1♀; USNM). GHANA: Kade, 23.ix.2001, M. Billah (1♂; ICIPE). GUINEA: Macenta, October-November 1953, R. Pijol (2♂; MNHN); Kankan, 17-20.vi.1995, mango 'P.P. Cuisse Mme' (1♂; KMMA); mango 'P.P. Miami', both J.F. Vayssieres (1♂; CIRAD). IVORY COAST: Korhogo, June-September

1999, A. Barbet (9♂; CNEARC). KENYA: Busia, 1000 m, 29.ii.1995, 'emerged from coffee berries', Vaamonde (1♂, 2♀; BMNH); Doondu, Kiambu distr., 1540 m, 29.iv.1988, 'on coffee arabica', I. White and CIBC (1♂; BMNH); Kabete, November 1969, 'bred from damaged peaches' (3♂, 2♀; BMNH); Kakamega, Bokum, 25.x.1949, R. Pelley (1♀; USNM); Kakamega forest, 5200 ft, 20.xii.1970, A. Stubbs (1♂; BMNH); 24.xi.1992, Whittington and Londt (1♂, 1♀; NMSA); 14.i.1996, I. Yarom and A. Freidberg (5♂, 6♀; TAUI); Karura, June 1936, 'ex Rawsonia' V. van Someren (1♂; NMK; 1♀, PPRI); Migori, 26.v.1995, 'on guava' (1♂, 1♀; ICIPE); Nairobi, April 1936, 'loquat', Krauss (5♂, 13♀; USNM; 15♂, 16♀; BPBM); 'Dorvyalis caffra' (4♂, 2♀; PPRI); June 1936, 'ex Rawsonia', van Someren (1♂; PPRI); 'Rawsonia usambarensis', Krauss (3♂, 14♀; USNM); August 1937, 'ex coffee', van Someren (1♂; NMK); 1937, 'ex loquat', van Someren (1♂; NMK); 'ex keiapple', van Someren (1♂; PPRI); September 1937, 'ex keiapple' van Someren (1♀; USNM); November 1937, 'ex Dorvyalis', van Someren (1♀; NMK); April 1938, 'ex Rawsonia', van Someren (1♂; NMK); 15.vii.1949, 'ex coffee', Skinner and McGough (2♂; USNM); July 1949, Skinner and McGough (1♀; USNM); 26.xi.1949, 'ex Warburgia ugandensis', J. McGough (1♀; USNM); 25.v.1950, 'McG107B' [=ex *Drypetes* according to Munro's archives], McGough (2♂, 1♀; USNM); Ngong, June 1939, 'ex Drypete', van Someren (1♂; NMK); unknown locality, 'fr coffee CIE A20210' (1♂, 1♀; BMNH); Rabai, August 1937, 'caught on bait', V. van Someren (2♀; NMK; 2♀; PPRI). MALI: Bamako, 30.viii.1980, 'ex mango' (10♂; TAUI). NIGERIA: Zaria, Samaru, 17.vi.1978, 'on mango fruits', S.A. Apeji (3♀; BMNH); RWANDA: Contref. Est. Muhavura, 28.i.1953, 2100m, P. Basilewsky (1♂; KMMA). SAO THOME: 28.v.1973, 'cacao', J. Derron (1♂; BMNH). SIERRA LEONE: Freetown, March 1936, 'Anisophyllea laurina', Van Zwaluwenburg and McGough (4♂, 12♀; USNM); Njala, May 1947, 'M877' [=ex *Anisophyllea laurina* according to Munro's archives], F.A. Squire (3♂, 4♀; PPRI). TANZANIA: Ukerewe Island, Father Conrads (1♂; NMK). UGANDA: unknown locality, F. Bianchi (2♀; USNM); Ankole, Kichwamba, 23-29.iv.1968, P.J. Spangler (1♀; USNM); Budonga, May 1936, 'Myranthus arboreus', Bianchi (12♂, 5♀; USNM); Busingiro, May 1936, 'guava', F. Bianchi (3♀; USNM); Kamengo, 8.ix.1949, van Someren (1♂; BMNH); Kampala, 29.vii.1929, 'ex avocado peach' [?, last word partly illegible], H. Hargreaves (1♂; BMNH); Kibale forest, April 1973, 'ex Pencovia turbinata', P. Waser (1♂; BMNH); W. Nile, 13.xi.1958, J.Bowden (1♂; TAUI); unknown locality, D. Bruce (1♂; BMNH).

Host plants

Because this species was confused with *C. rosa* no separate host data are known. From the material examined the following host plants can be listed: avocado (*Persea americana*), cacao (*Theobroma cacao*), coffee (*Coffea* sp.), guava (*Psidium guajava*), keiapple (*Dovyalis caffra*), loquat (*Eriobotrya japonica*), mango (*Mangifera indica*), and peach (*Prunus persica*). Furthermore found in *Anisophyllea laurina*, *Drypetes*, *Myrianthus arboreus*, *Pancovia turbinata*, *Rawsonia usambarensis* and *Rawsonia* sp., and *Warburgia ugandensis*. For a full discussion on the host plant spectrum, see De Meyer *et al.* (2002).

Distribution

Angola, Congo (Brazzaville), Congo (D.R.), Ethiopia, Ghana, Guinea, Ivory Coast, Kenya, Mali, Namibia, Nigeria, Rwanda, Sao Thome, Sierra Leone, Tanzania, and Uganda. Also recorded from Zambia (Hancock, 1987 under *C. rosa*; Hancock, personal communication, indicated that this record concerns *C. fasciventris*) and Mozambique (Cogan and Munro, 1980) but the latter could be due to confusion with *C. rosa* s.str.

Comments

De Meyer (2001a) raised *Pterandrus rosa* var. *fasciventris* to species status, and gave a detailed redescription of both *C. fasciventris* and *C. rosa*, which is repeated here. Males of *C. fasciventris* and *C. rosa* can be distinguished by the leg feathering, but females cannot be separated unambiguously. There is a biogeographic separation between the two species, with a largely allopatric distribution. *Ceratitis fasciventris* is mainly confined to western and Central Africa (Fig. 251), while *C. rosa* is limited to eastern and southern Africa (Fig. 252). The only known overlap is in Kenya, where both species occur sympatrically (R.S. Copeland, personal communication; S.A. Lux, personal communication). Norrbom *et al.* (1998) mention that syntypes of *C. flavotibialis* that were deposited in the collection of Hamburg were destroyed. However, from the original publication (Hering 1935: 156) it is doubtful that type material was ever deposited in Hamburg.

Ceratitis (*Pterandrus*) *flava* De Meyer and Freidberg, n. sp.

(Figs. 26, 86, 138-141, 243)

Diagnosis

Postpronotal lobe without a spot; scutal pattern with streaks and darker markings but without distinct spots; anepisternum completely yellow, setulae pale; apical black spots of scutellum separate; male midtibia with black setulae dorsally along distal 0.8 and ventrally along distal half, setulae forming row but without distinct feathering; wing bands well developed yellowish brown, interruption between marginal and discal bands near vein R_1 clear and complete.

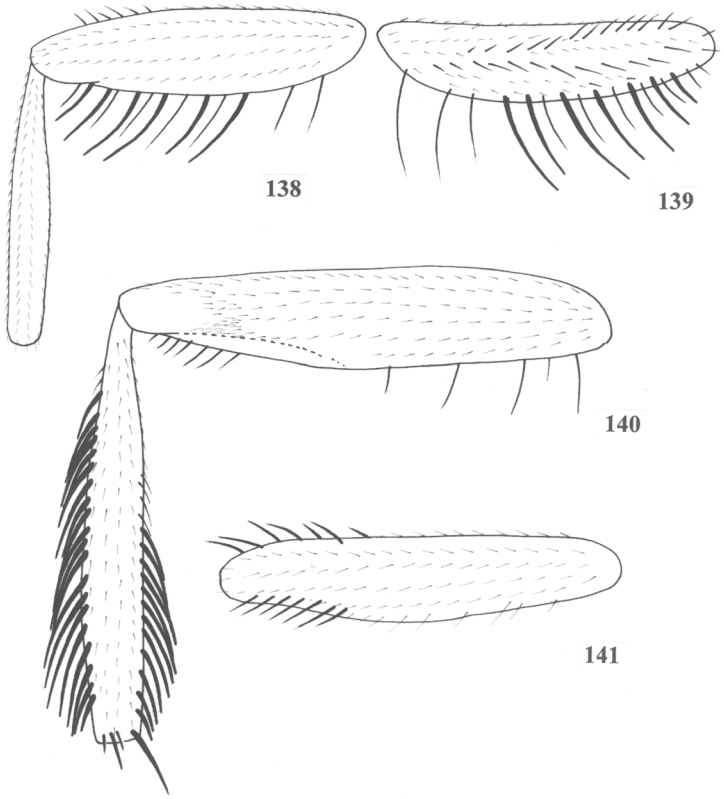
Description

Male. Head. Antenna yellow. First flagellomere three times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons flat to convex; yellow; with short scattered setulae largely of same color as frons. Frontal setae well developed. Face yellowish white, gena slightly darker yellow. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe yellowish white, without spot. Scutal pattern similar to Fig. 9: ground color pale gray with distinct yellowish orange tinge; with streaks and darker markings but without distinct spots, prescutellar white markings separate. Scapular setae dark. Scutellum yellowish white, basally without distinct spots, apically with three separate dark spots, extending to apical 0.33. Subscutellum yellowish brown. Anepisternum completely pale; setulae pale.

Legs. Yellow; setation typical for subgenus, mainly pale. Foreleg (Figs. 138-139): femur posteriorly with dispersed short pale setulae; posterodorsal and posterior rows longer and black; ventrally with row of long black setae. Midleg (Fig. 140): femur ventrally with few moderately long black setulae on distal 0.25, distinct feathering; tibia with black setulae dorsally along distal 0.8 and ventrally along distal half, setulae forming row but without distinct feathering. Hindleg (Fig. 141): femur at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 10; bands yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band absent; crossvein R-M just proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.



Figs. 138-141. *Ceratitis flava* n. sp., male legs. 138. Forefemur and foretibia, anterior view. 139. Forefemur, posterior view. 140. Midfemur and midtibia, anterior view. 141. Hindfemur, anterior view.

Abdomen. Mostly yellow. Tergites 2 and 4 across posterior part with pale gray band, weakly silvery when viewed from certain angle; tergite 3 occassionaly with very weak interrupted brownish line across posterior margin. Male epandrium (Fig. 243) in lateral view with lateral surstylus elongate, posterior lobe elongate and slightly curved.

Female. As male except for the following characters: Legs without feathering; forefemur posteroventrally with pale pilosity. Abdominal tergite 3 with small brown transverse band along posterior 0.25. Oviscape slightly longer than preabdomen. Aculeus (Figs. 26, 86 (note that the tip is broken)) at least 10 times longer than wide; lateral margin very weakly sinuous.

Body length. 5.43 (5.30-5.55) mm; wing length: 5.82 (5.55-6.05) mm.

Material examined

Holotype ♂, CONGO (D. R.): Parc National de Garamba, 'Aka/2', 22.v.1952, coll. Nr 3514, H. De Saeger (KMMA).

Paratypes: CONGO (D. R.): same date and locality as holotype (1♀ allotype; KMMA); Parc National de Garamba, 'Pp.K.72', 27.viii.1951, coll. Nr 2338, H. De Saeger (1♂; TAUI).

Other material examined (not included in type series): IVORY COAST: nr Korhogo, June-September 1999, mango orchards, A. Barbet (6♂; CNEARC). MALI: Madina, 5.vii.2001, A. Barbet (3♂; CNEARC).

Etymology

After the Latin flavus (meaning yellow) and referring to the predominantly yellow color.

Host plants

Unknown. The material from Ivory Coast was collected in mango orchards by means of lure traps, but no actual rearing from mangoes was done.

Distribution

Congo (D.R.), Ivory Coast, Mali.

Comments

This species is placed in *Pterandrus* because of the black feathering on the male midtibia. It only has a black band on abdominal tergite 3 in the female allotype and even then in reduced form. The exact position of this species within the genus is not certain. Unfortunately, the aculeus tip of the only available female is damaged, so it cannot be ascertained whether it is pointed or slightly bilobed. The material from the Ivory Coast was partly damaged and not pinned, and is therefore not included in the type series. One male specimen slightly differs in that the band on tergite 3 is pronounced and the midfemur has a mediolongitudinal line of short black setulae anteriorly. Otherwise it corresponds with the other specimens, and is therefore included in this species, at least provisionally. In De Meyer *et al.* (2002: 45) this species is listed under the undescribed species 'FL'.

***Ceratitis* (*Pterandrus*) *flexuosa* (Walker)**

(Figs. 9, 19, 46, 74, 75, 142-145, 244)

Trypeta flexuosus Walker, 1853: 382.
Pterandrus pauper Bezzi, 1924b: 99. Synonymy by: Munro, 1969: 423.
Ceratitis flexuosa: Bezzi, 1909: 278, 280 (key).
Pardalaspis flexuosa: Bezzi, 1918: 235 (new combination); Bezzi, 1924a: 482; Bezzi, 1924b: 102 (key).
Pterandrus flexuosus: Munro, 1969: 423 (Ivory Coast); Cogan and Munro, 1980: 531 (Afrotropical Catalog).
Ceratitis (*Pterandrus*) *flexuosa*: Hancock, 1984: 279 (new combination); Freidberg, 1991: 169 (key); White and Elson-Harris, 1992: 312 (pest status); Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer, 2001b: 221 (stenophagy, distribution); De Meyer *et al*., 2002: 33 (host check list).

Diagnosis

Postpronotal lobe without a spot; scutal pattern with streaks and darker markings but without distinct spots; anepisternum on ventral half darker yellow but often not pronounced, setulae pale; apical black spots of scutellum separate and strongly reduced; male midtibia with dark feathering along distal 0.4 to half; wings with bands largely reduced to isolated brownish spots.

Redescription

Male. Head. Antenna yellowish orange. First flagellomere twice as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons convex, pale yellow; with short scattered setulae largely of same color as frons. Frontal setae well developed. Face yellowish white; gena somewhat darker. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe yellowish white, without spot. Scutal pattern as in Fig. 9: ground color pale gray with faint orange tinge; microtrichose silvery shine; with streaks and darker markings but without distinct spots, except at transverse suture and around dorsocentral and (to lesser extent) prescutellar seta implant dark, shiny spots, prescutellar yellowish white markings separate. Scapular setae dark. Scutellum yellowish white, basally without spots, apically with three strongly reduced dark spots. Subscutellum yellowish orange, without distinct spots. Anepisternum on ventral half darker yellow but often not pronounced; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 142-143): femur without bushy pilosity, with dispersed dark setulae, ventral setae black. Midleg (Fig. 144): femur anteriorly with large median white spot; along dorsal edge on distal half to 0.6 with short dense black pilosity, ventrally with few long black setulae near base; tibia dilated, with apical 0.33 to 0.4 brown with silvery spot, only conspicuous when viewed from certain angle; with black feathering dorsally and ventrally along distal 0.4 to half; anteriorly with third row of very short black feathering, area between third and dorsal row not dark. Hindleg (Fig. 145): femur at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 19; bands largely reduced to isolated brownish spots, especially marginal band. Medial band absent; crossvein R-M just proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique posterobasally.

Abdomen. Mostly yellowish orange. Tergites 2, 4 and 5 largely grayish (not silvery); tergite 3 with posterior 0.33 brownish, interrupted medially; tergite 5 with anterior part brownish or yellowish brown, usually as two separate spots, occasionally as continuous band. Male epandrium (Fig. 244) in lateral view with posterior lobe of lateral surstylus short and stout, slightly curved; anterior lobe well pronounced.

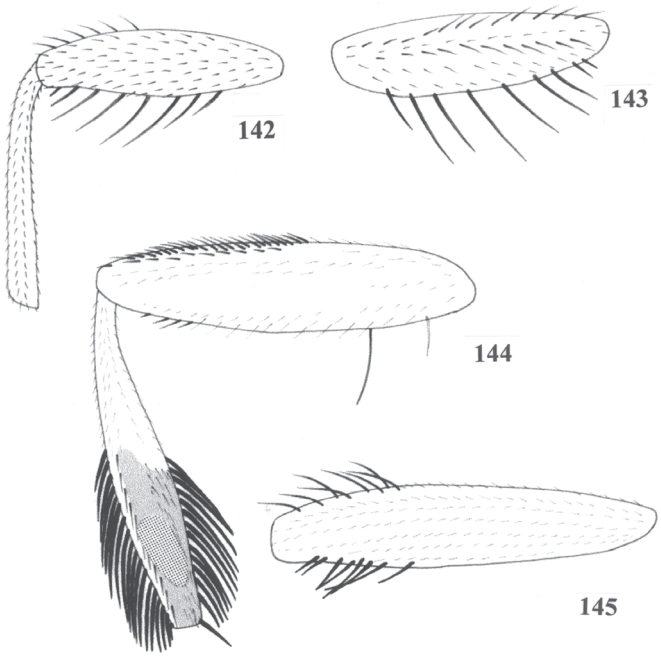
Female. As male except for the following characters: Darker patches on gena not distinct. Subscutellum usually with obscured dark spot in the middle. Legs without feathering; forefemur posteroventrally with pale pilosity. Abdominal tergite 5 anteriorly at most with darker yellow markings. Oviscape shorter than preabdomen. Aculeus (Figs. 46, 74, 75) at most six times longer than wide; tip with distinct apical indentation and lateral margin slightly sinuous. Some female specimens have a generally darker appearance.

Body length. 4.52 (3.75-4.75) mm; wing length: 5.00 (3.85-5.45) mm.

Material examined

Lectotype ♂, GHANA: 'Cape Coast Castle, Gold Coast, W. Africa', 'ex coll. Saunders', '68.4'. (BMNH) (lectotype designation by inference of holotype by Hardy, 1966: 661).

Holotype *C. pauper*, ♂, GHANA: Oblogo, 25.xii.1920, J.W. Scott Macfie (BMNH).



Figs. 142-145. *Ceratitis flexuosa*, male legs. 142. Forefemur and foretibia, anterior view. 143. Forefemur, posterior view. 144. Midfemur and midtibia, anterior view. 145. Hindfemur, anterior view.

Other material examined: ANGOLA: 7 miles W. Gabela, 16-18.iii.1972 (1♂; BMNH). CONGO (D.R.): Eala, January 1936, 'ex fruits Dorstenia', J. Ghesquière (14♂, 4♀; KBIN); Terr. De Banningville, Wombali, May 1945, A. Fain (1♂; KMMA); Tshuapa, Ikela, 1955, R.P. Lootens (1♂; KMMA); Bas-Congo, Kimwenza, Jan.-April 1956, R.P. Van Eyen (1♂; KMMA). GUINEA: Foulaya, 22.iv.1994, mangue 'Palmar', J. Vayssieres (1♀; CIRAD). IVORY COAST: Bingerville, October 1962, J. Decelle (1♀; KMMA). KENYA: Kakamega forest, 4.iii.1999, 'ex Antiaris toxicaria', R. Copeland (2♂, 2♀; ICIPE); Shimba Hills, February 1953, 'bred from fallen fruits of Antiaris toxicaria', J.H. Hensley [also mounted larvae and puparia] (4♂, 1♀; BMNH). NIGERIA: Univ. of Ibadan, 14.iv.1966, J.Bowden, 'light' (1♂; NMSA); S. Nigeria, Oshogbo, November 1910, T.F.G. Mayer (1♀; BMNH). TANZANIA: Bukoba, August 1935, A.H. Ritchie (1♀; PPRI). TOGO: AgouNyogbo, 'ex Antiaris africana', 17.xii.1982, (3♂, 3♀; TAUI), 30.xii.1981 (9♂, 6♀; TAMU), all G.J. Steck. UGANDA: Bwamba, June 1948, V. van Someren (1♂; PPRI; 2♂; BMNH); Entebbe, 8.ii.1910 (1♀; PPRI; 1♀; USNM), G. Gowdey; 9.ii.1910, 'G206' (1♂, 1♀; PPRI; 1♂, 2♀; BMNH); Masaka, 12.iv.1909 (1♂; USNM). One additional ♂ from an unknown locality is represented in the USNM collection (data on label: 4.iv.1944, 'A-1248').

Host plants

Reported from *Dorstenia* sp. in Congo (D.R.), *Antiaris toxicaria* in Kenya, *A. africana* in Togo (Moraceae), and *Mangifera indica* (Anacardiaceae) in Guinea (cf. material examined).

The latter host plant is also mentioned from East Africa but requires confirmation (White and Elson-Harris, 1992).

Distribution

Angola, Congo (D.R.), Ghana, Guinea, Ivory Coast, Kenya, Nigeria, Tanzania, Togo and Uganda.

Comments

C. flexuosa might be related to *C. fulicoides* based on the shared characters of reduced wing pattern and scutellar markings, as well as scutal pattern, but the aculeus shape is different. The type of *C. pauper* at the BMNH is a male. The mention of 'Type f' in the original description by Bezzi (1924b: 100) is most likely a typographical error since the description is that of a male specimen.

***Ceratitis* (*Pterandrus*) *fulicoides* (Munro)**

(Figs. 21, 23, 96, 146-149, 245)

Pterandrus fulicoides Munro, 1943: 137.
Pterandrus fulicoides: Cogan and Munro, 1980: 531 (Afrotropical Catalog).
Ceratitis (*Pterandrus*) *fulicoides*: Hancock, 1984: 279 (new combination); Freidberg, 1991: 168 (key); Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer *et al*., 2002: 33 (host check list).

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes except at transverse suture and around dorsocentral and prescutellar setae; anepisternum on ventral half yellowish orange, setulae pale; apical black spots of scutellum separate; male midtibia with orange feathering dorsally along distal 0.66 and ventrally along distal 0.8; wing bands well developed and brown or yellowish brown, interruption between marginal and discal bands near vein R_1 broad and complete with marginal band only well developed on distal half.

Redescription

Male. Head. Antenna yellowish orange. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons convex, with poorly developed median protuberance; pale, center yellow; with short scattered setulae largely of same color as frons. Frontal setae absent; posterior orbital less developed. Face yellowish white. Genal seta pale or reddish; genal setulae dark reddish, poorly developed.

Thorax. Postpronotal lobe yellowish white, without spot. Scutal pattern similar to Fig. 9: ground color pale gray with distinct orange tinge, microtrichose silvery shine; with streaks and darker markings but without distinct spots, except at transverse suture and around dorsocentral and prescutellar setae, prescutellar yellow-white markings separate. Scapular setae dark. Scutellum yellowish white, basally without distinct spots, apically with three separate black spots, extending anteriorly to basal half. Anepisternum on ventral half yellowish orange; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly pale. Foreleg (Figs. 146-147): femur posteriorly with bush of long orange setulae along entire length,

posterodorsal setulae longer; ventrally with row of long orange setae. Midleg (Fig. 148): femur ventrally with row of long orange setulae, on distal 0.33 closely appressed to form feathering; midtibia with orange feathering dorsally along distal 0.66 and ventrally along distal 0.8; anteriorly with short to moderately long dispersed orange setulae, longer along dorsal row. Hindleg (Fig. 149): femur at apical 0.25 with longer setulae dorsally and to a lesser extent ventrally.

Wing. Pattern as in Fig. 21; bands brownish or yellowish brown. Marginal band only well developed on distal half, interruption between marginal and discal bands broad and complete; discal band narrow and partly interrupted near crossvein R-M; cubital band free; medial band absent; crossvein R-M slightly beyond middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique posterobasally.

Abdomen. Mostly yellow. Tergite 2 largely and tergite 4 across posterior half with pale gray (not silvery) band; tergite 3 across posterior 0.33 to 0.25 with brown band, interrupted medially or with median notch; tergite 5 across posterior margin sometimes narrowly brownish. Male epandrium (Fig. 245) in lateral view with lateral surstylus slender and elongate; posterior lobe straight and elongate, anterior lobe well pronounced.

Female. As male except for the following characters: Two (sometimes three) well developed frontal setae present; orbital setae stronger developed. Genal seta dark, genal setulae all dark and well developed. Wing bands slightly paler; discal and cubital bands broader and well developed; medial band weakly developed but present, joining marginal band. Legs without feathering. Forefemur with posterior and posterodorsal rows of dark orange setae; posteroventral setulae pale. Ventral setae orange, basally black. Abdominal tergite 5 not darkened posteriorly. Oviscape almost as long as preabdomen. Aculeus (Figs. 23, 96) about eight times longer than wide; tip pointed and lateral margin slightly concave.

Body length. 5.84 (5.60-6.25) mm; wing length: 6.51 (5.80-7.00) mm.

Material examined

Holotype ♂, CONGO (D. R.): Mulungu, Costermansville, March-April 1942, “Lef. 399”, P.C. Lefèvre (PPRI).

Paratypes: CONGO (D. R.): same date and locality as holotype (1 ♀ allotype, 1 ♂,1 ♀; PPRI; 1 ♂, 1 ♀; KMMA).

Host plants

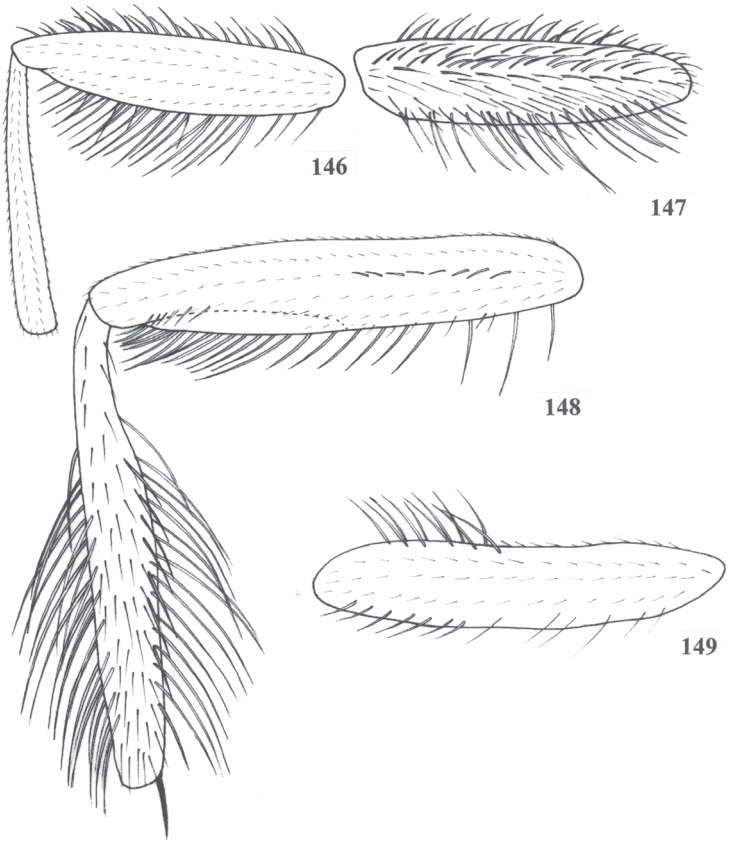
According to Munro (1943) the larvae were found in fruits of a wild fig (Moraceae), although none of the type specimens studied is labeled as such.

Distribution

Congo (D.R.).

Comments

This species is unlike any other *Pterandrus* species in that the leg feathering is completely yellow and the wing banding partly reduced. The leg feathering resembles that found in *Ceratitis* s.str. and the *Ceratalaspis stictica* group, but the scutal pattern is different, and the male has no modified orbital setae. Perhaps it is related to *C. flexuosa* based on the reduced wing pattern and scutellar markings, and a similar ground color of scutum.



Figs. 146-149. *Ceratitis fulicoides*, male legs. 146. Forefemur and foretibia, anterior view. 147. Forefemur, posterior view. 148. Midfemur and midtibia, anterior view. 149. Hindfemur, anterior view.

***Ceratitis* (*Pterandrus*) *gravinotata* (Munro)**

(Figs. 2, 15, 29, 93, 150-153, 235)

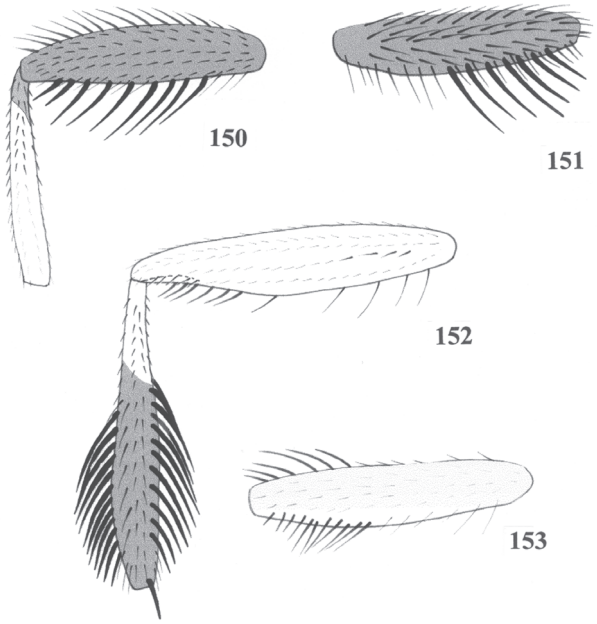
Pterandrus gravinotatus Munro, 1937: 9.

Pterandrus gravinotatus: Cogan and Munro, 1980: 531 (Afrotropical Catalog).

Ceratitis (*Pterandrus*) *gravinotata*: Hancock, 1984: 279 (new combination; erroneously listed as *Trirhithromyia gravinotata*); Freidberg, 1991: 169 (key); Hancock and White, 1997: 196 (taxonomy, hosts); Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer, 2001b: 221 (stenophagy, distribution); De Meyer *et al*., 2002: 33 (host check list).

Diagnosis

Postpronotal lobe with a dark spot; scutal pattern brown with silvery microtrichose areas, spots brownish black and prescutellar markings yellow; anepisternum on ventral 0.33 brown, setulae pale except on ventral 0.33 where black; basal black spots of scutellum separate, apical spots merged; male midtibia with dark feathering along distal 0.66; wing bands well developed and brown, interruption between marginal and discal bands near vein R_1 narrow and not always complete; medial band joined with marginal band, sometimes free.



Figs. 150-153. *Ceratitis gravinotata*, male legs. 150. Forefemur and foretibia, anterior view. 151. Forefemur, posterior view. 152. Midfemur and midtibia, anterior view. 153. Hindfemur, anterior view.

Redescription

Male. Head. Antenna yellowish orange. First flagellomere three times as long as pedicel. Arista with very short rays; basoventral rays shorter and sparser than basodorsal rays. Frons on ventral half swollen; yellow, lateral margin pale yellow; with short scattered setulae largely of same color as frons. Frontal setae slightly less developed than other setae. Face yellowish white; gena with yellowish brown markings. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe yellowish white, with dark spot. Scutal pattern as in Fig. 2: ground color brown, microtrichose areas silvery with ashgray shine, spots brownish black, prescutellar yellow markings separate. Scapular setae dark. Scutellum yellowish white, basally with two separate dark spots, apically with three merged black spots, extending anteriorly to basal spots and touching, incised to basal half, sometimes less. Anepisternum on ventral 0.33 brown; setulae pale except on ventral 0.33 where black.

Legs. Yellowish orange except where otherwise noted; setation typical for subgenus, dark and pale. Foreleg (Figs. 150-151): femur brown, posteriorly with dispersed bush of long dark setulae along entire length, posterodorsal setulae longer; ventral setae dark. Midleg (Fig. 152): femur darker yellow, sometimes orange-brown; basally few short dark setulae, not always conspicuous; ventrally with dispersed dark setulae and setae; tibia orange-brown and dilated on ventral 0.66; ventrally and dorsally with dark feathering along distal 0.66; indication of third row anterior of dorsal feathering but not developed. Hindleg (Fig. 153): femur partly orange-brown; at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 15; bands brownish. Interruption between marginal and discal bands narrow, not always complete; cubital band free; medial band joined with marginal, occasionally free; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly brown. Tergite 1 yellow along anterior half. Tergites 2 across posterior half to 0.66 and tergite 4 wholly with silvery band. Tergite 5 sometimes with paler patches. Male epandrium (Fig. 235) in lateral view with lateral surstylus slender and elongate, strongly curved.

Female. As male except for the following characters: First flagellomere twice or three times as long as pedicel, darker color. Frontal setae well developed. Legs without feathering; orange-brown except tarsi and foretibia yellow; forefemur posteroventrally with dark pilosity. Wing with narrow but complete interruption marginal and discal bands; medial band sometimes weakly developed. Tergite 5 across posterior half with silvery band. Oviscape shorter than preabdomen. Aculeus (Figs. 29, 93) about six times longer than wide; tip pointed and lateral margin concave.

Body length. 3.99 (3.25-4.45) mm; wing length: 4.12 (3.50-4.70) mm.

Material examined

Holotype ♂: KENYA, Nairobi, January 1937, 'ex Podocarpus' [= *Podocarpus gracilior* according to Munro, 1937], V. van Someren (BMNH).

Paratypes: KENYA: same locality and date as holotype (1♂, 1♀; NMK; 1♂; PPRI; 2♀; USNM; 1♀; BMNH); December 1936 (1♀; PPRI), all V. van Someren, 'ex Podocarpus' [= *Podocarpus gracilior* according to Munro, 1937]; without label but probably from same series (1♂; PPRI).

Other material examined: ETHIOPIA: Wendo Genet, 220km S Addis, 14.xii.1989, 'ex Podocarpus fruit', A. Freidberg and F. Kaplan (5♂, 5♀; TAUI). KENYA: same date and locality as holotype,'ex Podocarpus' [probably also *P. gracilior* as in type material] (1♂; NMK).

Host plants

Reared from *Podocarpus gracilior* [=*falcatus*] fruits in Kenya and *Podocarpus* sp. in Ethiopia (Podocarpaceae). In Ethiopia it co-occurs with *C. podocarpi* and *C. nigricornis* n. sp., and *Podocarpus* fruits from Wendo Genet yielded all three species.

Distribution

Ethiopia, Kenya.

Comments

C. gravinotata, *C. nigricornis*, n. sp., *C. podocarpi* and *C. roubaudi* together form a distinct monophyletic group, based on the scutal pattern, darker leg color and the fact that all four species have *Podocarpus* spp. as hosts. They are all restricted to eastern and southern Africa (but see general discussion on type locality of *C. roubaudi*).

***Ceratitis* (*Pterandrus*) *inauratipes* (Munro)**

(Figs. 18, 154-157)

Trirhithrum inauratipes Munro, 1933a: 7.

Trirhithrum inauratipes: Munro, 1934: 479 (review); Cogan and Munro, 1980: 531 (Afrotropical Catalog); Norrbom *et al.*, 1999: 229 (World Catalog).
Ceratitis (*Pterandrus*) *inauratipes*: Hancock and White, 1997: 196 (new combination).

Diagnosis

Postpronotal lobe with a large black spot occupying most of the postpronotal lobe; scutal pattern shiny black without distinct spots or clearly defined stripes; anepisternum along ventral margin brown, setulae pale except a single dark setula ventral to anepisternal seta; scutellum shiny black, basally near lateral margins with paler spot; male midtibia with longer dispersed setulae along distal half but without real feathering; wing bands well developed and brown, marginal forming continuous band with anterior part of discal band.

Redescription

Male. Head. Antenna yellow. First flagellomere three times as long as pedicel. Arista with short setulae; ventral setulae shorter and sparser basally. Frons flat; yellow; with short scattered setulae largely of same color as frons. Frontal setae well developed. Face yellow, same color as frons. Gena with small brownish spot. Genal seta and setulae black, latter well developed. Occiput dark on dorsal 0.4 except in median part, ventral part pale.

Thorax. Postpronotal lobe dark yellow, large black spot occupying most of the postpronotal lobe so that it appears to have largely the same color as scutum. Scutal pattern similar to Fig. 1: shiny black, with dark pilosity; no streaks or spots, sutural lines more brownish. Scapular setae dark. Scutellum shiny black; basally near lateral margins with paler spot. Anepisternum along ventral margin brown, ventral 0.33 with a conspicuous silvery shine when viewed from front; setulae pale, except single setula ventral to anepisternal seta dark.

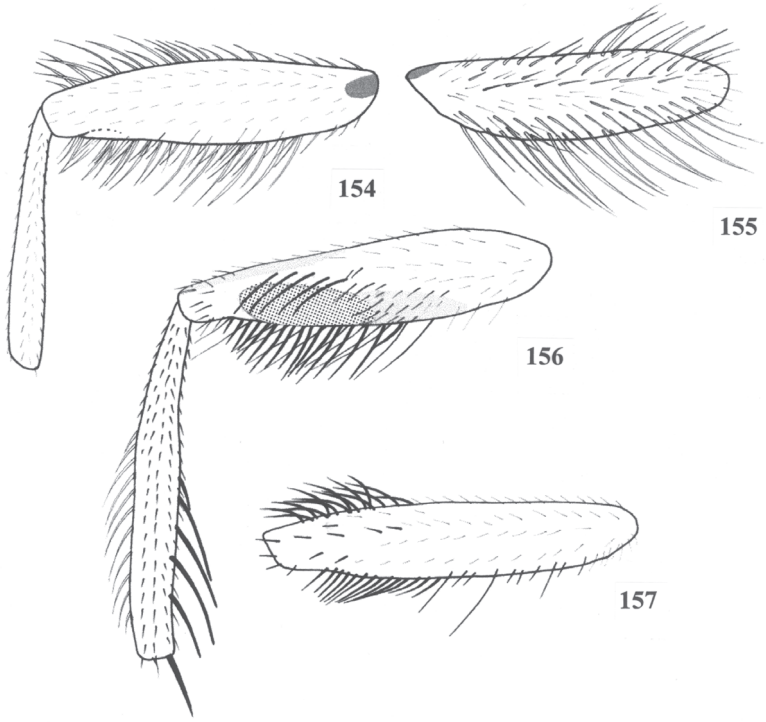
Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 154-155): coxa basal 0.33 brown; femur yellow with basal brown spot; posteriorly with well developed bush of long yellow setulae along entire length, posterodorsal setulae longer; ventral setae long and yellow. Midleg (Fig. 156): femur anteriorly with silvery oblique line on distal 0.33, dorsal and ventral to line with long black setulae; ventrally brownish on distal 0.33; tibia with longer dispersed setulae (no real feathering) along distal half, ventrally black, dorsally yellowish brown. Hindleg (Fig. 157): femur at apical 0.25 with longer black setulae dorsally and ventrally, relatively dense and forming almost feathering.

Wing. Pattern as in Fig. 18; bands brown. Marginal band forming continuous band with anterior part of discal band; cubital band free but with weak dark impression indicating link to discal band; medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 extending just proximal of crossvein R-M. Crossvein DM-Cu oblique posterobasally.

Abdomen. Shiny black. Tergites 2 and 4 with silvery band along respectively posterior half and 0.75; tergite 5 with orange median line. Setation and banding typical for subgenus. Male terminalia not dissected.

Female. Unknown.

Body length. 5.15 mm; wing length: 5.15mm.



Figs. 154-157. *Ceratitis inauratipes*, male legs, 154, Forefemur and foretibia, anterior view; 155: Forefemur, posterior view. 156. Midfemur and midtibia, anterior view. 157. Hindfemur, anterior view.

Material examined

Holotype ♂, CONGO (D.R.): Lukolela, left bank Congo river, 1°5'S, 16.xii.1930, J.P. Chapin 'Ac. 31300' (AMNH).

Host plants

Unknown.

Distribution

Congo (D.R.)

Comments

As indicated under *C. faceta*, this species belongs to a group characterized by the dark shiny mesonotum and abdomen. Since the female is unknown, the shape of the aculeus could not be ascertained.

***Ceratitis* (*Pterandrus*) *lepida* (Munro)**

(Fig. 158-161)

Pterandrus lepidus Munro, 1969: 420.
Pterandrus lepidus: Cogan and Munro, 1980: 531 (Afrotropical Catalog).

Ceratitis (*Pterandrus*) *lepida*: Hancock, 1984: 279 (new combination); Freidberg, 1991: 168 (key); Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer *et al*., 2002: 34 (host check list).

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral half black, setulae on ventral half and across posterior margin black, otherwise pale; apical black spots of scutellum separate; male midfemur ventrally with dark feathering along entire length except for small interruption in median part; male midtibia with dark feathering dorsally along distal 0.9 and ventrally along distal 0.66; wing bands well developed and brown and yellow, interruption between marginal and discal bands near vein R_1 clear and complete.

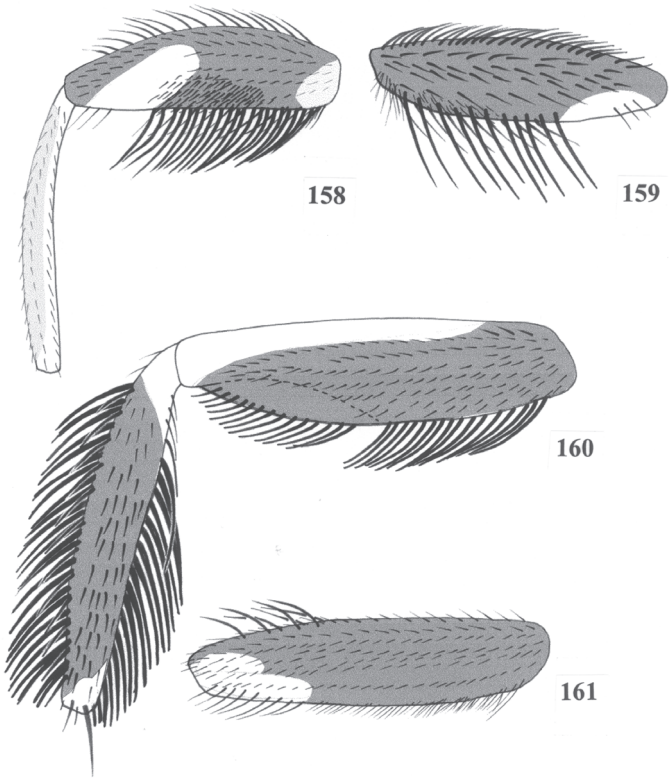
Redescription

Male. Head. Antenna orange-brown. First flagellomere three times as long as pedicel. Arista missing in holotype. Frons flat, yellow; with short scattered setulae distinctly darker than frons. Frontal setae missing in holotype (probably broken, two setal sockets are discernible). Face yellowish white; gena dark, darkening partly continued along ventral margin but not in median part; mouthparts black forming a contrasting character together with dark gena when viewed anteriorly. Genal seta black; genal setulae black, well developed.

Thorax. Postpronotal lobe white, without spot. Scutal pattern similar to Fig. 8: ground color dark gray with silvery shine; with streaks and darker markings but without distinct spots except prescutellar yellow separate markings. Scapular setae dark. Scutellum yellowish white, basally without spots, apically with three separate dark spots extending to halfway scutellar disc. Anepisternum on ventral half black; setulae on ventral half and across posterior margin black, otherwise pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly dark. Foreleg (Figs. 158-159): coxa black; femur anteriorly with contrasting black/white pattern, white spot and basal part of femur turn silvery when viewed from certain angle, anteroventrally with bush of short dark setulae along medial half; posteriorly dark except apically along ventral side; with dispersed bush of long dark setulae along entire length, posterodorsal setulae longer; ventral setae dark; tibia anteriorly mainly brownish black, only distally and along ventral side partly yellowish. Midleg (Fig. 160): femur anteriorly largely brownish black, only distal end and along dorsal margin partly yellowish; ventrally with dark feathering along entire length except for small interruption (two-three setae wide) in median part; tibia broadened and anteriorly largely brownish black, weak silvery when viewed from certain angle; with black feathering dorsally along distal 0.9 and ventrally along distal 0.66, second row of short black feathering present anterior to dorsal feathering, closely apressed to first one (not easy to differentiate); anteriorly with dispersed short black setulae. Hindleg (Fig. 161): femur brown except apically; at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 10; bands yellow and brown. Interruption between marginal and discal bands near vein R_1 complete; cubital band free; medial band absent; crossvein R-M just proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu straight. Extension cup fairly longer.



Figs. 158-161. *Ceratitis lepida*, male legs. 158. Forefemur and foretibia, anterior view. 159. Forefemur, posterior view. 160. Midfemur and midtibia, anterior view. 161. Hindfemur, anterior view.

Abdomen. Mostly orange-brown. Tergite 1 dark brown across posterior margin. Tergites 2 and 4 with silvery band occupying most if not whole of tergite. Tergite 3 dark brown posteriorly. Tergite 5 with weak silvery transverse band along posterior margin. Male terminalia not dissected.

Female. Unknown.

Body length. 4.81 mm; wing length: 5.25 mm.

Material examined

Holotype ♂, GHANA: Aburi, 24.iii.1911, 'on leaf of Tabernae-montana', L. Armstrong (PPRI).

Host plants

According to a label on the type, it was found on *Tabernaemontana* (Apocynaceae) but there is no indication that this is the actual host plant (see also under host plant records of *C. colae*).

Distribution

Ghana.

Comments

This species is closely related to *C. colae*, based on the male feathering and pattern of fore and midlegs, and on the anepisternal pilosity. The two species co-occur in Ghana. Since only the holotype male of *C. lepida* has been studied, further material is needed in order to clarify the exact relationship with *C. colae*. For the time being the two are considered to be distinct species. The males can be distinguished from each other by differences outlined in the key.

Ceratitis (*Pterandrus*) *lobata* Munro

(Figs. 13, 49, 100, 162-165, 230)

Ceratitis lobata Munro, 1933b: 38.
Pardalaspis lobata: Cogan and Munro, 1980: 530 (Afrotropical Catalog).
Ceratitis (*Pterandrus*) *lobata*: Hancock, 1984: 279 (new combination); Hancock, 1987: 56 (lures); Freidberg, 1991: 169 (key); Hancock and White, 1997: 196 (taxonomy); Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer *et al*., 2002: 34 (host check list).

Diagnosis

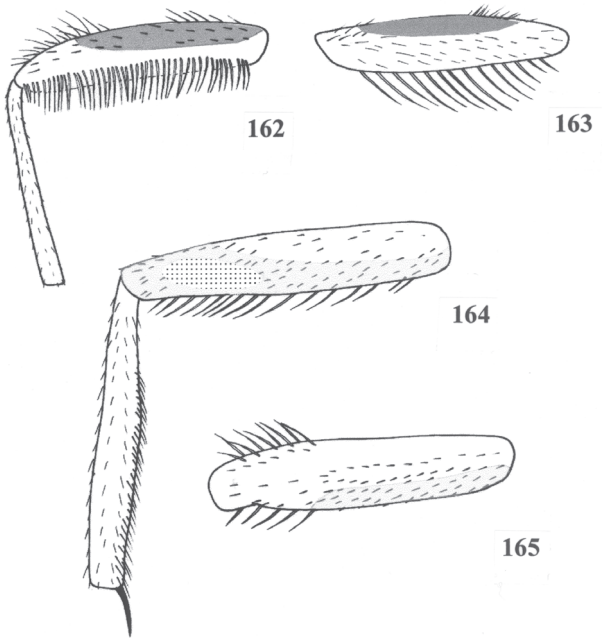
Postpronotal lobe with a brown spot, sometimes not prominent; scutal pattern brown to black with distinct spots; anepisternum on ventral half darker yellow or brown (in female), setulae pale in male, dark in female; basal and apical black spots of scutellum merged; male forefemur anteroventrally with dense comb of silvery setulae along entire length; wing bands well developed and brown and yellow; with incised loba on ventral apical part in male; marginal band forming continuous band with anterior part of discal band.

Redescription

Male. Head. Antenna yellow (sometimes yellowish orange). First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; basoventral rays shorter and sparser than basodorsal rays. Frons convex; yellowish white to yellow, rarely with darker yellow patches near frontofacial angle and in center; with short scattered setulae distinctly darker than frons. Frontal setae usually well developed, sometimes ventrally more poorly developed. Face yellowish white. Genal seta and setulae pale or reddish, latter poorly developed. Occiput on dorsal part yellowish brown to brown colored, except along dorsal margin.

Thorax. Postpronotal lobe yellow, with brownish spot, sometimes not prominent. Scutal pattern similar to Figs. 2 and 3: ground color brown, occasionally black, microtrichose areas silvery with ashgray shine, spots brownish black or black except poorly developed sutural yellow spots, prescutellar yellow markings merged or separate. Scapular setae dark. Scutellum yellowish white, basally with two merged dark spots, apically with three merged black spots, weakly incised, extending anteriorly to basal spots or almost so. Anepisternum on ventral half darker yellow; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 162-163): coxa with tuft of silvery setulae ventrally; femur yellow except dorsally on basal half black; anteroventrally with dense comb of silvery setulae along entire length; posteriorly with poorly developed bush of long palish setulae along entire length, posterodorsal setulae and row of dorsal setulae on distal half longer, basally darker setulae, occasionally all setulae more palish; ventral setae pale. Midleg (Fig. 164): femur anteriorly with



Figs. 162-165. *Ceratitis lobata*, male legs. 162. Forefemur and foretibia, anterior view. 163. Forefemur, posterior view. 164. Midfemur and midtibia, anterior view. 165. Hindfemur, anterior view.

silvery oblique line on distal 0.33, silvery shine conspicuous when viewed from certain angle; ventrally with dispersed long pale setulae; midtibia ventrally with dense white pilosity. Hindleg (Fig. 165): femur at apical 0.25 with longer setulae dorsally and ventrally. Midfemur and hindfemur anteriorly with brownish patch on ventral half.

Wing. Pattern as in Fig. 13; bands yellow and brown; with incised loba on ventral apical part. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergite 1 yellow with brown patches posteriorly; tergites 2 and 4 with silvery transverse band along posterior half; tergite 3 posterior half brown; tergite 5 yellow with brown patches laterally; sometimes abdominal tergites generally with darker brown appearance. Setation and banding typical for subgenus. Male epandrium (Fig. 230) in lateral view distinctly broadened; posterior lobe of lateral surstylus with base broadened, apical end sharply pointed.

Female. As male except for the following characters: Frons yellow, darker patches more distinct. Slight darker coloration along gena. Genal seta and setulae dark and well developed. Ventral half of anepisternum brown, with dark setulae posteriorly. Legs without feathering, dark yellow, femora more orange-brownish; pilosity and ventral setae of forefemur dark. Wing banding usually darker than in male; without incised lobe. Abdomen sometimes more extensively brownish colored. Oviscape shorter than preabdomen. Aculeus (Figs. 49, 100) at

least eight times longer than wide; tip in lateral view ventrally curved, pointed, and with lateral margin straight.

Body length. 4.20 (3.75-4.55) mm; wing length: 4.25 (3.80-4.50) mm.

Material examined

Lectotype (former co-type, here designated as lectotype) ♂, SOUTH AFRICA: Durban, January 1932, W. Marriott, bait trap (PPRI).

Paralectotypes (here designated): SOUTH AFRICA: Durban, January 1932 (5♂; PPRI; 1♂; USNM; 1♂; KMMA); February 1932 (2♂, 1♀ (latter former co-type); PPRI; 1♂; BMNH), all W. Marriott, bait trap.

Other material examined: KENYA: Arabuko-Sokoke Forest, 26.viii.1999, '251', ex *Strychnos angolensis*, R. Copeland (2♂, 7♀; ICIPE); Ramogi forest, 16.vii.1993, R. Bagine (1♀; NMK); Nairobi, July 1949, '86' [if this is identical to 'McG86', then ex *Strychnos henningsii* according to Munro's archives], Skinner and McGough (3♂, 1♀; USNM); Emali Range, Sultan Hamud, March 1940, 4900-5900 ft, V. van Someren (1♂; BMNH). RWANDA: Kigali, 10.ii.1986, 1500 m, M. Kühbandner (1♂; MHNG). SOUTH AFRICA: Durban, 9-16.ix.1932, W. Marriott (1♂; KMMA); 26.xi-8.xii.1932, W. Marriott, bait trap (1♂; BMNH); Bluff, March 1937 (55 specimens [not sexed] PPRI; 2♂, 3♀; KMMA; 1♂, 1♀; NMB; 2♀; NMK; 1♂, 1♀; BMNH), all 'M628' [= ex *Strychnos decussata* according to Munro's archives]; (1♂, 9♀; PPRI; 1♂; KMMA), both 'M629' [= ex *Strychnos micans* according to Munro's archives]; all W. Marriott.

Host plants

Bred from several *Strychnos* spp. (Loganiaceae): *Strychnos decussata* and *S. micans* [=*usambarensis*] in South Africa; *Strychnos angolensis* and probably also *S. henningsii* in Kenya (cf. material examined).

Distribution

Kenya, Rwanda, South Africa.

Comments

Females of *C. lobata* and *C. curvata* are difficult to distinguish from each other, especially when not associated with male specimens. The two species overlap in Kenya (Nairobi and Sultan Hamud).

Ceratitis (*Pterandrus*) *melanopus* (Hering)

(Figs. 38, 56, 57)

Pardalaspis melanopus Hering, 1942: 282.
Pardalaspis melanopus: Cogan and Munro, 1980: 530 (Afrotropical Catalog).
Ceratitis (*Ceratalaspis*) *melanopus*: Hancock, 1984: 280 (new combination); De Meyer, 1998: 281 (redescription); Norrbom *et al.*, 1999: 119 (World Catalog).
Ceratitis (*Pterandrus*) *melanopus*: Hancock and White, 1997: 196 (new combination).

Diagnosis

Postpronotal lobe without a spot; scutal pattern dark gray to brown, without distinct spots, only poorly developed lateral yellow lines; apical black spots of scutellum separate; male legs

without feathering; wing bands well developed and brown, Interruption between marginal and discal bands near vein R_1 clear and complete.

Redescription

Male. Head. Antenna brownish. First flagellomere twice as long as pedicel. Arista with short rays. Frons convex; yellowish orange with weak silvery shine; with short scattered setulae of same color as frons. Frontal setae well developed. Face yellowish orange.

Thorax. Postpronotal lobe white, not spotted. Scutal pattern similar to Fig. 7 but much darker: ground color darkish gray to brown, microtrichose areas with ashgray shine, poorly developed lateral yellow lines, prescutellar white markings separate, with grayish area in between. Scapular setae dark. Scutellum white, basally without dark spots, apically more yellowish with three separate spots.

Legs. orange to brown; setation typical for subgenus, dark. Without feathering.

Wing. Pattern as in Fig. 10; bands brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band absent; crossvein R-M proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique posterobasally.

Abdomen. Mostly pale orange. Tergite 3 with posterior half brown. Setation and banding typical for subgenus. Male terminalia not dissected.

Female. As male except for the following characters: Rays on arista longer but not plumose. First flagellomere longer. Face yellow. Scutal pattern slightly different, with more obscured orange lateral stripes, area between prescutellar markings more orange (also see Fig. 1q in De Meyer (1998)). Marginal band partly interrupted. Oviscape about as long as preabdomen. Aculeus (Figs. 38, 56, 57) at least eight times longer than wide; tip with distinct apical indentation and lateral margin more or less straight.

Body length. Male 3.35, female 5.40 mm; wing length: male 4.20, female 5.60 mm.

Material examined

Lectotype (designated by De Meyer, 1998) ♀, GHANA: 'Goldküste', Accra - Lome, 26.viii.1904, G. Tessman (MNHU) [original description mentions 'Sierra Leone'=error]. Paralectotype: 1♂, same date and locality as lectotype (MNHU).

Host plants

Unknown.

Distribution

Ghana. Also reported from Equatorial Guinea (paratype from Nkolentangan, Spanish Guinea in original description by Hering, 1942).

Comments

This species was dealt with in detail in the revision of the subgenus *Ceratalaspis* (De Meyer, 1998). However, while that article was in press, the species was transferred to the subgenus *Pterandrus* by Hancock and White (1997). As indicated by De Meyer (1998), there are a number of morphological differences between the female lectotype and the male paralectotype,

and the male is also much smaller than the female. It is therefore not certain that the two specimens are conspecific. No additional material was found during this study.

Ceratitis (*Pterandrus*) *morstatti* Bezzi
(Figs. 37, 58, 59)

Ceratitis morstatti Bezzi, 1912: 12.
Pardalaspis morstatti: Bezzi, 1918: 234 (new combination); Cogan and Munro, 1980: 530 (Afrotropical Catalog).
Ceratitis (*Ceratalaspis*) *morstatti*: Hancock, 1984: 280 (new combination); White and Elson-Harris, 1992: 312 (pest status); De Meyer, 1998: 282 (redescription); Norrbom *et al.*, 1999: 119 (World Catalog).
Ceratitis (*Pterandrus*) *morstatti*: De Meyer, 2001b: 221 (stenophagy, distribution); De Meyer *et al*., 2002: 35 (host check list).

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral margin yellowish brown; setulae pale, along ventral margin black; apical black spots of scutellum separate; male legs without feathering; wing bands well developed and yellowish brown, interruption between marginal and discal bands near vein R_1 clear and complete.

Redescription

Male. Head. Antenna yellow-orange (yellow according to original description). First flagellomere twice as long as pedicel. Arista with medium long rays. Frons convex, yellow (dark red, with gray basal stripes according to orginal description); with short scattered setulae distinctly darker than frons. Genal seta black; genal setulae black, well developed.

Thorax. Postpronotal lobe white, unspotted. Scutal pattern similar to Fig. 8: ground color pale gray (occasionally darker gray) with silvery shine; with very light streaks and darker markings but without distinct spots except prescutellar yellow separate markings. Scapular setae dark. Scutellum grayish, basally without spots, apically with three separate black spots extending to halfway scutellar disc. Anepisternum on ventral margin yellowish brown; setulae white, along ventral margin black.

Legs. Yellow; setation typical for subgenus, mainly dark; without feathering.

Wing. Pattern as in Fig. 10; bands yellow and brown. Interruption between marginal and discal bands near vein R_1 complete; cubital band free (only occasionally weakly connected); medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu variable.

Abdomen. Mostly gray. Tergites 2 and 4 with pale gray band occupying most if not whole of tergite. Tergite 3 dark brown posteriorly. Tergite 5 with yellowish brown and brown patches. Male terminalia not dissected.

Female. As male except for the following characters. Oviscape as long as preabdomen. Aculeus (Figs. 37, 58, 59) at least eight times longer than wide; tip with distinct apical indentation and lateral margin slightly sinuous.

Body length. 5.13 (4.50-5.70) mm; wing length: 5.34 (5.00-5.80) mm.

Material examined

CAMEROON: 7 mi S Ebolowa, 15-17.x.1966, 580m, E.S. Ross and K. Lorenzen (1♂; CAS); nr Yaoundé, 29.v.-8.vi.1936, from foliage, Van Zwaluwenburg and McGough (1♂; USNM). CONGO (D.R.): Bikoro, Tumba Lake, 17.x.1952, M. Mamet (1♂; KMMA); Eala, 13.v.1939, Obutobe (5♂; PPRI); 17.xii.1934, 'éclos de graine de Colatier' (1♂; KBIN); 10.iii.1935 (1♂, 2♀; KBIN); 2.iii.1935 (1♂, 4♀; KBIN); 18.iv.1935, 'fruits de *Cola acuminata*' (1♂, 4♀; KBIN), all J. Ghesquière; Lukolela, left bank Congo river, 16.xii.1930, J.P.Chapin (1♂; BMNH); Yangambi, 28.ii.1951, 'McG149' [=ex *Pancovia laurentii* according to Munro's archives], Clancy and McGough (1♂; USNM). GHANA: Kumasu, 17.iii.1947, J. Bowden (1♂, 1♀; NMSA). NIGERIA: unknown locality, intercepted ex fruit *Cola acuminata* from Nigeria (1♂, 1♀; USNM); Ibadan, IITA West bank lake, 7-9.ii.1978, D. and M. Davis (1♀; USNM).

Holotype (not examined), CAMEROON, Victoria, Morstatt (in Hamburg Museum according to original description).

Host plants

Reared from *Cola acuminata* (Sterculiaceae) and *Pancovia laurentii* (Sapindaceae).

Distribution

Cameroon, Congo (D.R.), Ghana and Nigeria. Also reported from Equatorial Guinea (Cogan and Munro, 1980).

Comments

As with the previous species, this species too was dealt with in the revision of the subgenus *Ceratalaspis* (De Meyer 1998). However, in recent studies (De Meyer, 2001b; De Meyer *et al.*, 2002) it was considered to belong to the subgenus *Pterandrus* because of similarities in scutal pattern, and aculeus shape with other species, especially *Cola* infesting ones. As explained by De Meyer (1998), the type could not be studied, and there are some inconsistencies between the original description and the material examined, as outlined in the redescription above. New material has now become available. Based on the shape of the aculeus and the host records, the species seem to belong to the *colae* subgroup. There is some variation in the pilosity of the legs and color of the mesonotum. The female from Ghana, Kumasu has a slightly different aculeus tip but otherwise falls within the variation seen among the other specimens. De Meyer (1998) suggested that the Ghana specimens may belong to a new species. However, in view of the limited amount of material, and the absence of the type of *C. morstatti*, it was decided to provisionally include these specimens here. Further material is needed to clarify this problem.

***Ceratitis* (*Pterandrus*) *nigricornis* De Meyer and Freidberg, n. sp.**

(Figs. 166-169, 233)

Diagnosis

Postpronotal lobe with a black spot broadly connected to scutal pattern or almost so; scutal pattern brown to black with distinct spots; anepisternum on ventral half brownish black, setulae pale except on ventral half where black setulae on posterior half; basal and apical black spots of scutellum merged; male midfemur ventrally with dark feathering along distal 0.4; wing bands well developed and brown; marginal band forming continuous band with anterior part of discal band.

Description

Male. Head. Antenna black. First flagellomere 2.5 times as long as pedicel. Arista with short rays; ventral rays shorter and sparser than dorsal rays. Frons yellow, with brown irregular band widened in median part; with short scattered setulae darker than frons. Face yellowish white, dorsal half brownish black; gena with brown markings. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe yellowish white, with black spot broadly connected to scutal pattern, or almost so. Scutal pattern similar to Fig. 2 except for prescutellar markings, which are more pronounced: ground color brownish black, microtrichose areas silvery, prescutellar white markings separate but with paler brown area in between. Scapular setae dark. Scutellum yellowish white, basally with two dark spots broadly joined forming a basal band, apically with three merged black spots (paratype shows indistinct separation), extending anteriorly to basal spots. Anepisternum on ventral half brownish black; setulae pale except on ventral half where black setulae on posterior half.

Legs. Blackish except where otherwise noted; setation typical for subgenus, dark and pale. Coxae and trochanters predominantly yellow to brown; base of femora, base and tip of tibiae narrowly yellow to brown. Foreleg (Figs. 166-167): femur swollen, posteriorly with dispersed bush of short dark setulae along entire length, posterodorsal setulae longer; ventral setae dark; tibia broadened. Midleg (Fig. 168): femur ventrally with dark feathering along distal 0.4, remaining with pale and sparse setulae; tibia not feathered. Hindleg (Fig. 169): femur at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 11; bands brownish. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M just beyond middle of discal cell. Apex of vein R_1 extending slightly beyond crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly brown. Tergite 1 yellow along anterior half, shiny brownish black posteriorly. Tergites 2 and 4 wholly with silvery band. Tergite 5 yellow with narrow brown anterior and posterior margin, anterior margin with gap medially. Male epandrium (Fig. 233) in lateral view with lateral surstylus slender and elongate; posterior lobe straight.

Female. Unknown.

Body length: 4.30 mm; wing length: 4.20 mm.

Material examined

Holotype ♂, ETHIOPIA: Shewa [District], Wendo Genet, 28.i.2000, 'ex Podocarpus fruits, adult: 18.ii.2000', I. Yarom and A. Freidberg, (TAUI).

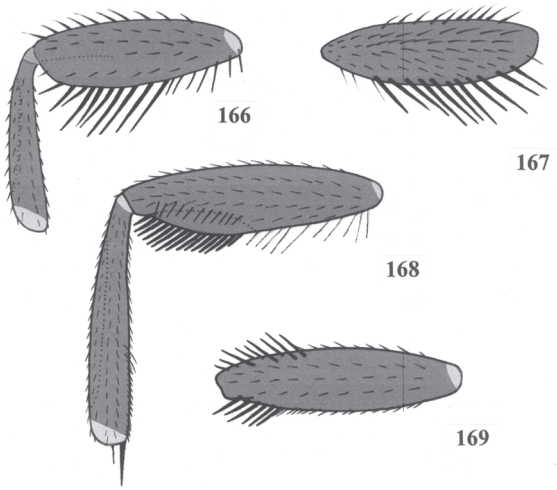
Paratype: ETHIOPIA: Wendo Genet, 220km S Addis, 14.xii.1989, 'ex Podocarpus fruit, adult: 7.1.1990' A. Freidberg and F. Kaplan (1♂; TAUI).

Etymology

Referring to the black antennae (in Latin nigrum = black; cornu = home, antenna).

Host plants

Reared from *Podocarpus* sp. in Ethiopia (Podocarpaceae).



Figs. 166-169. *Ceratitis nigricornis* n. sp., male legs. 166. Forefemur and foretibia, anterior view. 167. Forefemur, posterior view. 168. Midfemur and midtibia, anterior view. 169. Hindfemur anterior view.

Distribution

Ethiopia.

Comments

C. nigricornis belongs to the *gravinotata* species group and subgroup, as characterized under *C. gravinotata*. It can be differentiated from the other species by the black antennae, the turgid forefemur and the feathering on the femur. It co-occurs with *C. gravinotata* and *C. podocarpi* at the type locality of *C. nigricornis* in Ethiopia, where all three species were reared together from fruits collected from the same tree. In De Meyer *et al.* (2002: 45) it is listed under the undescribed species 'NI'.

***Ceratitis* (*Pterandrus*) *obtusicuspis* De Meyer and Freidberg, n. sp.**

(Figs. 40, 76, 77, 170-173, 240)

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum along ventral margin darker yellow; setulae pale, in female sometimes with few dark setulae along ventral margin; apical black spots of scutellum separate; male midfemur ventrally with dark short feathering along distal 0.33; male midtibia with black feathering dorsally along distal 0.8 to 0.9 and ventrally along distal 0.66; wing bands well developed and yellowish brown, interruption between marginal and discal bands near vein R_1 clear and complete, medial band sometimes weakly present.

Description

Male. Head. Antenna yellow. First flagellomere three times as long as pedicel. Arista with short to moderately long rays; only basally rays slightly shorter and sparser ventrally. Frons pale yellow, in center slightly darker; with short scattered setulae distinctly darker than frons. Frontal setae well developed, sometimes posterior frontal partly reduced. Face whitish, gena darker yellow. Genal seta and setulae black, well developed.

Thorax. Postpronotal lobe white, without spot. Scutal pattern similar to Figs. 7 and 8: ground color grayish-brown, with orange tinge; with streaks and darker markings but without distinct spots or clearly defined stripes, except shiny brown to brownish black sutural and dorsocentral spots; prescutellar white markings separate. Scapular setae black. Scutellum yellowish white, basally without spots, apically with three separate black spots, extending anteriorly to basal 0.33, sometimes along apical margins intermediate area darker yellowish brown. Anepisternum with only ventral margin darker yellow; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly dark. Foreleg (Figs. 170-171): femur somewhat darkened; posteriorly with dispersed long dark setulae along entire length, but not forming distinct bush; ventral setae dark. Midleg (Fig. 172): femur largely orange-brown except distally; ventrally with dark short feathering along distal 0.33, basally with more dispersed dark setulae; tibia broadened, silvery shine when viewed from certain angle; with black feathering dorsally along distal 0.8 to 0.9 and ventrally along distal 0.66, anteriorly with dispersed dark setulae, one row longer setulae. Hindleg (Fig. 173): femur at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 10; bands yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band usually absent, sometimes weakly present; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergite 1 with small black patches across posterior margin. Tergites 2 and 4 with pale gray band on posterior 0.66; tergite 4 with anterior 0.33 brown. Tergite 3 completely or largely brown; tergite 5 with brown band along anterior half, posterior margin narrowly brown. Brown bands on tergites 3, 4 and 5 often partly interrupted in middle. Male epandrium (Fig. 240) in lateral view with posterior lobe of lateral surstylus stout and short, anterior lobe pronounced.

Female. As male except for the following characters: First flagellomere more yellowish orange. Frons darker yellow. Anepisternum sometimes with few dark setulae along ventral margin. Legs without feathering, yellow with femora slightly darker; forefemur posteroventrally with dark pilosity. Abdominal tergite 5 across posterior margin yellow. Oviscape shorter than preabdomen. Aculeus (Figs. 40, 76, 77) at most six times longer than wide; tip blunt and broadened, with slight apical indentation and lateral margin slightly sinuous.

Body length. 5.43 (5.00-5.80) mm; wing length: 5.95 (5.60-6.30) mm.

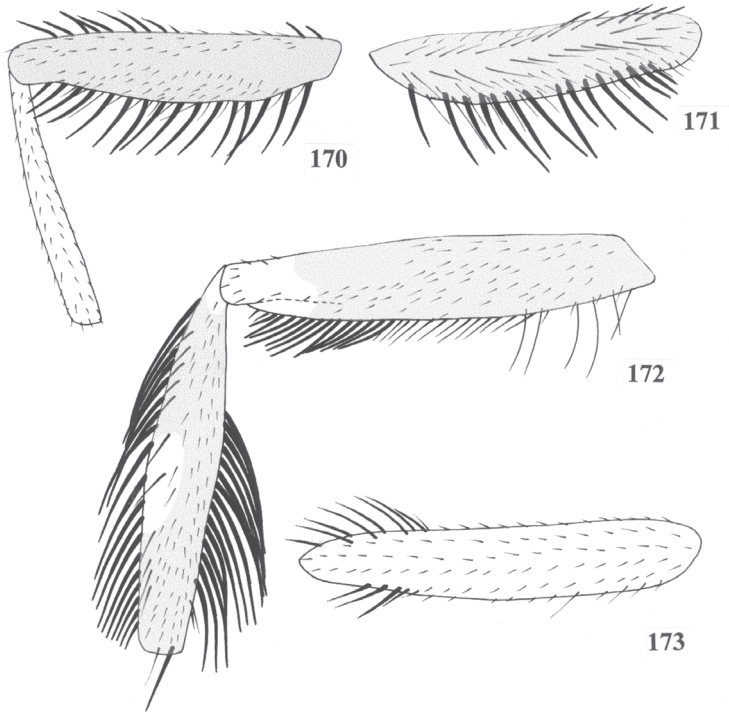
Material examined

Holotype ♂, KENYA: Nairobi [Karura forest according to Bianchi and Krauss, 1936], 26.v.1936, 'Deinbollia sp.', N. Krauss (USNM).

Paratypes: KENYA: same data as holotype (1♀, allotype; 4♂, 9♀; USNM; 1♂, 2♀; KMMA; 1♂; TAUI); same date and locality as holotype, 'Deinbollia kilimanscharica?' (3♀; BPBM); Mt. Elgon Lodge, 1-6.xi.1983, A. Freidberg (2♀; TAUI).

Etymology

After the Latin adjective obtusus (meaning blunt) and noun cuspis (meaning point of spear) and referring to the blunt tip of the aculeus.



Figs. 170-173. *Ceratitis obtusicuspis* n. sp., male legs. 170. Forefemur and foretibia, anterior view. 171. Forefemur, posterior view. 172. Midfemur and midtibia, anterior view. 173. Hindfemur, anterior view.

Host plants

Type material from Nairobi was reared from a species of *Deinbollia* (Sapindaceae). In Bianchi and Krauss (1936) it is listed under the same name. Material from this series in the BPBM collection is listed as possibly *D. kilimandscharica*. Only two species of *Deinbollia* occur in Kenya, of which only *D. kilimandscharica* has a distribution that corresponds with the type localities (see Beentje (1994) for distribution maps of the *Deinbollia* spp.).

Distribution

Kenya.

Comments

This new species belongs to the *anonae* group and is related to those species with feathered midfemur and midtibia, and oviscape shorter than preabdomen. It is listed as *C. rubivora* in an unpublished report by Bianchi and Krauss (1936: 19), but can be readily distinguished from the latter and other related species by the male feathering pattern and the blunt tip of the aculeus. In De Meyer *et al.* (2002: 45) it is listed under the undescribed species 'OB'.

***Ceratitis* (*Pterandrus*) *paracolae* De Meyer and Freidberg, n. sp.**

(Figs. 31, 54, 55, 174-177, 225)

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined

stripes; anepisternum along ventral margin brown or yellowish brown; setulae pale except on ventral part where black; apical black spots of scutellum separate; male midfemur ventrally with dark feathering along entire length except for large interruption in median part; male midtibia with black feathering dorsally along distal 0.8 and ventrally along distal 0.66; wing bands well developed and yellowish brown, interruption between marginal and discal bands near vein R_1 clear and complete.

Description

Male. Head. Antenna yellowish orange. First flagellomere twice as long as pedicel. Arista with moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons convex; yellow; with short scattered setulae of same color as frons. Frontal setae well developed. Face yellowish white; gena dark, yellowish brown; mouthparts with apex partly darkened but not completely black (as in *C. lepida*). Genal seta and setulae dark, well developed, the latter with bushy appearance.

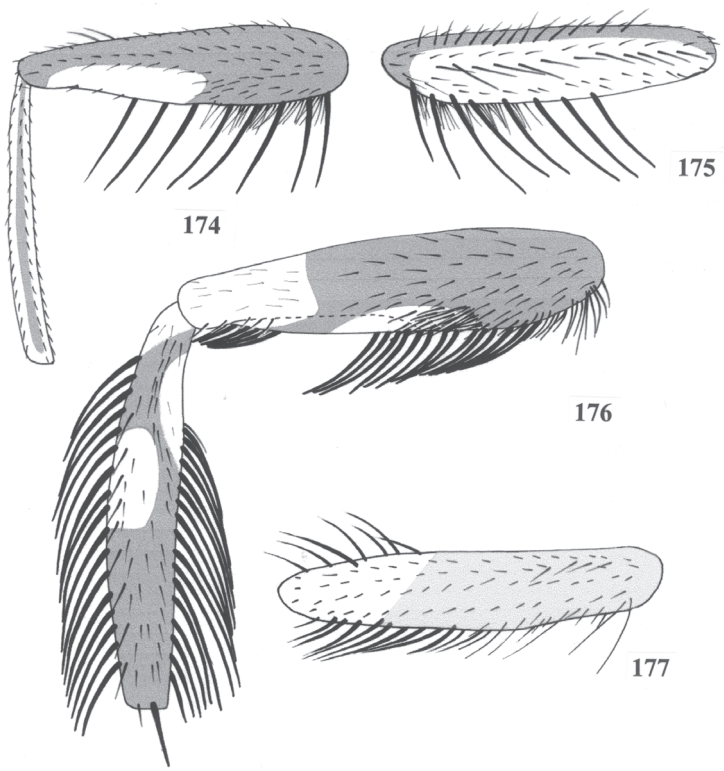
Thorax. Postpronotal lobe white, without spot. Scutal pattern similar to Fig. 8 except broader and more pronounced prescutellar markings (see below); ground color gray with silvery shine; with streaks and darker markings but without distinct spots or clearly defined stripes, except prescutellar white separate markings, almost reaching dorsocentrals; presence of faint but indistinct yellow lateral stripes. Scapular setae dark. Scutellum white, basally without spots, apically with three separate black spots, extending to half-way. Anepisternum along ventral margin brown; setulae pale except on ventral part, where black.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly dark. Foreleg (Figs. 174-175): coxa black; femur anteriorly dark brown except with patch ventrodistally; posteriorly with dispersed dark setulae, no bush; ventral setae dark; tibia anteriorly distinctly darkened along medial length. Midleg (Fig. 176): femur anteriorly brown with pale patches distally and anteroventrally; ventrally with dark feathering along entire length except for interruption (8-9 setae wide) in median part; tibia broadened; dark with pale patches, silvery shine when viewed from certain angle; with black feathering dorsally along distal 0.8 and ventrally along distal 0.66, anteriorly with few dispersed short dark setulae. Hindleg (Fig. 177): femur at apical 0.25 with longer setulae dorsally and ventrally, the latter continued basally forming feathering.

Wing. Pattern as in Fig. 10; bands yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band absent; crossvein R-M proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergite 1 yellowish orange. Tergites 2 and 4 with pale gray transverse band along posterior half, band with weak silvery shine. Tergite 3 with well defined brown transverse band along posterior 0.33 to half. Tergite 5 with yellowish brown patches along anterior part and weak silvery band posteriorly, posterior margin also yellowish brown. Setation and banding typical for subgenus. Male epandrium (Fig. 225) in lateral view with posterior lobe of lateral surstylus short and stout, anterior lobe well pronounced.

Female. As male except for the following characters: gena less dark, mouth parts not darkened along apex. Anepisternum along ventral margin more yellowish brown. Legs yellowish orange; without feathering, mainly with dark pilosity; forefemur posteroventrally with dark pilosity.



Figs. 174-177. *Ceratitis paracolae* n. sp., male legs. 174. Forefemur and foretibia, anterior view. 175. Forefemur, posterior view. 176. Midfemur and midtibia, anterior view. 177. Hindfemur, anterior view.

Crossvein DM-Cu oblique posterobasally. Ovipositor shorter than preabdomen. Aculeus (Figs. 31, 54, 55) about seven times longer than wide; tip with shoulder, and lateral margin slightly sinuous.

Body length. 5.34 (5.10-5.50) mm; wing length: 5.58 (5.20-5.80) mm.

Material examined

Holotype ♂, CAMEROON: nr Yaoundé, 29.v-8.vi.1936, 'from foliage', Van Zwaluwenburg and McGough (USNM).

Paratypes: CAMEROON: same locality and dates as holotype (♀, allotype; USNM). NIGERIA: Ibadan, 26-30.iv.1936, 'swept from Gliricidia maculata', Van Zwaluwenburg and McGough (1♀; USNM; 1♀; KMMA).

Etymology

Referring to the close relationship with *C. colae*.

Host plants

Unknown. One paratype was swept from *Gliricidia maculata* (Fabaceae) but there is no indication that this is the host plant.

Distribution

Cameroon, Nigeria.

Comments

This species is closely related to *C. colae* and *C. lepida* based on the midfemoral feathering and the darkened mouthparts, but can be distinguished from both by the pattern of the forefemur. The aculeus tip has a unique shape among *Pterandrus* species, but is more similar to some *Ceratitis* s.str. (see De Meyer, 2000). One female specimen from Nigeria (Ibadan 7-9.ii.1978, D. and M. Davis (USNM)) is not included in the type series. It has the same external morphology as the other females, but the aculeus tip is different, resembling that of *C. acicularis*. We leave it undescribed because of the limited material available. In De Meyer *et al.* (2002: 45) this species is listed under the undescribed species 'PA'.

Ceratitis (*Pterandrus*) *pedestris* (Bezzi)

(Figs. 33, 95, 178-181, 246)

Pardalaspis pedestris Bezzi, 1924a: 480.

Pardalaspis pedestris: Bezzi, 1924b: 103; Munro, 1925: 50 (host); Munro, 1929b: 11 (color notes); Munro, 1953: 220 (Angola); Cogan and Munro, 1980: 530 (Afrotropical Catalog).

Ceratitis (*Pterandrus*) *pedestris*: Hancock, 1984: 279 (new combination), 287 (Madagascar); Hancock, 1987: 52 (Zimbabwe), 56 (Zambia, lures); Freidberg, 1991: 169 (key); White and Elson-Harris, 1992: 305 (pest status); Hancock and White, 1997: 196 (taxonomy, hosts); Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer *et al*., 2002: 35 (host check list).

Diagnosis

Postpronotal lobe with a black or brownish spot; scutal pattern brownish black with distinct spots; anepisternum completely pale, at most ventral margin very narrowly yellow, ventral 0.33 brownish in female, setulae pale except for few dark setulae along dorsal and ventral margins; basal and apical black spots of scutellum separate; male forefemur with contrasting black/white pattern anteriorly, ventrobasally with bush of short dark setulae; wing bands well developed and yellow to yellowish brown, marginal band forming continuous band with anterior part of discal band.

Redescription

Male. Head. Antenna yellowish orange. First flagellomere twice as long as pedicel. Arista with short rays; basoventral rays shorter and sparser than basodorsal rays. Frons convex or flat, yellow (sometimes more palish); with short scattered setulae distinctly darker than frons. Frontal setae slightly underdeveloped. Face yellowish white. Genal seta and setulae dark, well developed. Occiput on dorsal part yellowish brown to brown colored except along dorsal margin; not always distinct.

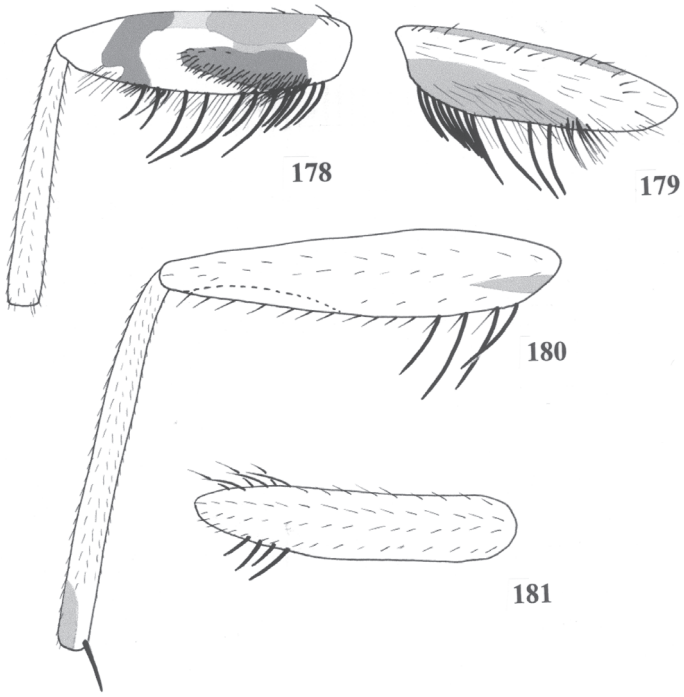
Thorax. Postpronotal lobe white, with black spot (sometimes more brownish). Scutal pattern similar to Fig. 2: ground color brownish black, sometimes orange-tinged (especially in West African specimens), microtrichose areas silvery with ashgray shine, spots brownish black or black, rarely spots reduced and orange ground color extensive; prescutellar yellow-white markings merged or separate. Scapular setae dark. Scutellum (similar to Fig. 6) yellow, basally

with two separate dark spots, apically with three separate dark spots, extending anteriorly to basal 0.25. Anepisternum completely pale, at most ventral margin very narrowly yellow; with pale setulae except few dark setulae along dorsal and ventral margins.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly pale. Foreleg (Figs. 178-179): coxa anteriorly shiny black with silvery spot; femur with contrasting black and white pattern, white band turns silvery when viewed from certain angle, ventrobasally with bush of short dark setulae, continued posteriorly as longer setulae; posteroventrally dark on basal 0.66, with bush of white setulae in dark patch, ventral setae dark, forming small tuft distally. Midleg (Fig. 180): without feathering, femur with brown basal spot and few isolated long setulae ventrally in basal part; tibia yellow with black apical spot anterodorsally. Hindleg (Fig. 181): femur at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 11; bands yellow to yellowish brown. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique posterobasally.

Abdomen. Mostly dark yellow; tergite 1 with brown patches posteriorly; tergites 2 and 4 with weak silvery transverse band along posterior half; tergite 3 with two dark brown spots on posterior half, sometimes more extensively brown; tergite 5 with posterior margin brown. Male epandrium (Fig. 246) in lateral view with lateral surstylus long and slender; posterior lobe short and straight.



Figs. 178-181. *Ceratitis pedestris*, male legs. 178. Forefemur and foretibia, anterior view. 179. Forefemur, posterior view. 180. Midfemur and midtibia, anterior view. 181. Hindfemur anterior view.

Female. As male except for the following characters: Frontofacial angle sometimes with darker patches. Frontal setae well developed. Postpronotal lobe usually with a larger and more conspicuous spot. Anepisternum brownish on ventral 0.33. Apical spots on scutellum touching basal spots or almost so, sometimes partly merged. Wing bands somewhat darker than in male. Legs without feathering; yellow, femora darkened; setation mixed pale and dark; forefemur posteroventrally with pale pilosity. Oviscape shorter than preabdomen. Aculeus (Figs. 33, 95) about 10 times longer than wide; tip very slender, pointed and lateral margin distinctly concave.

Body length. 4.55 (4.20-5.05) mm; wing length: 4.73 (4.30-5.30) mm.

Material examined

Lectotype (here designated) ♂, SOUTH AFRICA: Durban, 25.iv.1921, H.K. Munro [or C.P. van der Merwe, cf. comments below] (PPRI).

Paralectotypes (here designated): SOUTH AFRICA: same date and locality as lectotype (♀; PPRI); Transvaal, Pretoria, 17.vi.1917, (1♀; PPRI); 10.vii.1917 [probably D. Gunn] (1♂; PPRI). 1♂ and 1♀ in collection of BMNH with date and locality as lectotype and originally from Munro's collection probably also belong to the original type series (cf. comments below. See also below for discussion on possible host plants of type material).

Other material examined: ANGOLA: Santa Cruz, 15.viii.1952, M1149 [= ex *Strychnos cocculoides* according to Munro's archives], H.K. Munro (1♂; PPRI). IVORY COAST: Korhogo, June-September 1999, A. Barbet (1♂; CNEARC). KENYA: West Pokot, Chepareria, 4-5.xi.1983, I. Yarom (1♂, 1♀; TAUI); 8mi NE Eshoum, 31.iii.1950, 'ex Strychnos, prob. spinosa', J. McGough (2♂, 1♀; USNM); Rabai, August 1937 (2♂, 2♀; NMK; 1♀; USNM), all 'bred ex Makuakua', V. van Someren. MADAGASCAR: 'Laboratory culture', V. Rarafimahatratra (1♂, 1♀; TAUI); Mtge des Français, February 1959, A. Robinson (1♂; PPRI); Sante-Luce, Fort Dauphin, 22.2.1958, P. Griveaud (1♀; PPRI). MALI: N'gorodougou, 20.vii.2001, A. Barbet (2♂; CNEARC). MOZAMBIQUE: 'Nr 67', 24.vi.1949, 'ex Strychnos', Skinner and McGough (3♂, 3♀; USNM). SOUTH AFRICA: Durban, April 1926, C.P. van der Merwe (1♀; KMMA); August 1930 (1♂; PPRI); December 1931 (1♀; BMNH); 6.vii-16.viii.1932 (1♀; BMNH); January 1933 (1♂; BMNH; 1♂; KMMA); 15-23.vi.1933 (1♂; KMMA); March 1933 (1♂; BMNH), all bait trap, W. Marriott; Durban Stellabush, February 1936, W. Marriott (1♀; KMMA); Eshowe, March 1949, '53A' [=ex *Strychnos* prob. *spinosum* according to Munro's archives], J. McGough (1♂, 2♀; USNM); Naboomspruit, Nylsvley Reserve, Tvl, 20.vii.1977, 'bred from fruit Strychnos pungens Solered', P. Ferrar (4♂, 10♀; BMNH); Natal, New Germany, September 1938, M664 [= ex *Strychnos spinosa* according to Munro's archives], W. Marriott (2♂, 3♀; PPRI); Pretoria, June 1929 (1♂, 1♀; KMMA); December 1929 (3♂, 3♀; PPRI) both E. Anderssen. TANZANIA: Ukerewe Island, H.A. Conrads (1♂; NMK). ZIMBABWE: Widderombe Park, Salisbury Distr. 18.iii.1950, 'JAW coll. E.L. 3714' (1♀; BMNH).

Host plants

Reared from several *Strychnos* spp. (Loganiaceae): *Strychnos cocculoides* in Angola; 'makuakua' (probably variant spelling of the Swahili name mkwakwa, referring to *Strychnos madagascariensis* (see Beentje, 1994)), and '*Strychnos* sp. probably *spinosa*' in Kenya; *Strychnos* sp. in Mozambique; *Strychnos pungens*, *S. spinosa* and *S. gerrardi* in South Africa. According to White and Elson-Harris (1992) it is sometimes a minor pest of tomato (*Lycopersicon esculentum*). For detailed list of host plants, see De Meyer *et al.* (2002).

Distribution

Angola, Ivory Coast, Kenya, Madagascar, Mali, Mozambique, South Africa, Tanzania, and Zimbabwe. Also recorded from Zambia (Hancock, 1987).

Comments

Bezzi (1924) described this species based on 'some specimens of both sexes from Natal, Durban, 25th April 1921, and from Transvaal, Pretoria, June-July 1917 (H.K. Munro)'. In the collection of the PPRI there are four specimens from these localities labeled as co-types (see material examined) and a small red label with a handwritten 'B' on it. The 'B' might stand for 'Bezzi' and refer to the fact that Bezzi saw these specimens. One specimen has an additional label with (handwritten) 'Pardalaspis / pedestris / type ♂♀ n. sp.'. These four specimens undoubtedly belong to the original type series, and the lectotype was selected from them. According to M. Mansell (personal communication) no other specimens from this type series are housed in the PPRI, although other specimens of *C. pedestris* are present. In the collections of the BMNH, there are a male and a female with identical data as the lectotype and an additional label: 'ex. Coll. Munro'. However, they do not bear the red label with the 'B'. Since they appear to be part of the original series of Munro, and the exact number on which Bezzi based his description is not given, they are hereby also considered to belong to the original type series and therefore labeled as paralectotypes.

Munro (1925) mentions that specimens were bred from fruits "…, of *Strychnos gerrardi*, April, 1921, C.P. v. d. Merwe, Durban; from fruits of *Strychnos pungens* (wild orange), June, 1917, D. Gunn, Pretoria.". There may have been specimens from these series that Munro put at Bezzi's disposal for the description of the species, although none of the specimens is labeled with the host plant name. It is therefore probable that these are the host plants (and respective collectors) of the type material.

C. pedestris is probably related to *C. lobata* and *C. curvata*. It shows the same mesonotal pattern and, as in *C. curvata*, it also has *Strychnos* spp. as hosts. However, the feathering on the male forefemur and the aculeus shape are distinctive. All three species occur in southern and eastern Africa. Specimens of *C. pedestris* from western Africa have a paler ground colour on the thorax but are otherwise identical to East and southern African material, including the distinctive male leg feathering. They are included here.

***Ceratitis* (*Pterandrus*) *penicillata* Bigot**

(Figs. 32, 62, 63, 182-185, 223)

Ceratitis ? *penicillatus* Bigot, 1891: 381.
Pterandrus fumitactus Munro, 1938: 166. Synonymy by Munro, 1969: 424.
Ceratitis penicillata: Bezzi, 1909: 277, 279 (key).
Pterandrus penicillatus: Bezzi, 1924b: 99 (key); Munro, 1969: 424 (Ivory Coast); Cogan and Munro, 1980: 531 (Afrotropical Catalog).
Ceratitis (*Pterandrus*) *penicillata*: Hancock, 1984: 279 (new combination); Freidberg, 1991: 169 (key); White and Elson-Harris, 1992: 312 (pest status); Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer *et al*., 2002: 36 (host check list).

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum along ventral margin brown; setulae pale; apical black spots of scutellum

separate; male midtibia ventrally with black feathering along distal half, dorsally slightly over distal half; wing bands well developed and yellowish brown to brown, marginal band forming continuous band with anterior part of discal band.

Redescription

Male. Head. Antenna yellowish orange, First flagellomere brown; twice or three times as long as pedicel. Arista with moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons yellow, sometimes pale yellow; darker patches on ventral half, especially at frontofacial angle; with short scattered setulae largely of same color as frons (occasionally darker). Frontal setae well developed. Face pale, median part with darker yellow to brown patch. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe white, without spot. Scutal pattern similar to Fig. 8: ground color dark gray; with streaks and darker markings but without distinct spots except prescutellar white separate markings, with pale area in between. Scapular setae dark. Scutellum white, basally without spots, apically with three separate black spots, extending anteriorly to basal half. Anepisternum along ventral margin only brown; setulae pale.

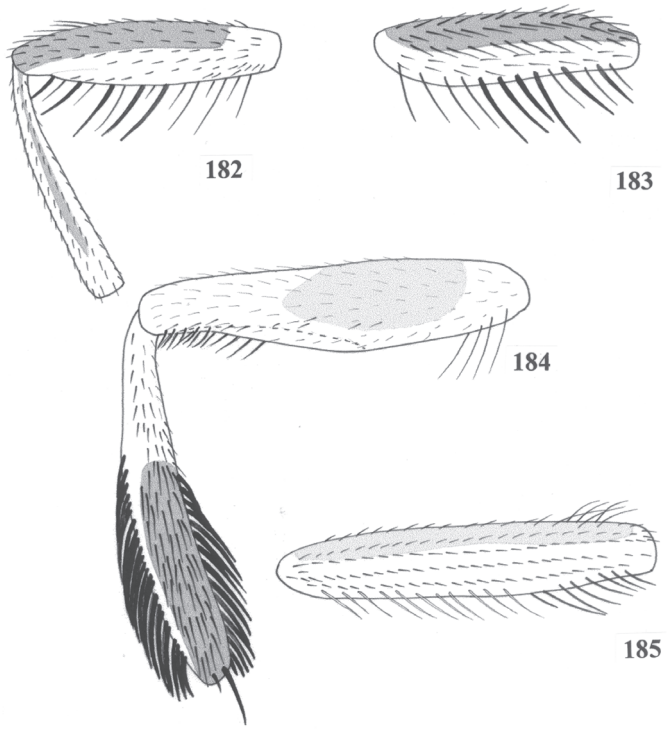
Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 182-183): femur with dorsal part brownish colored anteriorly and posteriorly; posteriorly no bush, only dispersed setulae; ventral setae black. Midleg (Fig. 184): femur anteriorly with large brown patch in median part, basally with few dispersed long pale setulae; tibia moderately broadened and anteriorly brownish black on distal half (except along dorsal row of feathering where yellow covered by short dark setulae), with black feathering ventrally along distal half, dorsally slightly over distal half. Hindleg (Fig. 185): femur brown on dorsal half; at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 11; bands yellowish brown to brown. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent (in rare cases a weak and incomplete band is present); crossvein R-M proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Orientation crossvein DM-Cu variable.

Abdomen. Mostly yellow. Tergites 2 and 4 across posterior half with pale gray band. Tergite 3 brown on posterior half. Tergites 4 and 5 along anterior margin yellowish brown, latter posteriorly narrowly brown. Male epandrium (Fig. 223) in lateral view with lateral surstylus long and slender; posterior lobe straight and elongate.

Female. As male except for the following characters. First flagellomere darker but not brown. Face without darker coloration in median part. Crossvein DM-Cu oblique anterobasally. Medial band in one paratype of *fumitactus* weakly present. Legs without feathering, femora yellowish brown; forefemur posteroventrally with pale pilosity. Abdominal tergite 3 sometimes almost completely brown; tergite 5 on anterior 0.33 yellowish brown to brown, posteriorly without brownish margin. Oviscape slightly shorter than preabdomen. Aculeus (Figs. 32, 62, 63) at least eight times longer than wide; tip with distinct apical indentation and lateral margin weakly sinuous.

Body length. 4.40 (3.90-5.15) mm; wing length: 4.78 (4.45-5.25) mm.



Figs. 182-185. *Ceratitis penicillata*, male legs. 182. Forefemur and foretibia, anterior view. 183. Forefemur, posterior view. 184. Midfemur and midtibia, anterior view. 185. Hindfemur, anterior view.

Material examined

Holotype of *C. penicillata* ♂, IVORY COAST: Assinie, Afrique oc., Bigot collection (UMO).

Holotype of *C. fumitactus* ♂, CONGO (D.R.): Katanga, Sandoa, February 1932, F. Overlaet (PPRI).

Paratypes of *C. fumitactus*: CONGO (D.R.): same locality and date as holotype (♀ allotype, 2♂, 2♀; PPRI; 1♂, 1♀; BMNH; 1♂, 1♀; KMMA).

Other material examined: CENTRAL AFRICAN REPUBLIC: Dept. de la Lobaye, Forêt de M'Balé, 7.ix.1967, 'lisière', L. Matile (1♂; TAUI). CONGO (Brazzaville): Banane, 25.ii.1986, A. Delobel (1♂; TAUI). CONGO (D.R.): Basongo, 15-31.vii.1921, H. Schouteden (1♂; KMMA). GHANA: Aburi, 3.v.1911, 'on leaf of Funtumia latifolia in flower', L. Armstrong (1♀; PPRI); Kumasi, 17.iii.1947, J. Bowden (1♂; NMSA). IVORY COAST: Bingerville, February 1964, J. Decelle, 'ex follicules de Cola gabonensis' (10♂, 11♀; KMMA); November 1963, J. Decelle (1♀, as paratype of *C. acicularis;* KMMA); Man, December 1930 – April 1931 [probably March 1931 according to additional label], C. Alluaud and P.A. Chappuis (1♂; MNHN). NIGERIA: Ile-Ife, 2.viii.1969, J.T. Medler (1♂; BMNH; 1♂; PPRI). TOGO: Sodo Forest, 2-21.i.1982, G. Steck (1♂; TAUI).

Host plants

Reported from *Cola gabonensis* (Sterculiaceae) in Ivory Coast and *Cola* sp. in Congo (D.R.). The latter is based on type material of *C. fumitactus* which was reared from 'kola' according to the original description ('élevés de larves trouvées dans des noix de Kola'). According to White and Elson-Harris (1992) this would refer to *Cola acuminata*.

Distribution

Central African Republic, Congo (Brazzaville), Congo (D.R.), Ghana, Ivory Coast, Nigeria, Togo.

Comments

The male holotype of *C. penicillata* is in poor condition, covered by fungi, and most cephalic setae and the antennae are missing. However, the main characteristics (complete marginal band and the feathering of the midleg) are still discernible. *Ceratitis fumitactus* is confirmed to be synonymous. The confusion regarding the identity of *C. penicillata* and the consequent description of *C. fumitactus* is explained by Munro (1969). This species belongs to a species group that is predominantly restricted to *Cola* spp. as hosts (see comments under *C. acicularis* and *C. colae*).

***Ceratitis* (*Pterandrus*) *pennitibialis* De Meyer and Freidberg, n. sp.**

(Figs. 44, 90, 186-189, 232)

Diagnosis

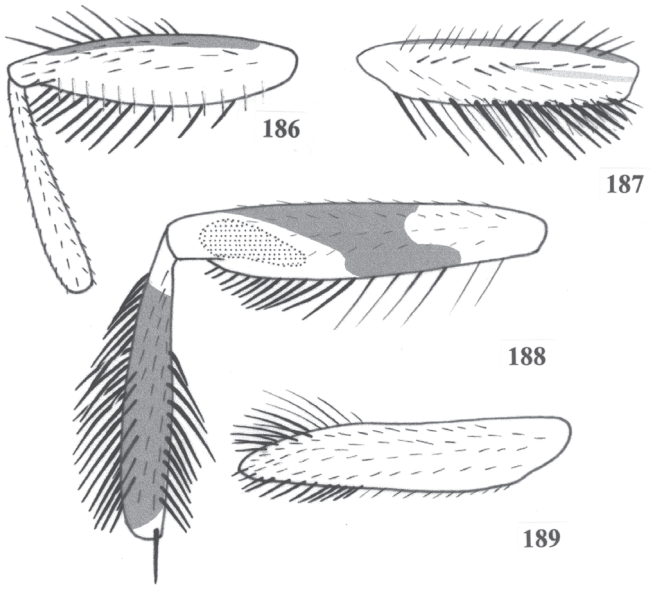
Postpronotal lobe with a brown spot; scutal pattern brown with distinct spots; anepisternum on ventral half yellowish brown, brown in female; setulae pale (rarely one dark setula ventral to anepisternal seta, several in female); scutellum black, basally near lateral margin and in median part with yellow spots; male midfemur ventrally with black feathering on apical half; midtibia with dispersed rows of black feathering dorsally along apical 0.8 and ventrally along distal 0.66; wing bands well developed and brown, marginal band forming continuous band with anterior part of discal band.

Description

Male. **Head**. Antenna yellow. First flagellomere twice as long as pedicel. Arista with short rays, basoventral rays shorter and sparser than basodorsal rays. Frons convex; yellow, with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face yellowish white. Gena at most with darker yellow spot. Genal seta black or reddish; genal setulae dark, poorly developed. Occiput on dorsal part yellowish brown (but not dark brown as in *C. curvata*) except along dorsal margin.

Thorax. Postpronotal lobe whitish, with brown spot. Scutal pattern similar to Fig. 2 except mediolongitudinal line more pronounced; ground color brown, microtrichose areas silvery with ashgray shine, spots brownish black, prescutellar white or yellow markings small, separate. Scapular setae dark. Scutellum black, basally near lateral margin and in median part with yellow spots. Anepisternum on ventral half yellowish brown; setulae pale (rarely one dark setula ventral to anepisternal seta); dorsal half with whitish stripe along dorsal margin.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 186-187): femur yellow except dorsally darker, posteriorly with brownish streak



Figs. 186-189. *Ceratitis pennitibialis* n. sp., male legs. 186. Forefemur and foretibia, anterior view. 187. Forefemur, posterior view. 188. Midfemur and midtibia, anterior view. 189. Hindfemur, anterior view.

on apical half; anteroventrally with row of very short and dispersed silvery setulae along entire length (not dense and long comb as in *C. curvata*); posteriorly with dispersed mix of pale and dark setulae; posterodorsal row pale, apically dark, posterior row black along entire length; ventral setae black. Midleg (Fig. 188): femur posteriorly brown except on basal part, brownish in median part anteriorly, with silvery oblique spot on distal 0.33, silvery shine conspicuous when viewed from certain angle; ventrally with black feathering on apical half, continued basally as row of dispersed, and slightly longer setulae; tibia brown except basally and apically; with dispersed rows of black feathering dorsally along distal 0.8 and ventrally along distal 0.66; anteriorly with short setulae, in front of dorsal feathering with row of longer setulae. Hindleg (Fig. 189): femur at apical 0.25 with longer setulae dorsally, less so ventrally.

Wing. Pattern as in Fig. 11; bands brownish. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M at or just proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly brownish black. Tergite 1 yellow along anterior margin; tergite 2 across posterior half to 0.66 and tergite 4 largely with silvery band; tergites 2 and 5 with yellow median patch. Setation and banding typical for subgenus. Male epandrium (Fig. 232) in lateral view distinctly broadened; posterior lobe of lateral surstylus with base broadened, apical end bluntly pointed.

Female. As male except for the following characters: Antenna yellowish orange; first flagellomere 2-3 times as long as second. Genal seta dark. Gena with more distinct brown spot. Ventral half of anepisternum brown with dark setulae on posterior half. Crossvein DM-Cu

oblique posterobasally. Legs without feathering; yellowish brown except brownish femora; pilosity and ventral setae of forefemur dark. Oviscape shorter than preabdomen. Aculeus (Figs. 44, 90) about six times longer than wide; tip pointed, and lateral margin slightly sinuous.

Body length. 4.28 (3.75-4.70) mm; wing length: 4.67 (4.45-5.00) mm.

Material examined

Holotype ♂, KENYA: Nairobi, May 1938, ex Maba 568 [= *Diospyros*], V. van Someren (PPRI).

Paratypes: KENYA, same date and locality as holotype (♀ allotype, 4♂, 7♀; PPRI; 1♂, 1♀; NMK; 1♂, 1♀; KMMA; 1♂, 1♀; TAUI; 1♂, 1♀; BMNH).

Other material, not included in type series: KENYA, Nairobi, 2.xii.2001, '1621', ex *Diospyros abyssinica*, R.S. Copeland (2♂, 2♀; ICIPE).

Etymology

An adjective based on the Latin *tibia* and *penna* (meaning feather) and referring to the characteristic feathering on the midtibia.

Host plants

Bred from *Diospyros* sp. and *D. abyssinica* (Ebenaceae).

Distribution

Kenya.

Comments

This species is only known from Kenya. It shares some of the characters found in the *C. lobata* and *C. faceta* subgroups (see general discussion). It seems more closely related to *C. lobata* and *C. curvata* but the feathering on the foreleg and midleg is different. The female is similar in general appearance to those of *C. lobata* and *C. curvata* but can be distinguished by the shape of the aculeus (broad in *C. pennitibialis*, elongated in *C. curvata* and *C. lobata* (compare figures 49-50 with 44)). In De Meyer *et al.* (2002: 45) this species is listed under the undescribed species 'PE'.

Ceratitis (*Pterandrus*) *pinnatifemur* Enderlein

(Figs. 6, 53, 97, 190-193, 236)

Ceratitis pinnatifemur Enderlein, 1920: 353.

Pterandrus pinnatifemur: Bezzi, 1924b: 99 (key); Cogan and Munro, 1980: 531 (Afrotropical Catalog).

Ceratitis (*Pterandrus*) *pinnatifemur*: Hancock, 1984: 279 (new combination); Freidberg, 1991: 169 (key); Norrbom *et al.*, 1999: 121 (World Catalog).

Diagnosis

Postpronotal lobe with a black or brownish spot; scutal pattern without distinct spots or clearly defined stripes except black sutural and dorsocentral spots; anepisternum on ventral half brown; setulae pale except a few dark setulae across posterior margin on ventral half, more extensively so in female; basal and apical black spots of scutellum separate; male midfemur anterodorsally with tuft of black appressed setae, ventrally with black feathering along distal 0.33; wing bands well developed and brown, marginal band forming continuous band with anterior part of discal band.

Redescription

Male. Head. Antenna yellowish orange. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons yellow to yellowish orange; with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face yellowish white; gena slightly darker. Genal seta and setulae dark, well developed. Occiput dark brown on dorsal 0.33, except along dorsal margin.

Thorax. Postpronotal lobe white, with black or brownish spot. Scutal pattern as in Fig. 6: ground color gray with golden shine; with streaks and darker markings but without distinct spots, except shiny black sutural and dorsocentral spots; prescutellar white markings separate. Scapular setae dark. Scutellum yellowish white, basally with two separate dark spots, apically with three separate dark spots, extending anteriorly to basal 0.33. Anepisternum on ventral half brown; setulae pale except few dark setulae across posterior margin on ventral half.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly dark. Foreleg (Figs. 190-191): femur posteriorly with dispersed bush of long dark setulae along entire length, posterodorsal setulae longer; main area with pale brownish bushy pilosity; ventral setae dark. Midleg (Fig. 192): femur posteriorly completely dark, anteroventrally dark brown on distal half, anterodorsally with tuft of black appressed setae; ventrally with black feathering along distal 0.33. Hindleg (Fig. 193): femur at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 11; bands brown. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergites 1 and 3 across posterior part with continuous brown band; tergites 2 and 4 on posterior half pale gray (not silvery); tergite 5 anteriorly broadly and posteriorly narrowly yellowish brown. Male epandrium (Fig. 236) in lateral view with posterior lobe of surstylus short and slightly curved.

Female. As male except for the following characters: antenna darker, first flagellomere partly dark brown. Anepisternal pilosity with dark setulae extending somewhat further anteriorly of hind margin. Legs without feathering, yellow with femora orange-brown; forefemur posteroventrally with dark pilosity. Crossvein DM-Cu oblique posterobasally. Ovipositor shorter than preabdomen. Aculeus (Figs. 53, 97) at least 10 times as long as wide; tip distinctly broadened, and lateral margin straight.

Body length. 5.05 (4.60-5.30) mm; wing length: 5.01 (4.40-5.55) mm.

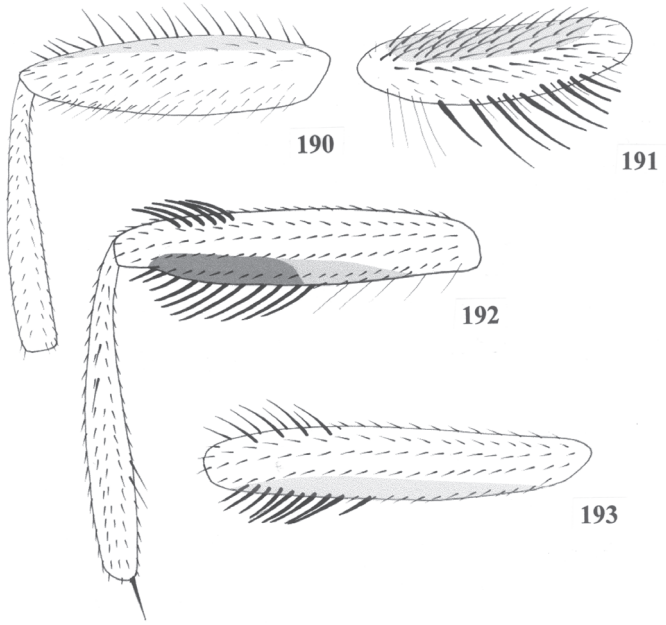
Material examined

Holotype ♂, EQUATORIAL GUINEA: Uelleburg, June-August, 1908, S. Tessmann (MNHU).

Other material examined: CAMEROON: Rt. N9, 20 km E Sangmelina, 7.x.1987, A. Freidberg and F. Kaplan (13♂, 7♀; TAUI). UGANDA: Kamengo, 8.ix.1949 (1♀; PPRI).

Host plants

Unknown.



Figs. 190-193. *Ceratitis pinnatifemur*, male legs. 190. Forefemur and foretibia, anterior view. 191. Forefemur, posterior view. 192. Midfemur and midtibia, anterior view. 193. Hindfemur, anterior view.

Distribution

Cameroon, Equatorial Guinea and Uganda.

Comments

The holotype is damaged, with the frons, wings and mesonotum largely or partly folded, and the abdomen covered by whitish debris. The series from Cameroon (TAUI) includes the hitherto unknown female. The exact position of this species within the subgenus is not certain. Enderlein (1920) placed it near *C. anonae* but mentioned a number of diagnostic characters to differentiate both species, such as the marginal band not being interrupted, and differences in the pilosity of the mesonotum and legs. However, *C. pinnatifermur* does not seem to be related to *C. anonae*. Enderlein (1920) mentioned the collecting date as being 'Mai bis Aug. 1908', although the label on the holotype clearly reads 'vi-viii.08'. The tip of the aculeus is clearly flattened and somewhat bifurcated. However, its general shape corresponds with that found in some species of the *C. lobata* and *C. faceta* subgroups, expecially that of *C. querita*, which is also partly flattened.

***Ceratitis* (*Pterandrus*) *podocarpi* (Bezzi)**

(Figs. 28, 94, 194-197, 234)

Pterandrus podocarpi Bezzi, 1924a: 476.

Pterandrus podocarpi: Bezzi, 1924b: 99 (key); Munro, 1925: 49 (hosts); Cogan and Munro, 1980: 531 (Afrotropical Catalog).

Ceratitis (*Pterandrus*) *podocarpi*: Hancock, 1984: 279 (new combination); Hancock, 1987: 56 (lures); Freidberg, 1991: 169 (key); Hancock and White, 1997: 196 (taxonomy, hosts);

Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer, 2001b: 221 (stenophagy, distribution); De Meyer *et al*., 2002: 36 (host check list).

Diagnosis

Postpronotal lobe with a brown spot; scutal pattern with distinct spots; anepisternum on ventral margin darker yellow, brown in female, setulae pale except few dark setulae ventrally; basal and apical black spots of scutellum separate; male midtibia with dark feathering along distal half, anterodorsaly with extra row of black feathering along distal half to 0.66; wing bands well developed and yellowish brown, interruption between marginal and discal bands near vein R_1 present or absent.

Redescription

Male. Head. Antenna yellowish orange. First flagellomere three times as long as pedicel. Arista with very short rays; ventral rays absent or shorter and sparser than dorsal rays basally. Frons on ventral half swollen; yellow, lateral margin pale yellow; with short scattered setulae largely of same color as frons. Frontal setae slightly less developed than other setae. Face yellowish white; gena darker yellow. Genal seta and setulae dark, well developed.

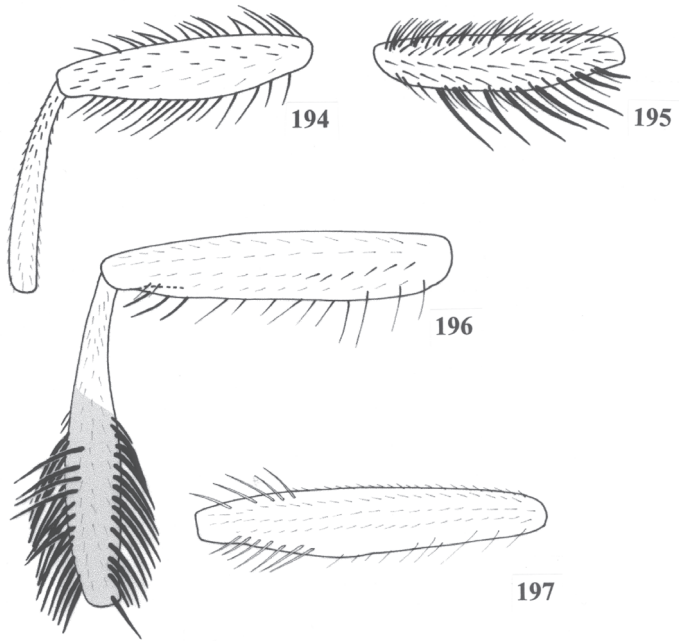
Thorax. Postpronotal lobe white, with brown spot. Scutal pattern similar to Fig. 2 except prescutellar markings more pronounced; ground color orange-brown, microtrichose areas with silvery or ashgray shine; spots brown, prescutellar yellow markings separate. Scapular setae dark. Scutellum (similar to Fig. 6) yellow, basally with two separate dark spots, apically with three separate black spots, extending anteriorly to basal 0.33, touching basal spots or almost so. Anepisternum along ventral margin only darker yellow; setulae pale, except few dark setulae ventrally.

Legs. Yellowish orange except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 195-195): femur posteriorly with weakly developed and dispersed bush of long dark setulae along entire length, posterodorsal setulae longer; ventral setae dark. Midleg (Fig. 196): femur anteriorly with row of short dark setae on basal half, not always conspicuous; ventrally with few dispersed long pale setulae, distally darker setae; tibia darker and dilated in distal 0.66; ventrally and dorsally with black feathering along distal half, anterodorsally extra row of black feathering along distal half to 0.66, except apical 0.17. Hindleg (Fig. 197): femur at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern usually as in Fig. 10; bands yellowish brown. Marginal and discal bands with interruption, or partly joined; cubital band free; medial band absent (sometimes weakly present as free band); crossvein R-M just beyond middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergite 1 with brown patches across posterior margin. Tergites 2 and 4 with silvery transverse band along posterior half, brownish colored anteriorly as two large spots, sometimes wholly brownish colored. Tergite 3 largely yellowish brown. Tergite 5 yellow, with brown patches along anterior and posterior margin. Setation typical for subgenus. Male epandrium (Fig. 234) in lateral view with lateral surstylus slender and elongate, anterior lobe strongly pronounced.

Female. As male except for the following characters: Frons yellow with few dark patches. Frontal setae well developed. Anepisternum along ventral margin dark brown, sometimes



Figs. 194-197. *Ceratitis podocarpi*, male legs. 194. Forefemur and foretibia, anterior view. 195. Forefemur, posterior view. 196. Midfemur and midtibia, anterior view. 197. Hindfemur, anterior view.

extended to ventral 0.33. Crossvein DM-Cu oblique posterobasally. Legs without feathering, pilosity dark; femora orange-brown; forefemur posteroventrally with dark pilosity. Abdominal tergite 5 with silvery transverse band along posterior margin; sometimes abdomen completely brown with silvery bands. Oviscape shorter than preabdomen. Aculeus (Figs. 28, 94) about six times longer than wide; tip pointed and lateral margin concave.

Body length. 4.33 (3.55-4.75) mm; wing length: 4.39 (3.70-4.70) mm.

Material examined

Lectotype (here designated) ♀, SOUTH AFRICA: Uitenhage, 26.x.1922 (SAMC). Paralectotypes (here designated) SOUTH AFRICA: Uitenhage, 26.x.1922 (1♀; SAMC); East London, 10.vi.1923 (1♀; PPRI).

Other material examined: ETHIOPIA: Wendo Genet, 220 km S Addis, 14.xii.1989, 'ex Podocarpus fruit', A. Freidberg and F. Kaplan (5♂, 5♀; TAUI). KENYA: Nairobi, December 1936, 'ex Podocarpus fruit', V. van Someren (1♀; PPRI); January 1937, 'bred ex Podocarpus', V. van Someren (2♂, 5♀; NMK; 10♂, 10♀; PPRI; 2♂, 2♀; BMNH; 1♂, 1♀; USNM); 25.v.1936, 'Podocarpus gracilior', N. Krauss (3♂, 1♀; BPBM; 2♂, 11♀; USNM); October 1951, 'R 399', 'fruits of Podocarpus gracilior', J. Gardner (2♂; BMNH). SOUTH AFRICA: Durban, March 1933, bait trap (additional label with 'Podocarpus spp. Fruits') (1♂; NMSA); August 1930 (1♂; PPRI); 26.xi-8.xii.1932 (1♂; PPRI); January 1933 (1♂; PPRI); March 1933 (4♂; PPRI); 23-30.vi.1933 (1♂; PPRI); May 1936 (1♂; PPRI), all bait trap, W. Marriott; East

London, 1.viii.1923 (3♂, 2♀ (including 1 specimen labeled "homotype"); PPRI); 4.viii.1923 (2♂; PPRI; 1♀; BMNH); 7.viii.1923 (3♂, 4♀; PPRI; 1♀; NMSA); 11.viii.1923 (1♂; NMSA); 17.viii.1923 (1♀; NMSA); August 1923 (1♂, 1♀; KMMA; 1♂; BMNH; 8♂, 9♀; PPRI), all Munro; Kokstad, 15.iii.1933, bait trap, H. Eagle (1♂; PPRI); Port Elizabeth, 14.x.1922 (1♂, 1♀; PPRI); Uitenhage, 10.x.1922 (1♂; PPRI). no locality [probably also from South Africa] (1♂; NMSA).

Host plants

Bred from several *Podocarpus* spp. (Podocarpaceae): *Podocarpus falcatus* in Kenya, and *Podocarpus* sp. in Ethiopia and South Africa. Also recorded from *Podocarpus elongatus* in South Africa (Bezzi, 1924a: type material from Uitenhage).

Distribution

Ethiopia, Kenya, South Africa.

Comments

The species was described by Bezzi (1924), based on 'two female specimens from Uitenhage, 26 October 1922, bred from fruits of the indigenous conifer, Podocarpus elongata (D. Garm); numerous specimens of both sexes from East London (H.K. Munro)'. According to M. Mansell (personal communication), in the PPRI collection there is a long series originating from East London, as well as a male specimen from Uitenhage, but no material designated as types.

In the collection of SAMC there is one female specimen that fits the details given in the original description. It bears an additional label (on brown paper; handwritten, probably in Bezzi's hand) with 'Pterandrus / podocarpi / typ. ♀ n. sp.'. This specimen is considered as belonging to the original type series and is designated as lectotype. A second female specimen bears a label with the same data but lacks the additional label with identification. This is presumably the second female mentioned by Bezzi (1924). For the East London material, no date was given in the original description. Munro (1925) mentioned that "The fruits of *Podocarpus elongata* from the Uitenhage District were first observed to be infested by the larvae of a fruit-fly by D. Gunn in September, 1922. In June, 1923, the fruits of the same tree round East London were heavily infested." It could be assumed from this that he sent material from these first findings to Bezzi for identification. One of the specimens in the PPRI collection, from August 1st 1923, is labeled as 'homotype' by Munro, which implies that it was compared with type material at a later stage. Therefore a conservative approach has been taken and only material from East London, collected in June 1923, is considered as being part of the original type series (one specimen in the PPRI collection was labeled by us as paralectotype). It could well be, however, that at least some of the additional specimens from East London collected in August 1923 are also types. Apparently, at a later stage, Munro must have exchanged material with other collections and thereby distributed the series to the NMSA; KMMA and BMNH collections.

Ceratitis podocarpi, C. gravinotata, *C. nigricornis*, n. sp. and *C. roubaudi* form a distinct monophyletic group. *Ceratitis podocarpi* is very similar to *C. gravinotata*, but can be distinguished by the scutellar markings (apical spots not touching in *C. podocarpi*) and wing pattern (medial band usually absent in *C. podocarpi*) in both sexes, and by the leg feathering in the males. However, the difference in wing pattern is not always reliable.

Ceratitis (*Pterandrus*) *querita* (Munro)
(Figs. 20, 51, 98, 231)

Trirhithrum queritum Munro, 1937: 10.
Trirhithrum queritum: Cogan and Munro, 1980: 532 (Afrotropical Catalog); Norrbom *et al.*, 1999: 230 (World Catalog).
Ceratitis (*Pterandrus*) *querita*: Hancock and White, 1997: 196 (new combination, hosts); De Meyer *et al*., 2002: 37 (host check list).

Diagnosis

Postpronotal lobe with a black spot; scutal pattern shiny black; anepisternum on ventral half dark brown, dorsal half paler brown and demarcated with pale line dorsally and ventrally, setulae black; basal and apical black spots of scutellum merged; male legs without feathering; wing bands well developed and brown, marginal band forming continuous band with anterior part of discal band; cubital band joining junction of marginal and discal bands.

Redescription

Male: Head: Antenna orange-brown. First flagellomere 2-3 times as long as pedicel. Arista with short rays; basoventral rays shorter and sparser than basodorsal rays. Frons convex; yellow, sometimes with darker patches; with short scattered setulae darker than frons. Frontal setae well developed. Frontofacial angle with brown band. Face white; gena brown. Genal seta and setulae black, well developed. Occiput mainly pale.

Thorax: Postpronotal lobe dark yellow, with black spot. Scutal pattern similar to Fig. 2 or darker; shiny black, center with silvery microtrichia; with pale and dark pilosity; no streaks or spots, except very small white separate prescutellar spots. Scapular setae dark. Scutellum yellow, basal spots well developed and joined, occupying full anterior margin of scutellum; apical spots extending anteriorly to basal 0.33, almost touching basal spots, joined, weakly incised. Anepisternum on ventral half dark brown, dorsal half paler brown, demarcated with pale line dorsally and ventrally; setulae black.

Legs: Yellow, femora dark brown; midtibia and hindtibia brown on basal two-third. No feathering, pilosity and ventral setae on forefemur black.

Wing: Pattern as in Fig. 20; bands brown. Marginal band forming continuous band with anterior part of discal band; cubital band joining junction of marginal and discal bands; medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen: Shiny black, except tergite 1 yellowish orange. Tergites 2 and 4 with silvery band along respectively posterior half and almost entire width. Setation and banding typical for subgenus. Male epandrium (Fig. 231) in lateral view distinctly broadened; posterior lobe of lateral surstylus slender, apical end curved.

Female: As in male. Ovipositor shorter than preabdomen. Aculeus (Figs. 51, 98) at least 10 times longer than wide; tip distinctly broadened, and lateral margin straight.

Body length: 3.90 (3.80-4.20) mm; wing length: 4.15 (4.00-4.40) mm.

Material examined

Holotype ♂, KENYA: Nairobi, 1936 'bred ex Strychnos' [= *Strychnos usambarensis* according to Murno, 1937), N. Krauss (BMNH)

Other material examined: KENYA: Nairobi, May-June 1936, 'Strychnos sp.', N. Krauss (3♂, 1♀; BPBM); September 1937 (2♂, 3♀; NMK; 3♀; BMNH); October 1937 (1♂; NMK; 1♀; BMNH), all 'bred ex fruit 423' [= *Strychnos* sp. according to separate label in NMK collection drawer], V. van Someren; October 1950, 'Strychnos reticulata' (1♀; PPRI); June 1950, 'Chrysophyllum pruniforme' (2♀; PPRI), all McGough; Nairobi, City Park, 5.iv.2001, '1141', ex *Strychnos mitis*, R. Copeland (5♂, 5♀; ICIPE); Uplands, October 1937, 'bred ex Psycotria 898', V. van Someren (1♂; USNM). ZIMBABWE: Mt. Selinda, Chirinda forest, 15-26.i.1959, 3,500ft, van Bruggen (1♀; PPRI).

Host plants

Mainly recorded from *Strychnos* spp. (Loganiaceae): *Strychnos mitis*, *S. reticulata* (=*henningsii*), *S. usambarensis* and *Strychnos* sp. There are also records from *Psychotria* sp. (Rubiaceae) and *Chrysophyllum pruniforme* (Sapotaceae) (see material examined). Furthermore reported from *Chrysophyllum viridifolium* (Sapotaceae) and *Ludia mauritiana* (Flacourtiaceae) (R. Copeland, personal communication).

Distribution

Kenya, Zimbabwe.

Comments

C. querita was originally described in *Trirhithrum* but was recently moved to *Ceratitis* by Hancock and White (1997). It is related to other species with a mainly dark thorax and abdomen, such as *C. faceta*, *C. bicincta*, and *C. inauratipes*. It can be distinguished from all other *Pterandrus* species, except *C. chirinda*, by its typical wing pattern. The male does not have any feathering on the legs.

***Ceratitis* (*Pterandrus*) *rosa* Karsch**

(Figs. 39, 80, 81, 198-201, 241, 252)

Ceratitis rosa Karsch, 1887: 1.

Ceratitis rosa: Bezzi, 1909: 277, 279 (key).

Pterandrus rosa: Bezzi, 1918: 231 (new combination); Bezzi, 1924a: 477 (South Africa); Bezzi, 1924b: 99 (Malawi); Munro, 1925: 48 (hosts); Munro, 1929a: 4 (South Africa); Munro, 1929b: 11 (hosts); Cogan and Munro, 1980: 531 (Afrotropical Catalog).

Ceratitis (*Pterandrus*) *rosa*: Munro, 1935b: 29 (hosts); Hancock, 1984 : 279 (new combination [partim]), 287 (Mauritius); Hancock, 1987: 52 (Zimbabwe); Freidberg, 1991: 169 (key); White and Elson-Harris, 1992: 306 (pest status); Norrbom *et al.*, 1999: 121 (World Catalog); Quilici and Jeuffrault, 2001: several pages (host check list Mauritius, Réunion, Seychelles); De Meyer, 2001a: 58 (redescription, status revised); De Meyer, 2001b: 223 (polyphagy, distribution); De Meyer *et al*., 2002: 38 (host check list).

Pterandrus rosa var. *fasciventris*: Bezzi, 1923: 526 (Mozambique) [?misidentification]; Bezzi, 1924a: 477 (South Africa) [misidentification]; Munro, 1925: 49 (host) [misidentification].

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral half yellowish brown, setulae pale; basal and apical black spots of scutellum separate; male midtibia with dark feathering dorsally along distal 0.75 and ventrally along distal 0.66; wing bands well developed and yellowish brown, interruption between marginal and discal bands near vein R_1 clear and complete.

Redescription

Male. Head. Antenna yellow. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons yellow; with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face yellowish white. Genal seta and setulae dark, well developed.

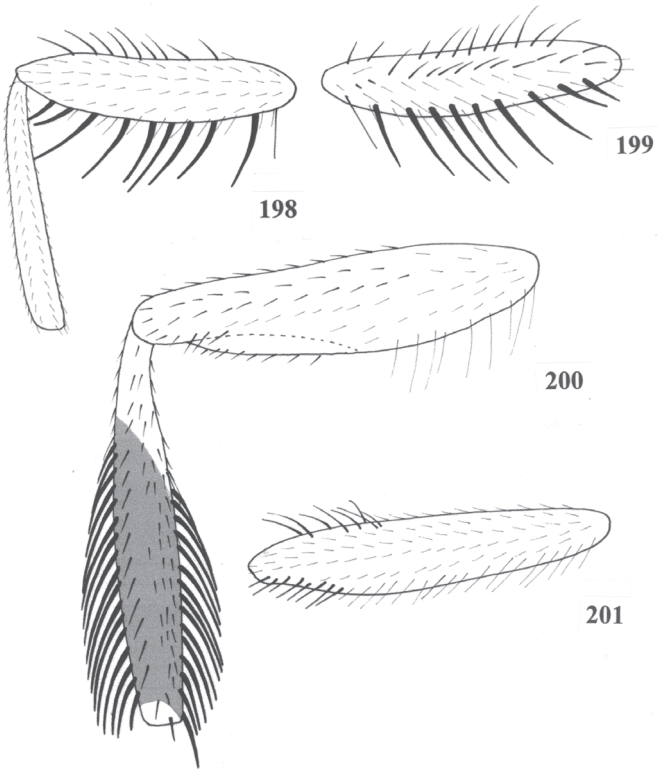
Thorax. Postpronotal lobe yellowish white, without spot, although sometimes darker yellow around postpronotal seta. Scutal pattern similar to Fig. 7: ground color grayish-brown with orange tinge; with streaks and darker markings but without distinct spots except prescutellar white markings separate, usually with paler area in between. Scapular setae dark. Scutellum yellowish white, basally usually with two separate dark spots, sometimes less distinct; apically with three separate black spots, extending anteriorly to basal 0.33. Anepisternum on ventral half darker yellowish brown; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly pale. Foreleg (Figs. 198-199): femur without bushy feathering posteriorly, only dispersed rows of long black setulae posterodorsally, posteroventrally shorter and pale; ventral setae black. Midleg (Fig. 200): femur with few dispersed pale setulae ventrally; tibia moderately broadened; anteriorly black with conspicuous silvery shine when viewed from certain angle on distal 0.66 to 0.75 (black color sometimes inconspicuous in teneral specimens but silvery shine is always present) with black feathering dorsally along distal 0.75 and ventrally along distal 0.66, ocassionaly to distal 0.75. Hindleg (Fig. 201): femur at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 10; bands yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergites 2 and 4 with pale gray band on posterior half, anterior margin sometimes with narrowly brownish colored, especially laterally. Tergite 3 with posterior half patchily brownish colored, anterior half yellowish brown, both parts not clearly demarcated; sometimes more complete brown. Tergite 5 with basal half brownish, sometimes divided medially into two spots. Male epandrium (Fig. 241) in lateral view with posterior lobe of lateral surstylus short and straight, anterior lobe well pronounced.

Female. As male except for the following characters: First flagellomere yellowish orange. Crossvein DM-Cu oblique posterobasally. Anepisternum on ventral part rarely with darker setulae. Legs without feathering; forefemur posteroventrally with pale pilosity, at least basally, distally sometimes dark setulae. Oviscape shorter than preabdomen. Aculeus (Figs. 39, 80,81) at most six times longer than wide; tip with distinct apical indentation and lateral margin slightly sinuous (specimens from Luabo, Mozambique seem to have an aculeus tip which is



Figs. 198-201. *Ceratitis rosa*, male legs. 198. Forefemur and foretibia, anterior view. 199. Forefemur, posterior view. 200. Midfemur and midtibia, anterior view. 201. Hindfemur, anterior view.

without any indentation but otherwise completely fit the description of *rosa*. They are tentatively placed here).

Body length. 4.96 (4.25-5.30) mm; wing length: 5.34 (4.50-5.75) mm.

Material examined

Holotype ♂, MOZAMBIQUE: 'Delagoabai', R. Monteiro (MNHU).

Other material examined: KENYA: Diani Beach, July 1951, Krauss (1♂, 1♀; PPRI); Mtwapa, 4.xi.1969, H.L. Adenya, 'ex guava' (1♂, 1♀; BMNH); Shimba Hills, July 1939, V. van Someren, 'ex fruit Nr 2' (1♂; BMNH). LESOTHO: Mamathes, 22.iii.1950, A. Jacot-Guillarmod (1♀; AMG). MALAWI: Bvumbwe, 9.ii.1988, 'ex ripe peach' (1♂; BMNH); Limbe, 22.ix.1916, R.C. Wood (1♀; BMNH); Livingstonia, 21.ii.1942, 4400 ft, R.C. Wood (1♀; BMNH); Zomba, 1.iii.1915, 'mango fruit', C. Mason (1♀; BMNH). MAURITIUS: Black River, 17.vi.1971 (1♂; BMNH); Macchabee Forest, 1.vi.1971 (1♂; BMNH); 8.vi.1971 (1♂; BMNH), all A.M. Hutson. MOZAMBIQUE: Luabo, January 1956, P. Usher (7♀; NMSA); September 1957, P.I. Stuckenberg (1♀; NMSA); Namaacha, 24.vi.1949, 'ex loquat', Skinner and McGough (2♂, 2♀; USNM). REUNION: Station de Bassin Plat, St Pierre (Laboratory rearing stock), 22.ii.2000, S. Quilici (20♂, 20♀; CIRAD). SOUTH AFRICA: Cedara, January 1933 (1♀; USNM); April 1949, 'ex Solanum auriculatum', Skinner and McGough (1♀;

USNM); Dukuduku, March 1949, '51A' [=ex *Strychnos* according to Munro's archives], J. McGough (1♀; USNM); Durban, 24.ii.1915, H.M. Miller (1♂; BMNH); 2.v.1915, L. Bevis (1♂; BMNH); 21.viii.1916, C.P. van der Merwe (1♀; BMNH); February 1932, W. Marriott, bait trap (2♀; NMSA); March 1932, W. Marriott, bait trap (1♂; NMSA); [no date given] (1♂, 1♀; USNM); Durban Seaton Pk, November 1936, W. Marriott (1♀; KMMA); Empangeni, 28°38'S 31°42'E, 5-15.i.1990, Reavell (1♂; NMSA); Enon Farm, Richmond, January 1964, B and P. Stuckenberg (2♂, 3♀; NMSA); Gillits, 11.ix.1960, B. and P. Stuckenberg (1♂, 1♀; NMSA); Eshowe, 2.iv.1949, 'ex Strychnos' (1♀; USNM); 12.iv.1949, 'ex guava' (1♂; USNM); April 1950, '106' [=ex chinese guava according to Munro's archives] (1♂; USNM), all J. McGough; Grahamstown, 28.iv.1949, 'reared from squash', McGough and Skinner (1♂; USNM); Hilton Road, 21.xii.1953, P. Graham (1♀; NMSA); January 1954, B. Stuckenberg (1♂; NMSA); Karkloof Forest, 9 km S and 6 km W of Rietvlei, 21-25.ii.1978, 1525m, Davis and Akerberge (1♀; USNM); Kwambonambi, March 1949, '50A' [=ex guava according to Munro's archives], J. McGough (1♂, 1♀; USNM); nr Lilani, Ahrens district, April 1962, B. and P. Stuckenberg (1♀; NMSA); Louis Trichardt, March 1928, G.G. Hay (1♂; KMMA); Maritzburg [♂=Pietermaritzburg], December 1912, 'on peaches', G. Fuller (1♂; BMNH); Mtubatuba, 24-25.iii.1968, P.J. Spangler (1♀; USNM); Ngoya forest, Mtunzini distr., 19-21.iii.1968, Potgieter and Goode (2♂; NMSA); Pearl, November 1959, A.C. Myburgh (3♀; USNM); Pietermaritzburg, December 1912, C. Fuller (1♂; NMSA); 10.i.1923 (1♂; NMSA); 3.ii.1949, J. McGough (2♀; USNM); 21.ii.1962, B. and P. Stuckenberg (1♂; NMSA); November 1976, town bush, R. Miller (1♂; NMSA); 8.ii.1994, 'on pawpaw', K. R. Cradock (1♀; NMSA); Pietermaritzburg, Montrose, 29°34'45"S 30°20'4"E, 22.iii.1992, banana bait, J. Londt (1♂; NMSA); 30.iii.1992, 'garden/house', J. Londt (2♂, 1♀; NMSA); Port Elisabeth, January 1957, Krauss (1♂; USNM); Port St. Johns, 20-25.xi.1961, B. and P. Stuckenberg (1♂; NMSA); Pretoria, 15.ii.1914, G.A.H. Bedford (1♂; BMNH); 6.iii.1914 (1♀; BMNH); 7.iv.1914 (1♂; NMSA); 10.v.1916, 'from guavas' (1♀; NMSA); 7.iii.1931, G. van Son (1♀; NMSA); 10.ii.1971, J.H. Potgieter (4♀; NMSA); 10.i.1995, A. Freidberg (1♀; TAUI); Pretoria, Lynwood, 1400 m, 11.i.1994, 'ex Ficus carica', M. Mansell (1♂, 4♀; PPRI); Stellenbosh, Cape Prov., January 1949, A.C. Myburgh (32♂, 25♀; USNM); Umlalazi Nat. Res., E. Mtunzini, 16.vii.1978, R. Miller, coastal indigenous forest (1♂; NMSA); Umtumvuna nat. Reserve, 15.vii.1983, 'attracted to jam in wooded stream gully', J. Manning (1♀; NMSA). TANZANIA: Amani, 27.ii.1936, 'strawberry guava', F. Bianchi (5♂, 11♀; BPBM; 10♂, 19♀; USNM); March 1936 (some specified as 19.iii.1936), 'strawberry guava', Bianchi and Krauss (30♂, 22♀; USNM); 'Myrianthus arboreus', 27.ii.1936 (1♂; USNM); March 1936 (13♂, 17♀; USNM), all Bianchi; Arusha, June 1936, 'coffee arabica', F. Bianchi (11♂, 13♀; USNM; 3♂, 2♀; BPBM); Engare Sero, nr Arusha, March 1936, 'guava' (20♂, 20♀; USNM); 'collected strawberry guava' (13♂, 10♀; USNM); 'collected orange' (4♂, 3♀; USNM); 25.iii.1936, 'collected quince' (1♂, 6♀; USNM), all F. Bianchi; March 1936, 'guava', F. Bianchi (1♂, 5♀; USNM); Lushoto, December 1935 (16♂, 20♀; USNM); January 1936 (1♀; USNM), all 'ex peach', F. Bianchi; 24.viii.1996, 1300 m, A. Freidberg (1♂, 5♀; TAUI); Makoa, 22-23.ii.1952 (1♀; BMNH); Morogoro, 9.vi.1925, 'ex Psidium japonicum' (1♂; BMNH); 26.v.1925, 'ex Anona muricata' (1♂; BMNH); July 1922, 'guava' (2♂; BMNH), all A.H. Ritchie; Moshi, 1-15.i.1935, 'ex coffea arabica cherry', A. Ritchie (1♂; BMNH); Segoma, 25.ii.1936, 'guava', Bianchi and Krauss (9♂, 21♀; BPBM; 1♀; USNM); Tengeru, 28.ii.1979 (1♂, 1♀; BMNH); 14.iii.1980 (1♀; BMNH), all 'from guava fruit', F. Jongeleer; Vickers Est., nr Arusha,

29.iii.1936, 'on coffee' (5♂, 12♀; USNM); 30.iii.1936, 'on peach' (2♂, 1♀; USNM), all F. Bianchi. ZIMBABWE: Harare, 25.iii.1976, 'bred from avocado', P.Hulley (1♂, 3♀; AMG); January 1959, 'B.R.S. P.G.' (1♀; PPRI).

Host plants

Recorded from a wide variety of host plants; see White and Elson-Haris (1992) for a review. Material examined confirmed records from guava (*Psidium guajava*), strawberry guava (*P. littorale*), peach (*Prunus persica*), loquat (*Eriobotrya japonica*), common fig (*Ficus carica*), and arabica coffee (*Coffea arabica*). Furthermore from *Annona muricata*, *Myrianthus arboreus*, *Solanum auriculatum*, and *Strychnos* sp. Specimens were also collected on orange, pawpaw and quince but it is not certain whether they were actually reared from these plants. See De Meyer *et al.* (2002) for a full list of host plants.

Distribution

Kenya, Lesotho, Malawi, Mauritius, Mozambique, Réunion, South Africa, Tanzania, Zimbabwe (Fig. 44b). See under *C. fasciventris* for discussion on distribution.

Comments

C. rosa belongs to a species complex in which the females are especially difficult to separate. The variety described as *Pterandrus rosa* var. *fasciventris* is considered here as a separate species, as discussed by De Meyer (2001a). A review of the problems encountered while identifying females of these two, as well as other related species, is given in the general discussion.

Ceratitis (*Pterandrus*) *roubaudi* (Bezzi)

(Figs. 30, 92)

Pardalaspis roubaudi Bezzi, 1923: 527.
Pardalaspis roubaudi: Bezzi, 1924b: 103; Cogan and Munro, 1980: 530 (Afrotropical Catalog).
Ceratitis (*Ceratalaspis*) *roubaudi*: Hancock, 1984: 280 (new combination); De Meyer, 1998: 284 (redescription); Norrbom *et al.*, 1999: 119 (World Catalog).
Ceratitis (*Pterandrus*) *roubaudi*: Hancock and White, 1997: 196 (new combination, host); De Meyer, 2001b: 221 (stenophagy, distribution); De Meyer *et al*., 2002: 42 (host check list).

Diagnosis

Postpronotal lobe with a brown spot; scutal pattern with distinct spots; anepisternum on ventral half brown, setulae pale except in ventral half; basal and apical black spots of scutellum separate; male legs without feathering; wing bands well developed and brown, marginal band forming continuous band with anterior part of discal band.

Redescription

Male. Head. Antenna orange to brown (yellow according to the original description). First flagellomere twice as long as pedicel. Arista with short rays (medium long rays according to the original description); ventral rays shorter and sparser than dorsal rays, especially basally. Frons convex; dark yellow, with short scattered setulae distinctly darker than frons. Face white; gena darker yellow. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe white (yellow according to the original description), with brown spot. Scutal pattern similar to Fig. 2 except more pronounced prescutellar markings (see also

Fig. 3r in De Meyer, 1998: 265); ground color dark brown, microtrichose areas silvery with ashgray shine; prescutellar white markings separate, with pale gray area in between. Scapular setae dark. Scutellum as in Fig. 6; white, basally with two separate dark spots (not mentioned in original description), apically with three separate black spots, reaching to basal 0.3 of scutellum. Anepisternum yellow, ventral half brown; one anepisternal seta; anepisternal setulae pale, except in ventral half.

Legs. Yellowish brownish (yellow according to original description); setation typical for subgenus, mainly black; no feathering.

Wing. Pattern usually as in Fig. 11; bands brown. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M just proximal of middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly pale orange. Tergites 2 and 4 with gray transverse band along posterior half, brownish anteriorly. Tergite 3 largely brown. Setation typical for subgenus. Male terminalia not dissected.

Female. As male except for the following characters: One or two anepisternal setae present. Crossvein R-M opposite middle of discal cell. Oviscape shorter than preabdomen. Aculeus (Figs. 30, 92) about six times longer than wide; tip pointed and lateral margin slightly concave.

Body length. 5.13 (4.40-6.15) mm; wing length: 5.04 (4.60-5.40) mm.

Material examined

Holotype♂ (not examined), CONGO (BRAZZAVILLE): envir. Brazzaville, 1907, E. Roubaud and D. Weiss (probably Muséum National d'Histoire Naturelle, Paris).

Other material examined: TANZANIA: Minziro, 8.ii.1955, 1341, ex fruits *Podocarpus*, J.C.M. Gardner (2♂; BMNH); E.A. Forest Insect Survey [no exact locality given], 1955, 1157, ex *Podocarpus* fruit, J.C.M Gardner (2♀; BMNH).

Host plants

Podocarpus sp. (Podocarpaceae) in Tanzania.

Distribution

Congo (Brazzaville), Tanzania (see Comments).

Comments

This species was included by De Meyer (1998) in his revision of the subgenus *Ceratalaspis*. However while that article was in press, Hancock and White (1997) transferred it to the subgenus *Pterandrus*. The type material of *C. roubaudi* from Congo Brazzaville, could not be studied. The material studied by De Meyer (1998), identified as this species, originated in Tanzania and was bred from *Podocarpus* fruits. No additional material has been studied. Because of the host plant association as well as certain morphological similarities, this species seems to be related to the *gravinotata* species group. It can be differentiated from other members of that species group by the following combination of characters: legs not feathered, and forefemur not swollen in the male, wing with marginal band continuous and medial band absent, apical scutellar spots separate, and aculeus tip more robust. However, a study of the type material is required before a definite species recognition can be confirmed, especially since the

type locality is very far from any of the other localities recorded for this or related species.

Ceratitis (*Pterandrus*) *rubivora* Coquillett
(Figs. 14, 42, 88, 202-205, 248)

Ceratitis rubivora Coquillett, 1901: 29.
Pterandrus volucris Bezzi, 1918: 232. Synonymy by Munro, 1957 (indicated as variety of *rubivora*).
Ceratitis rubivora: Bezzi, 1909: 277, 279 (key); Silvestri, 1913: 66 (redescription, pest status).
Pterandrus rubivorus: Bezzi, 1918: 232 (new combination); Bezzi, 1924a: 477 (South Africa); Munro, 1925: 49 (hosts); Munro, 1929b: 11 (host); Munro, 1957: 870 (references); Cogan and Munro, 1980: 531 (Afrotropical Catalog).
Pterandrus rubivorus var. *volucris*: Munro, 1957: 871 (Uganda).
Pterandrus volucris: Bezzi, 1924b: 100 (Malawi, female).
Ceratitis (*Pterandrus*) *rubivora*: Munro, 1935b: 29 (host); Hancock, 1984: 279 (new combination); Hancock, 1987: 52 (Zimbabwe), 56 (lures); Freidberg, 1991: 169 (key); White and Elson-Harris, 1992: 311 (pest status); Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer *et al*., 2002: 42 (host check list).

Diagnosis

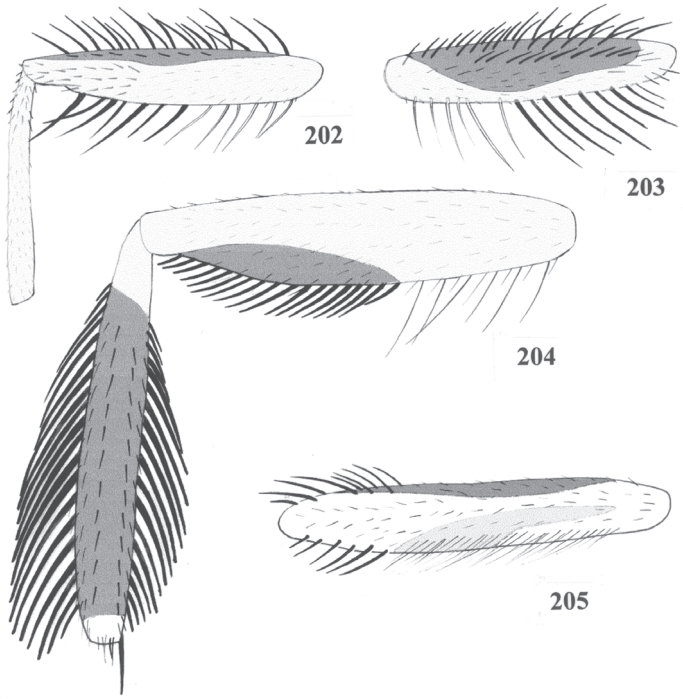
Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral half yellowish orange to brown, setulae pale; basal and apical black spots of scutellum separate, basal spots sometimes ill defined; male midfemur ventrally with dark feathering along distal half, basally with more dispersed setulae; male midtibia with dark feathering dorsally along distal 0.8-0.9 and ventrally along distal 0.8; wing bands well developed and yellowish brown, interruption between marginal and discal bands near vein R_1 clear and complete; medial band free (sometimes missing).

Redescription

Male. Head. Antenna yellow. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons pale, in center more yellow; with short scattered setulae of same color as frons. Frontal setae well developed, occasionally anterior one slightly underdeveloped. Face white. Genal seta and setulae dark or dark reddish, latter moderately to poorly developed.

Thorax. Postpronotal lobe yellowish white, without spot, at most with darker yellow coloration near postpronotal seta. Scutal pattern similar to Fig. 7 and 8: ground color, grayish-brown, usually with orange tinge, sometimes without; with streaks and darker markings but without distinct spots or clearly defined stripes, except prescutellar white separate markings, with paler gray area in between. Scapular setae dark reddish or black. Scutellum yellowish white, basally with ill defined separate dark spots (occasionally well developed), apically with three separate black spots, extending anteriorly to basal 0.33, sometimes only to half-way. Anepisternum on ventral half yellowish orange to brown; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 202-203): femur anteriorly with dorsal margin brownish over entire length; posterodorsally brown, with dispersed long dark setulae along entire length, but not forming distinct bush; ventral setae pale, distally dark, rarely dark over entire length. Midleg (Fig. 204):



Figs. 202-205. *Ceratitis rubivora*, male legs. 202. Forefemur and foretibia, anterior view. 203. Forefemur, posterior view. 204. Midfemur and midtibia, anterior view. 205. Hindfemur, anterior view.

femur brown on distal half to 0.66 (usually only ventral part brown anteriorly) except at apical margin where white, with weak silvery shine; ventrally with dark feathering along distal half, basally with more dispersed pale or dark setulae; tibia broadened, largely brownish black except at extremities, with conspicuous silvery shine when viewed from certain angle, with black feathering dorsally along distal 0.8-0.9 and ventrally along distal 0.8. Hindleg (Fig. 205): femur partly brownish colored; at apical 0.25 with longer setulae dorsally and ventrally. Darker coloration of legs in some specimens more pronounced and more extensively blackish.

Wing. Pattern as in Fig. 14; bands yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; discal band often partly, occasionally fully interrupted in discal cell; cubital band free; medial band free (not always well defined, sometimes missing); crossvein R-M at or just proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergite 1 with black patches across posterior margin. Tergites 2 and 4 with pale gray band on posterior half; tergite 4 with anterior margin brown. Tergite 3 with brown transverse band along posterior half to 0.66; tergite 5 with brown band along anterior 0.33 and narrowly brownish black across posterior margin. Brown bands on tergites 3, 4 and 5 often interrupted in middle. Male epandrium (Fig. 248) in lateral view with posterior lobe of lateral surstylus short and slightly curved, anterior lobe pronounced.

Female. As male except for the following characters: First flagellomere more yellowish orange. Gena sometimes darker yellow. Genal setula and seta black and well developed. Scapular seta black. Anepisternal pilosity rarely with few dark setulae. Legs without feathering; femora yellow, often with dark patches; forefemur posteroventrally with pale pilosity. Discal band complete. Oviscape shorter than preabdomen. Aculeus (Figs. 42, 88) at most five times longer than wide; tip pointed and lateral margin straight.

Body length. 4.56 (3.95-5.00) mm; wing length: 4.98 (4.45-5.45) mm.

Material examined

Holotype of *rubivora*, ♂, SOUTH AFRICA: "C.G.H." [=Cape of Good Hope?], Wynberg, 2.iii.1901, C.P. Lounsbury (USNM, Nr 5790).

Holotype of *volucris*, ♂, KENYA: Embu, 18.xii.1913, J. Orde-Browne (BMNH).

Presumed paratypes of *rubivora* (cf. comments below): SOUTH AFRICA: same locality and date as holotype (1♀; USNM; 1♂, 1♀; KMMA; 2♂; NMSA); same locality and date as holotype, C.W. Mally (1♂, 1♀; BMNH). Specimen erroneously labeled as paratype: SOUTH AFRICA, Caffra, coll. Winthem (1♀; BMNH).

Other material examined: KENYA: Gatamayu forest, 15 km E Uplands, 12.iii.1993, B. Merz (1♀; MHNG); 26.iii.1999 (2♂, 2♀; ICIPE); 30.iv.1999 (1♂, 3♀; ICIPE), both 'Rubus sp.', R. Copeland; Kakamega, 16.v.1936, 'Rubus sp.', Krauss (1♂, 4♀; USNM); Meru, 3.v.1936, 'Himalayan blackberry', M. Krauss (15♂, 12♀; USNM); Nairobi, August 1937, 'ex Rubus', V. van Someren (2♂, 2♀; NMK); May-June 1936, 'Himalayan blackberry', Krauss (3♂, 5♀; BPBM; 14♂, 20♀; USNM); Sabatia, SE Kakamega, 12.iii.1993, B. Merz (1♂; MHNG); Taita hills, 4.v.1991, 1200-1700m, A. Freidberg and F. Kaplan (2♂; TAUI); Uplands, September 1937, 'ex Rubus', van Someren (2♀; NMK; 1♂, 1♀; USNM); Webuye, 15 km E, 14.iii.1993, B. Merz (1♂; MHNG). MALAWI: Limbe, 24.xii.1916, R.C. Wood (1♂, 1♀; BMNH). MOZAMBIQUE: Vanduzi, 28.iii.1966, D. Cookson (1♀; PPRI). SOUTH AFRICA: Cape Town, '7075', 'on blackberry', C. Lounsbury (3♂, 4♀; USNM); Cedara N.P., January 1933, 'Rubus spp. fruits' (2♀; NMSA; 1♀; BMNH; 4♀; PPRI); 2.i.1934 (1♂; KMMA); Constantia, Cape Colony, 19.vii.1898, 'on wing on orange', C. Lounsbury (2♂, 1♀; USNM); Durban, August 1930 (2♂; NMSA); February 1932 (1♂; BMNH); 15-23.vi.1933 (1♀; PPRI); 4-21.viii.1933 (1♂; KMMA), all W. Marriott, bait trap; Magoebaskloof T.P., November 1956, A. Barnard (3♀; PPRI); Stellenbosch, 1913 (1♂; BPBM); 14.iv.1916, A.C. Buller (1♂; KMMA); Weenen, January-March 1927, H.P. Thomasset (1♂; BMNH). TANZANIA: Engaro Sero, nr Arusha, 26.iii.1936, 'blackberry', F. Bianchi (3♂; 7♀; BPBM; 16♂, 15♀; USNM). UGANDA: Kawanda, nr Kampala, 4.xii.1939, (1♂; PPRI); 7.xii.1939, (1♂; PPRI), both H. Hargreaves; Kanyawara, Kibale Forest, June 1994, trimedlure trap, C.A. Chapman (1♂; FSCA). ZIMBABWE: N. Vumba, 4.iv.1964 (1♂; PPRI); 5.iv.1964 (1♂; PPRI); 6.iv.1964 (1♂; PPRI); 8.iv.1964 (1♂; PPRI); 13.iv.1964 (1♂; PPRI); 22.viii.1964 (1♂; PPRI); 9.ix.1964 (1♂; PPRI); 10.ix.1964 (1♂; PPRI), all D. Cookson.

Host plants

Reared from several *Rubus* spp. (Rosaceae): *R. fruticosa* (blackberry) from South Africa and Tanzania; Himalayan blackberry from Kenya; *Rubus* sp. from Kenya and South Africa. Also recorded from youngberry (*R. flagellaris* x *R. loganobaccus*?), blackberry, loganberry (*R. loganobaccus*) and raspberry (*R. idaeus*) in Zimbabwe (White and Elson-Harris, 1992). See De Meyer *et al.* (2002) for a detailed list of host plant records.

Distribution

Kenya, Malawi, Mozambique, South Africa, Tanzania, Uganda, and Zimbabwe. According to White and Elson-Harris (1992), the species is also found in Cameroon, but this needs to be confirmed given the present known distribution.

Comments

The holotype male is deposited at the USNM collection and bears the following labels: a rectangular label [printed]: 'Wynberg / C.G.H. / [handwritten, black] 2" Mch. '01 / [in left hand margin, handwritten, red] 1173'. A rectangular label [printed]: 'C P Lounsbury / Collector'. A square red label [printed]: 'Type / N° [handwritten, black] 5790 / U.S.N.M.'. A rectangular label [handwritten, black]: ' Ceratitis / rubivora / Coq.'. Coquillett (1901) mentioned in the original description that the type series consisted of fifteen males and ten females, and that paratypes were returned to Lounsbury. A female specimen in the USNM collection bears identical locality and collector's labels as the holotype. In addition, the collection of the KMMA harbours one male and one female specimen (donation of Munro) with a locality label identical to the first one on the holotype, including handwriting and number, but no collector's name indicated. The same applies to two male specimens in the NMSA collection (but no red handwritten '1173'). These specimens could well belong to the original type series. In the BMNH collection there is one male and one female specimen with a rectangular, green framed label [handwritten, black]: C.W. Mally / Wynberg / [printed] Cape Prov. / 2nd Mch. 1901'. This information corresponds to that of the holotype except for the collector's name. There is also an additional label [printed] indicating '[handwritten] Ac. C. 1173 / [printed] Ag Dp S Afr' thereby referring to the same reference number as the holotype and other presumed paratypes. These specimens therefore could also belong to the type series. All these specimens have therefore been labeled with 'paratype' labels. On the other hand, there is one female specimen in the BMNH collection, labeled as paratype, which apparently is not part of the original type series. It bears a label [handwritten, black]: 'Caffra / [printed] Coll. Winthem'. This specimen was apparently purchased by BMNH or IIE from E.M. Hering, who in turn got it from the Museum of Vienna, as indicated on a separate label ('i. Tausch v. Mus. Wien. als grata Wied.'. The species *grata* Wiedemann belongs to the genus *Leucotaeniella* Bezzi). There is no indication that this specimen forms part of the original type series.

Ceratitis rubivora shows considerable intraspecific variation in the coloration of the legs, scutellum and scutum. A new species, *Pterandrus volucris*, was described by Bezzi (1918), based on the largely dark femora, but later was considered a mere variation (Munro, 1957). The holotype of *C. volucris* has only one midleg left, in which the darker coloration is more blackish than in the type of *C. rubivora*. Otherwise the specimen matches well the type of *C. rubivora* and falls within the variation observed in the material examined. A series of female specimens associated with both forms was compared for aculeus shape. All seem to fall within the same range of variation, with the darker type showing at most a tendency to have a somewhat longer aculeus. The synonymy is therefore confirmed.

This species belongs to the *anonae* group based on the feathering of the midleg and the mesonotal pattern, but it lacks the typical notch in the aculeus tip. The diagnostic characters usually cited are the presence of the medial band and the specificity to *Rubus* spp. as hosts. However, in the material examined, some specimens of series reared from *Rubus* spp. have the medial band only poorly developed or missing, whereas other specimens of the same series have this band well developed. The aculeus shape is identical in all these specimens, and they are all considered conspecific

***Ceratitis* (*Pterandrus*) *stipula* De Meyer and Freidberg, n. sp.**
(Figs. 47, 72, 73, 206-209, 242)

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum along ventral margin yellowish brown, setulae pale; apical black spots of scutellum separate; male midfemur ventrally with dark feathering along distal half; midtibia with dark feathering dorsally along distal 0.9 and ventrally along distal 0.6; wing bands well developed and brown, interruption between marginal and discal bands near vein R_1 clear and complete.

Description

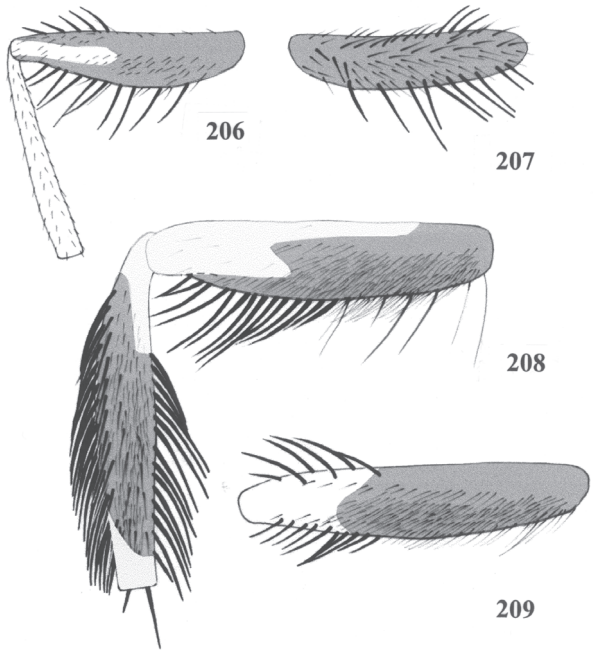
Male. Head. Antenna yellow to orange. First flagellomere 2-3 times as long as pedicel. Arista with short rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons yellow, sometimes with dark orange patches; with short scattered setulae of same color as frons. Frontal setae well developed, sometimes slightly underdeveloped. Face yellowish white, gena sometimes darker yellow. Genal seta and setulae black, well developed.

Thorax. Postpronotal lobe yellowish white; without spot. Scutal pattern similar to Fig. 8 except darker, ash-gray ground color; with streaks and darker markings but without distinct spots or clearly defined stripes except prescutellar white separate markings, with pale area in between. Scapular setae dark. Scutellum yellowish white, basally without spots (sometimes darker coloration posterior of prescutellar markings but not distinct spots), apically with three separate dark spots, extending anteriorly to basal half. Anepisternum along ventral margin yellowish brown; setulae pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mainly dark. Foreleg (Figs. 206-207): femur brown; posteriorly with poorly developed bush of dispersed long dark setulae along entire length, posterodorsal setulae longer, especially in apical 0.33, posteroventral setulae sometimes pale brown; ventral setae dark. Midleg (Fig. 208): femur largely brown except distally pale, dorsally pale part extending further basally; ventrally with dark feathering along distal half; anteroventrally with short but conspicuous dark setulae except in pale part; tibia broadened; largely yellowish brown with extremities pale, with weak silvery shine when viewed from certain angle; with black feathering dorsally along distal 0.9 and ventrally along distal 0.6, anteriorly with short to moderately long setulae, second row with shorter feathering present anterior to dorsal feathering. Hindleg (Fig. 209): femur dark brown except distally; at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 10; bands brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band absent; crossvein R-M at or just proximal to middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu variable.

Abdomen. Mostly yellow. Fusion area between tergites 1 and 2 with orange-brown patches. Tergites 2 and 4 with pale gray band occupying almost entire tergite, at most narrowly yellow anteriorly. Tergite 3 with distinct brownish black transverse band along posterior half. Tergite 5 anteriorly with two brown spots, posterior margin narrowly brownish. Male epandrium (Fig. 242) in lateral view with posterior lobe of lateral surstylus short and straight, anterior lobe pronounced.



Figs. 206-209. *Ceratitis stipula* n. sp., male legs. 206. Forefemur and foretibia, anterior view. 207. Forefemur, posterior view. 208. Midfemur and midtibia, anterior view. 209. Hindfemur, anterior view.

Female. As male except for the following characters. Legs without feathering; femora dark yellow, sometimes with brownish streaks, forefemur sometimes largely brownish, posteroventrally with dark setulae. Oviscape shorter than preabdomen. Aculeus (Figs. 47, 72, 73) about seven times longer than wide; tip with distinct apical indentation, narrow and lateral margin strongly sinuous.

Body length. 4.60 (4.05-5.00) mm; wing length: 4.98 (4.20-5.30) mm.

Material examined

Holotype ♂, CAMEROON: Yaoundé, Etoug-Ebe, June 1982, 'reared ex fallen fruits of Myrianthus arboreus', G. Steck (FSCA).

Paratypes: same date and locality as holotype (Allotype ♀; FSCA; 1♂, 1♀; BMNH; 2♂, 2♀; KMMA; 1♂, 1♀; TAUI; 1♂, 1♀; USNM; 2♂, 4♀; TAMU); 7.vii.1982 (6♂, 6♀; TAMU).

Other material (not included in type series). CAMEROON: Akonolinga, 17.vii.1982 (1♂, 1♀; TAMU); 26.v.1982 (5♂, 2♀; TAMU), all 'reared ex fallen fruits of Myrianthus arboreus', G. Steck; Yaoundé, June 1936; 'bred from Myrianthus arboreus', Van Zwaluwenburg and McGough (3♂, 2♀; USNM); 10-20.vii.1936, 'ex Myrianthus', J.M. McGough (2♂, 2♀; FSCA). CONGO (D.R.): Lukolela, left bank Congo R., J.P. Chapin, 21.xii.1930 (1♂; AMNH); 13.i.1931 (2♂; AMNH; 1♂; PPRI; 1♂; BMNH); Tshibala, 14.xi.1934, Overlaet (3♂; PPRI); Yangambi, 18.ii.1951, 'McG148' [=ex *Myrianthus arboreus* according to Munro's archives], McGough (6♂, 7♀; USNM). GUINEA: Macenta, October-November 1953, R. Pijol (1♂; MNHN). KENYA: Kirimiri Forest, 8.xi.2001, '1507', ex fruits *Myrianthus holstii*, R. Copeland (4♂, 3♀; ICIPE). TANZANIA: Amani, 27.ii.1936 (13♂, 8♀; USNM); March 1936 (4♂, 3♀;

USNM), all 'Myrianthus arboreus', F. Bianchi. UGANDA, Budonga, May 1936, 'Myrianthus arboreus', F. Bianchi (3♂, 2♀; USNM).

Etymology

After the Latin noun stipula (meaning stubble) and referring to the distinct pilosity on the midleg.

Host plants

The type material from Cameroon and material from Congo, Tanzania and Uganda was reared from *Myrianthus arboreus* (Cecropiaceae). This species also shares host plants with other *Pterandrus* species. Among the material studied, there were long series from *M. arboreus* from Yangambi (Congo D.R.) and Yaoundé (Cameroon) that harbor a mixture of *C. stipula* and *C. anonae*; from Amani (Tanzania) that harbor both *C. stipula* and *C. anonae*; and from Budonga (Uganda) that harbor *C. stipula*, *C. fasciventris* and *C. anonae*. Recently the species was also reared from the related *Myrianthus holstii* in Kenya.

Distribution

Cameroon, Congo (D.R.), Guinea, Kenya, Tanzania, and Uganda.

Comments

C. stipula, n. sp. is closely related to *C. anonae* and *C. barbata*, and belongs to the *anonae* subgroup. Males can be distinguished by the pilosity of their midleg, which is denser than in *C. anonae*, and similar to *C. barbata*, although lacking the tuft of setulae near the base. Females are more difficult to tell apart, but *C. stipula* is characterized by a constriction of the tip of the aculeus. Some variation was observed in the coloration of the legs, pilosity of the male midfemur, and in the extent of constriction of the aculeus tip. In De Meyer *et al.* (2002: 45) it is listed under the undescribed species 'ST'.

***Ceratitis* (*Pterandrus*) *tananarivana* Hancock**

(Figs. 5, 45, 89, 210-213, 227)

Ceratitis (*Pterandrus*) *tananarivana* Hancock, 1984: 287.
Ceratitis (*Pterandrus*) *tananarivana*: Freidberg, 1991: 169 (key); Norrbom *et al.*, 1999: 120 (World Catalog).

Diagnosis

Postpronotal lobe with a small brownish spot, sometimes only weakly developed; scutal pattern with distinct spots; anepisternum on ventral half darker yellow, setulae silvery; apical black spots of scutellum separate; male foretibia flattened dorsoventrally and expanded laterally, male midtibia flattened dorsoventrally, distal 0.17 club shaped with black feathering dorsally and ventrally; wing bands well developed and yellowish brown, interruption between marginal and discal bands near vein R_1 clear and complete, medial band joined with marginal band.

Redescription

Male. **Head**. Antenna yellowish orange, third segment sometimes partly brown. First flagellomere three times as long as pedicel. Arista with short rays; ventral rays slightly shorter and sparser than dorsal rays, especially basally. Frons flat with median longitudinal groove, with protuberance at occellar triangle; yellow, slightly golden shine in front of ocellar triangle,

continued down longitudinal groove when viewed from certain angle; with short scattered setulae largely of same color as frons. Frontal setae less developed. Face yellowish white to yellow. Genal seta and setulae dark, well developed.

Thorax. Postpronotal lobe white, with small brownish spot, sometimes weakly developed. Scutal pattern as in Fig. 5: ground color brown, lateral margin darker; microtrichia pattern silvery, specimen from USNM with distinct orange tinge; mixed pale and dark pilosity; prescutellar white or yellow-white markings separate but with pale area in between. Scapular setae dark. Scutellum yellowish white, basally without spots, apically with three separate black spots, extending anteriorly to basal 0.33. Anepisternum on ventral half darker yellow; with very dense silvery pilosity.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 210-211): femur posteriorly on dorsal half with very dense bush of white setulae, on ventral half with shorter and more dispersed dark setulae, ventral setae long and black; tibia flattened dorsoventrally and expanded laterally, white, with short (and few longer) white setulae. Midleg (Fig. 212): tibia flattened dorsoventrally, distal 0.17 thickened, club-like; pale, thickened part dark, silvery when viewed from certain angle; with black feathering dorsally and ventrally; tarsi flattened, white, silvery ventrally. Hindfemur (Fig. 213) at apical 0.25 with longer setulae dorsally and ventrally.

Wing. Pattern as in Fig. 15; bands yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band joined with marginal band; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique posterobasally.

Abdomen. Tergite 3 brown except two pale gray spots posteriorly; tergite 4 with brown band along anterior half, with median notch; tergite 5 with two yellowish brown spots along anterior 0.66, sometimes connected medially. Tergites 2 and 4 pale gray (not silvery) across posterior half. Male epandrium (Fig. 227) in lateral view moderately broadened; posterior lobe of lateral surstylus short and straight.

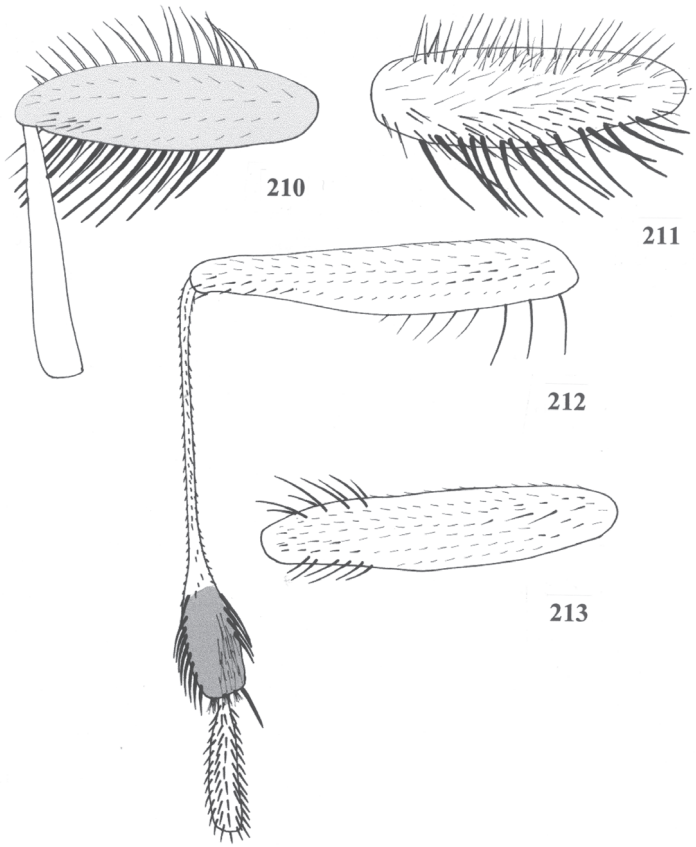
Female. As male except following characters: Frons with dorsal protuberance and golden shine less developed; frontal setae well developed. Anepisternal pilosity more dispersed. Legs normal shape and without feathering; femora in two specimens examined variable (yellow, or more orange colored); pilosity dark; forefemur with dark setulae. Oviscape shorter than preabdomen. Aculeus (Figs. 45, 89) at most six times longer than wide; tip pointed, and lateral margin slightly sinuous.

Body length. 4.71 (4.45-5.00) mm; wing length: 5.12 (5.00-5.40) mm.

Material examined

Holotype ♂, MADAGASCAR: Tananarive, February 1962, E.R.A.M. 242 (PPRI).

Other material examined: MADAGASCAR: Andrianpamaky West (2♂, 1♀; CIRAD); Antanetibe (1♂; CIRAD); Antanetibe, 'in Diospyros kaki orchard', 26.i.1999, 'in protein hydrolysate trap' (1♂; CIRAD); 1.ii.1999, 'in protein hydrolysate trap' (1♂; CIRAD); 1.ii.1999, 'in TML trap' (1♂; CIRAD), all Ravololonandrianina, J. and C. Raoelijaona; Mtge d'Ambre, 23.v.1958, F. Keiser (2♂; NMB); Prov. Fianarantsoa, 7km W Ranomafana, 1100m,



Figs. 210-213. *Ceratitis tananarivana*, male legs. 210. Forefemur and foretibia, anterior view. 211. Forefemur, posterior view. 212. Midfemur and midtibia, anterior view. 213. Hindfemur, anterior view.

16.x.1988, W. Steiner, C. Kremer and P. Daniels (1♂; USNM); 8-21.x.1988, W. Steiner (1♀; USNM).

Host plants

Unknown.

Distribution

Madagascar.

Comments

This species is unlike any other *Pterandrus* species, except for the newly described *C. copelandi*. They are both distinguished from the remaining species by the greatly modified legs that are more extremely shaped in *C. tananarivana.* Their exact position within the genus is not clear. The scutal pattern of this species shows distinct black patches reminiscent of some *Ceratitis* s.str. species. However, other characters exclude it from this subgenus (lack of

modified orbital setae, abdominal pattern, leg feathering). The aculeus tip is pointed and does not indicate affinity with any other species.

Ceratitis (*Pterandrus*) *tripteris* (Munro)

(Figs. 34, 78, 79, 214-217, 226)

Pterandrus tripteris Munro, 1957: 869.
Pterandrus tripteris: Cogan and Munro, 1980: 531 (Afrotropical Catalog).
Ceratitis (*Pterandrus*) *tripteris*: Hancock, 1984: 279 (new combination); Freidberg, 1991: 168 (key); Norrbom *et al.*, 1999: 121 (World Catalog); De Meyer *et al*., 2002: 44 (host check list).

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral half yellow, setulae pale except few dark setulae ventral to anepisternal seta; basal and apical black spots of scutellum separate; male midfemur with lump of dark feathering in median part for 0.17 of entire length; midtibia with dorsally a dispersed row of dark feathering along distal 0.66 to 0.8 and ventrally with more appressed row along entire length except basal and distal end; wing bands well developed and yellowish brown, marginal band forming continuous band with anterior part of discal band.

Redescription

Male. Head. Antenna yellow. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons convex; pale, center more yellow; with short scattered setulae largely of same color as frons. Frontal setae poorly developed. Face yellowish white; gena sometimes somewhat darker. Genal seta and setulae dark, well developed. Cephalic setae usually all black, occasionally few setae more reddish (perhaps discoloration?).

Thorax. Postpronotal lobe yellowish white, without spot, at most with darker yellow coloration near postpronotal seta. Scutal pattern similar to Fig. 8: ground color grayish-brown, dorsolaterally more yellow; with streaks and darker markings but without distinct spots or clearly defined stripes, except prescutellar white separate markings, with pale area in between. Scapular setae dark reddish or black. Scutellum as in Fig. 6, yellowish white, basally with two separate dark spots, apically with three separate black spots, extending anteriorly to basal 0.33. Anepisternum on ventral half yellow; pilosity pale except few dark setulae along ventral margin ventral to anepisternal seta.

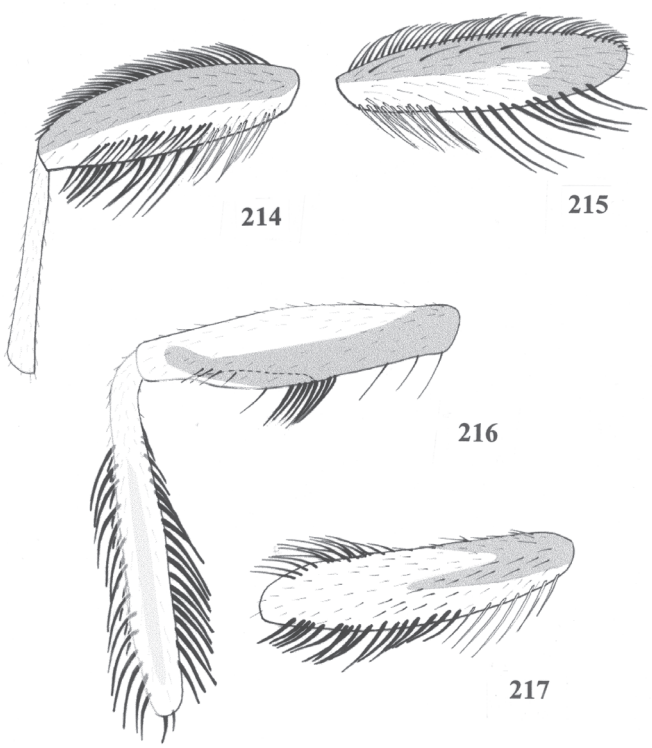
Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 214-215): coxa anteriorly brownish black; femur brown, pale along ventral 0.33; at demarcation with row of longer setulae, basally pale, distally dark; posteriorly with dorsal 0.33 brown, with bush of dispersed longer setulae along entire length, posterodorsal row longer and dark, others pale; ventral setae dark only on distal half; basally dispersed long setulae pale. Midleg (Fig. 216): femur anteriorly pale, ventral half brown except at apical margin where white, ventrally with silvery shine when viewed from certain angle; with lump of dark feathering in median part for 0.17 of entire length; tibia not broadened, pale with brownish longitudinal streak; with black feathering dorsally with dispersed row along distal 0.66 to 0.8 and ventrally with more appressed row (as in other *Pterandrus* species) along entire length

except basal and distal end; second row of much shorter appressed feathering present posterior of dorsal row for slightly more than distal half. Hindleg (Fig. 217): femur yellow with brownish streaks; with distinct black feathering on distal half dorsally and and ventrally.

Wing. Pattern as in Fig. 11; bands yellowish brown. Marginal band forming continuous band with anterior part of discal band; cubital band free; medial band absent; crossvein R-M just beyond middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergites 2 and 4 with pale gray band on posterior half. Tergite 3 with brown transverse band along posterior half to 0.66. Male epandrium (Fig. 226) in lateral view with posterior lobe of surstylus slightly curved and short, anterior lobe well pronounced.

Female. As male except for the following characters: Frontal setae well developed. Wing banding slightly darker; marginal band partly interrupted but never fully. Legs without feathering; mainly yellow; forefemur with ventral setae and posterodorsal setulae dark; posteroventral setulae pale, at distal end few dark setulae. Oviscape shorter than preabdomen. Aculeus (Figs. 34, 78, 79) at most six times longer than wide; tip with distinct apical indentation and lateral margin slightly sinuous.



Figs. 214-217. *Ceratitis tripteris*, male legs. 214. Forefemur and foretibia, anterior view. 215. Forefemur, posterior view. 216. Midfemur and midtibia, anterior view. 217. Hindfemur, anterior view.

Body length. 4.21 (3.95-4.45) mm; wing length: 4.55 (4.12-4.95) mm.

Material examined

Holotype ♂, SIERRA LEONE: [no locality given] W.G. Clements (BMNH, erroneously labeled allotype).

Paratypes: NIGERIA: Olokemeji, 1936 (♀ allotype, 4♀; USNM; 4♀; PPRI), all 'ex Adenia', Van Zwaluwenburg and McGough.

Other material examined: IVORY COAST: Tay, 24.i.1985, G. Couturier and V. Van Zeyst (1♂; TAUI). NIGERIA: Olokemeji, 1936, 'ex Adenia' (7♂, 7♀; USNM); May 1936, 'bred from unknown' (6♂, 6♀; USNM), all Van Zwaluwenburg and McGough; Olokemeji, Ibadan, [no date or collector given] (2♂, 1♀; USNM).

Host plants

Type material from Nigeria was bred from *Adenia* sp. (Passifloraceae).

Distribution

Ivory Coast, Nigeria and Sierra Leone.

Comments

Munro labeled both the male type (in the BMNH) and female type (in the USNM) as 'allotype'. Since the original publication indicates the male as the holotype, the allotype label on the BMNH specimen is erroneous. Based on the aculeus shape and mesonotal pattern, this species seems to be related to the *anonae* group. However, the feathering on the midleg is somewhat aberrant and different from other species in this group. The newly described species, *C. whitei*, shows a similar feathering pattern of the foreleg but differs in other aspects.

Ceratitis (*Pterandrus*) *whitei* De Meyer and Freidberg, n. sp.

(Figs. 36, 66, 67, 218-221, 250)

Diagnosis

Postpronotal lobe without a spot; scutal pattern without distinct spots or clearly defined stripes; anepisternum on ventral half yellow, setulae pale; basal and apical black spots of scutellum separate; male midtibia with dark feathering dorsally along distal half and ventrally slightly less so; wing bands well developed and yellowish brown, marginal band forming continuous band with anterior part of discal band or at most incompletely so.

Description

Male. Head. Antenna yellow. First flagellomere three times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons convex; pale, center more yellow; with short scattered setulae largely of same color as frons. Face yellowish white. Genal seta and setulae dark reddish or black, partly developed.

Thorax. Postpronotal lobe yellowish white, without spot, at most darker yellowish brown coloration near postpronotal seta. Scutal pattern similar to Fig. 8: ground color orange-brown, with streaks and darker markings but without distinct spots or clearly defined stripes, except prescutellar white markings, which are separate but with pale area in between; microtrichia silvery or more golden colored. Scapular setae black. Scutellum yellowish white, basally with

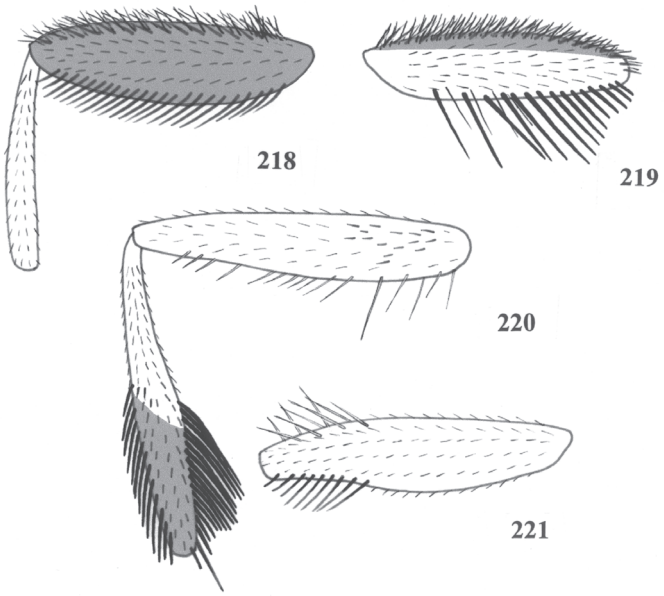
two separate dark spots (not clear in all specimens but this might be because of discoloration), apically with three separate black spots, extending anteriorly to basal 0.33. Anepisternum pale with ventral half yellow (in some specimen completely yellow, perhaps also discoloration); pilosity pale.

Legs. Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg (Figs. 218-219): coxa brown; femur anteriorly brownish black; with short black setulae, along ventral part with row of longer black setulae; posteriorly with dorsal margin darker brown, with bush of longer setulae along entire length, posterodorsal row longer and dark, others pale; ventral setae dark. Midleg (Fig. 220): femur anteriorly with short pale setulae, basally with few dark setulae, no feathering; tibia dilated on ventral 0.66; with black feathering dorsally along distal half and ventrally slightly less so; feathered part dark colored. Hindleg (Fig. 221): femur at apical 0.25 with longer pale setulae dorsally and dark setulae ventrally.

Wing. Pattern as in Fig. 11; bands yellowish brown. Marginal band forming continuous band with anterior part of discal band or at most incomplete one; cubital band free; medial band absent; crossvein R-M at or just beyond middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen. Mostly yellow. Tergites 2 and 4 with pale gray band on posterior half. Tergite 3 with weak brown transverse band along posterior 0.33. Male epandrium (Fig. 250) in lateral view with posterior lobe of lateral surstylus straight and short, apical end shortly curved.

Female. As male except for the following characters: Genal seta and setulae all black, well developed; setulae on frons darker than frons. Legs without feathering; mainly yellow; forefemur with ventral setae and posterodorsal setulae dark; posteroventral setulae pale.



Figs. 218-221. *Ceratitis whitei* n. sp., male legs. 218. Forefemur and foretibia, anterior view. 219. Forefemur, posterior view. 220. Midfemur and midtibia, anterior view. 221. Hindfemur, anterior view.

Oviscape shorter than preabdomen. Aculeus (Figs. 36, 66, 67) about 6-7 times longer than wide; tip with shoulder and lateral margin slightly sinuous.

Body length. 4.45 (3.95-5.00) mm; wing length: 4.85 (4.20-5.30) mm.

Material examined

Holotype ♂, CONGO (D.R.): Yangambi, 3.iv.1951, 'McG157' [=ex *Pleiocarpa tubicinia* according to Munro's archives], J. McGough [D.W. Clancy and J. McGough according to Munro's archives] (PPRI).

Paratypes: same locality and data as holotype (♀ allotype, 1♂, 2♀; PPRI; 1♂, 1♀; BMNH; 1♂, 1♀; KMMA; 1♂, 1♀; TAUI).

Etymology

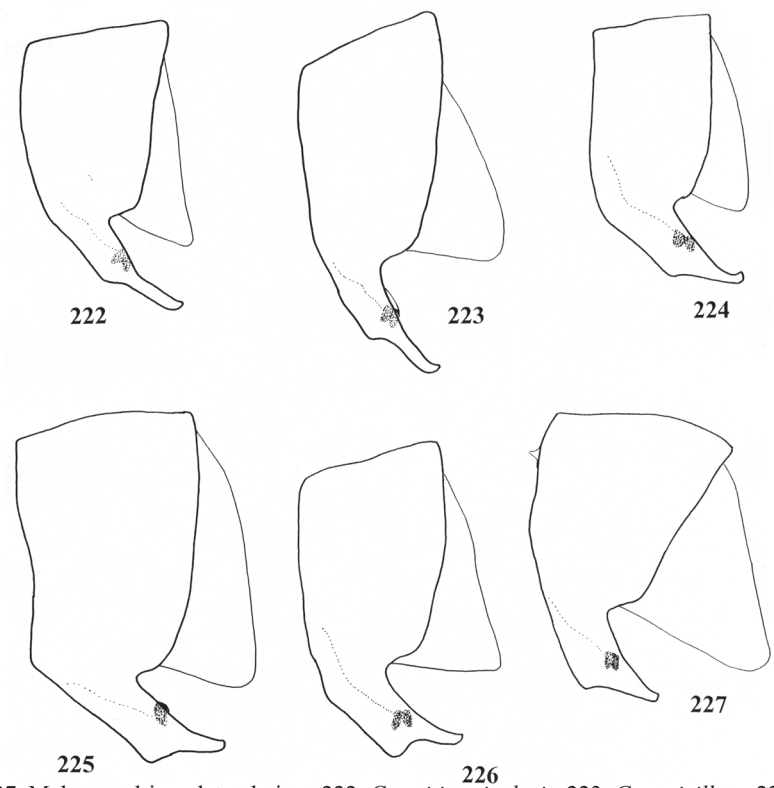
Named in honor of Dr. Ian White (BMNH), a leading specialist on Tephritidae taxonomy, in particular dacines.

Host plants

Type material was bred from *Pleiocarpa tubicinia* (Apocynaceae).

Distribution

Congo (D.R.).



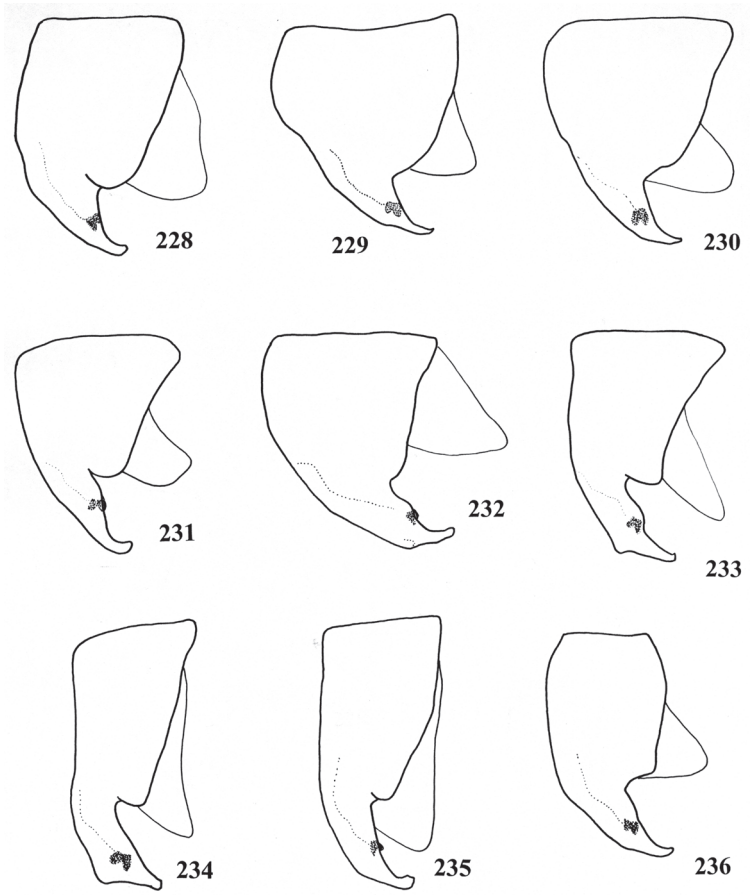
Figs. 222-227. Male epandrium, lateral view. 222. *Ceratitis acicularis*. 223. *C. penicillata*. 224. *C. colae*. 225. *C. paracolae* n. sp. 226. *C. tripteris*. 227. *C. tananarivana*.

Comments

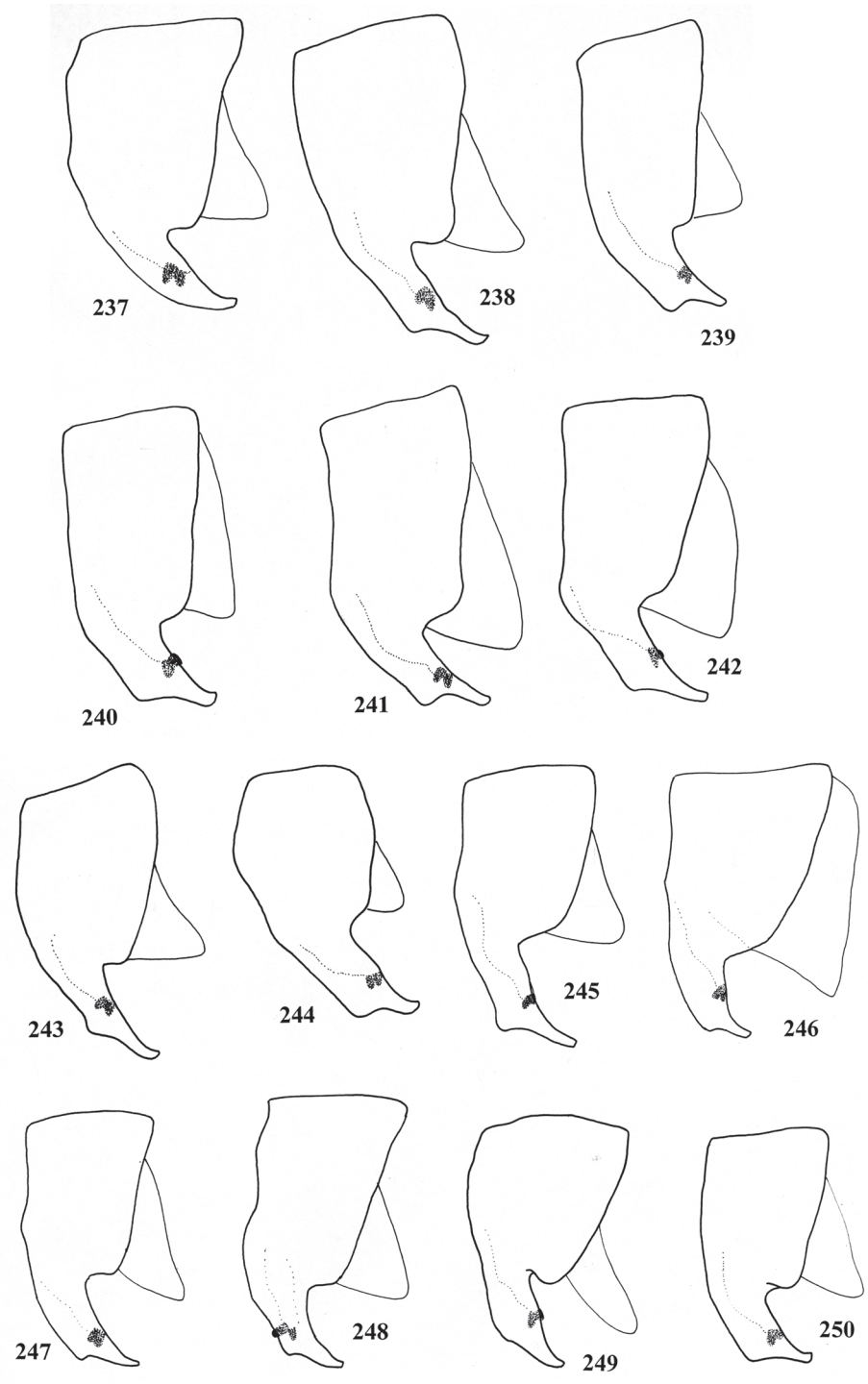
The ornamentation of the forefemur of this species resembles that of *C. tripteris,* with constrasting colors and the well developed ventral row of setulae anteriorly. However, the two species differ in some other aspects. The aculeus shape is unlike any other *Pterandrus* (except for *C. paracolae*) in that the tip has a small step (Fig. 67) reminiscent of Madagascan *Ceratitis* s.str. species. In De Meyer *et al.* (2002: 45) this speciesis listed under the undescribed species 'WH'.

DISCUSSION

We discuss here the relationships among the species within the subgenus *Pterandrus*, as well as the difficulties in differentiating the females of some closely related species. Based on the



Figs. 228-236. Male epandrium, lateral view. 228. *Ceratitis bicincta*. 229. *C. curvata*. 230. *C. lobata*. 231. *C. querita*. 232. *C. pennitibialis* n. sp. 233. *C. nigricornis* n. sp. 234. *C. podocarpi*. 235. *C. gravinotata*. 236. *C. pinnatifemur.*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present study it is not clear whether *Pterandrus* forms a monophyletic group. The only character known to be shared by all the species is the presence of a black band on abdominal tergite 3. This character is not so easy to use phylogenetically because of variation in abdominal coloration in some of the species (e.g., almost no dark pattern in *C. flava*, or abdomen extensively black in the *faceta* group). In the preliminary phylogenetic analysis of the genus *Ceratitis* as a whole (De Meyer, 1999b), the two main groups of *Pterandrus* were on different, unrelated branches. However, a more detailed study is needed to test the monophyly of these subgroups and *Pterandrus* itself. Therefore, and as in the case with earlier revisions of the subgenera of *Ceratitis*, we have decided not to propose subgeneric changes until a more rigorous phylogenetic study is undertaken.

Hancock and White (1997) first proposed a species group within the subgenus *Pterandrus* based on the markings of the scutum and scutellum and the wing pattern. They defined this group ("blackish scutum with extensive gray microtrichia and two yellow or white prescutellar spots, a large black postpronotal spot, no medial wing band, scutellum with the black area extensive, often broadly trilobed or even entirely black") and explicitly included a number of species in it. A second species group (the 'typical *Pterandrus*'), including all other *Pterandrus* species, except one, was only implied and not explicitly proposed. The second group, which includes *C. rosa*, is characterized by "the postpronotal lobe yellow, and the scutellum more broadly yellow basally". Only *C. tananarivana* was not placed because it was considered to hold an intermediate position between the two groups (Hancock, personal communication). De Meyer (1999b) presented a preliminary phylogeny of the genus, which indeed confirmed the differentiation of two groups within *Pterandrus*: the *gravinotata* group (corresponding to the distinct species group proposed by Hancock and White (1997)); and the *anonae* group (corresponding to 'typical *Pterandrus*'). The present study also recognizes these two well-defined subgroups within the subgenus with a number of subdivisions based on morphological characters and host plant relationships. The two groups and their subgroups are discussed below.

The *gravinotata* group is characterized by the scutal pattern with distinct shiny black spots within a well defined pattern, remainder silvery gray, or scutum sometimes completely shiny black; postpronotal lobe spotted; scutellum with black spots well developed, and often merged or touching. It is further divided into three subgroups:

The *lobata* subgroup is characterized by the silvery comb of setulae on the male forefemur (well developed in *C. curvata* and *C. lobata*, less so in *C. pennitibialis*, cf. Figs. 126, 162, 186); aculeus tip with lateral margin straight in *C. curvata* and *C. lobata* (Figs. 49, 50) (in *C. pennitibialis*, the lateral margins are sinuous like in other *Pterandrus* species); black scutellar spots largely merged; host plants *Strychnos* spp. (Loganiaceae) or, in *C. pennitibialis*, *Diospyros* (Ebenaceae). The subgroup comprises *C. lobata*, *C. pennitibialis*, *C. curvata* and possibly a fourth undescribed species. *Ceratitis pedestris* is apparently related to this subgroup based on a similar scutal and scutellar pattern, and the same host plant genus (*Strychnos*), but it lacks some of the other characteristics, such as forefemur pilosity and aculeus shape. All of

Figs. 237-250. Male epandrium, lateral view. 237. *Ceratitis anonae.* 238. *C. barbata* n. sp. 239. *C. fasciventris*. 240. *C. obtusicuspis* n. sp. 241. *C. rosa*. 242. *C. stipula* n. sp. 243. *Ceratitis flava* n. sp. 244. *C. flexuosa*. 245. *C. fulicoides*. 246. *C. pedestris*. 247. *C. argenteostriata* n. sp. 248. *C. rubivora*. 249. *C. copelandi* n. sp. 250. *C. whitei* n. sp.

these species are restricted to eastern and southern Africa (*C. pedestris* occurs also in Madagascar and western Africa).

The *faceta* subgroup is characterized by the shiny black scutum, scutellum and abdomen. The aculeus is elongated, except in *C. faceta* (see Figs. 51, 52, and 24). The subgroup comprises *C. faceta*, *C. inauratipes*, *C. bicincta* and *C. querita*, although *C. querita* may not belong here. Its scutum, with grayish stripes, and only partly black scutellum are intermediate between the *lobata* and the *faceta* subgroups. Based on the original description of *C. chirinda* it is plausible that this species also belongs here. The subgroup is found in most of the Afrotropical Region, but most species are known from a single or few localities only.

The *faceta* and *lobata* subgroups might be related because of a number of characters found in common in some but not all species: *Strychnos* (in *C. curvata*, *C. lobata*, *C. pedestris* and *C. querita*) or *Diospyros* (in *pennitibialis* and *bicincta*) as hostplants; midfemur with shiny oblique patch (in *C. lobata*, *C. faceta*, *C. pennitibialis* and *C. inauratipes*; in *C. curvata*, a similar but weak spot is present although it is largely obscured by the pilosity); epandrium strongly broadened dorsally in lateral view (in *C. curvata, C. lobata* and *C. querita*, cf. Figs. 229-231); aculeus tip gradually tapered (in *C. curvata*, *C. lobata*, *C. bicincta* and *C. querita*), although some species (*C. faceta*, *C. pedestris*) have an aculeus shape similar to that of the *gravinotata* subgroup. *Ceratitis pinnatifemur* may be related to these subgroups as it shares the character state of the aculeus shape (Fig. 53) but not the other characters.

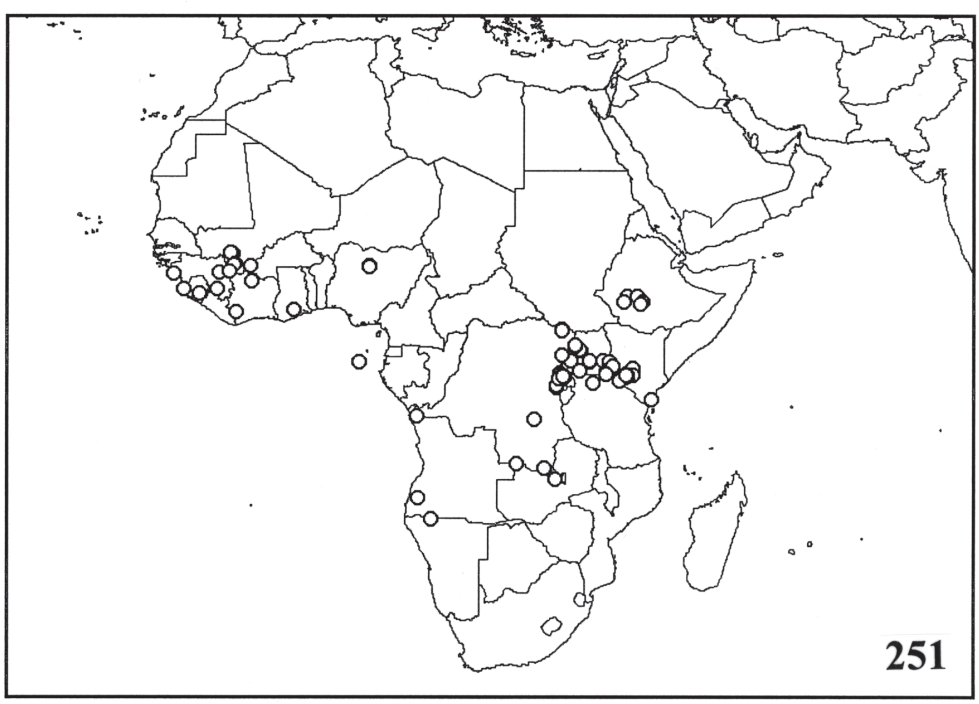
The *gravinotata* subgroup comprises: *C. gravinotata*, *C. nigricornis*, *C. podocarpi* and *C. roubaudi*. They share the following characters: Host plants *Podocarpus* spp. (Podocarpaceae); aculeus tip with lateral margin concave (Figs. 28, 29); male midtibia dilated in feathered part (in *C. gravinotata* and *C. podocarpi*). All species are restricted to East and South Africa. The only exception being the type locality of *C. roubaudi*, described from Congo Brazzaville (but see De Meyer (1998) for discussion on the identity of *C. roubaudi*).

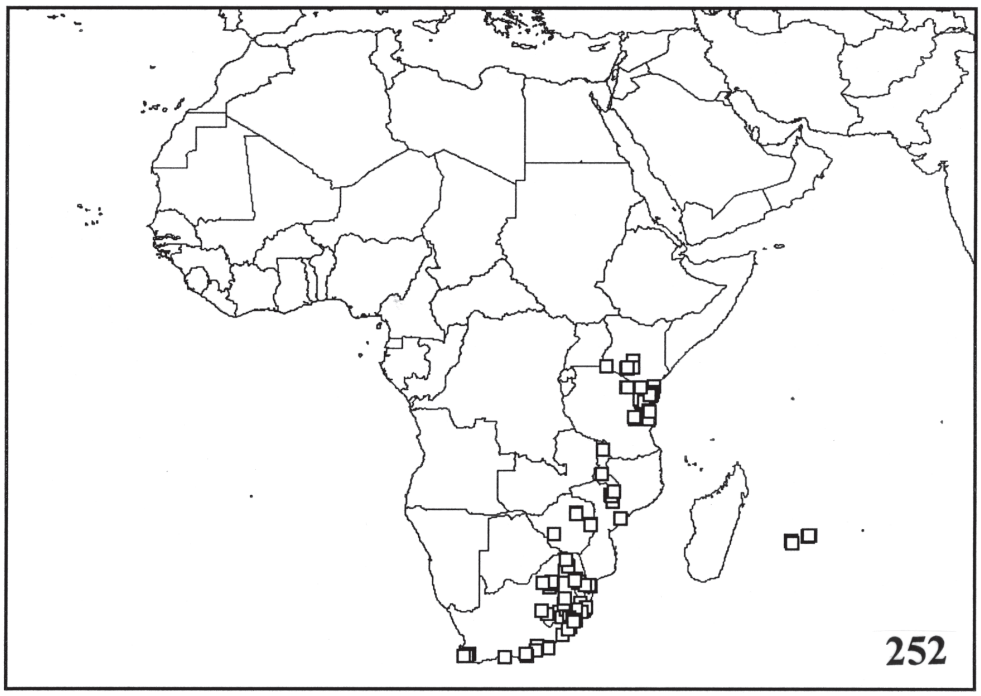
The *anonae* group is characterized by the postpronotal lobe not spotted, scutal pattern with indistinct streaks and stripes, scutellum usually with the black spots being more restricted or reduced, midleg of male usually with black feathering, and aculeus tip bilobed except for *rubivora* in which it is almost acute. It is the largest group and the most difficult to identify, especially because the females are very similar to each other. The leg feathering in the male is varied, from only distally to almost along the entire dorsal and ventral length of the midtibia, plus ventrally on the midfemur. The tibia is sometimes flattened and covered by long setulae anteriorly. Two subgroups are recognized:

The *colae* subgroup is characterized by the very long aculeus, and host plants mainly *Cola* spp. (Sterculiaceae). The group comprises *C. acicularis*, *C. colae*, *C. lepida*, *C. paracolae*, and *C. penicillata*. Three species (*C. colae*, *C. lepida* and *C. paracolae*) form a distinct unit, based on the feathering of the male midfemur (feathered ventrally except for a median gap), and the partly darkened mouthparts. *Ceratitis acicularis* and *C. penicillata* are perhaps sister species based on the elongated male surstyli (Figs. 222-223). All species are restricted to western and Central Africa.

The species of the *anonae* subgroup are grouped primarily by not belonging to any of the other groups. They have a shorter aculeus, and several of them are polyphagous. No synapomorphies are known. This subgroup comprises *C. anonae*, *C. barbata*, *C. fasciventris*, *C. morstatti*, *C. obtusicuspis*, *C. rosa*, *C. rubivora*, *C. stipula* and *C. tripteris*.

Both subgroups (*colae* and *anonae*) have a similar pattern of feathering in at least the





Figs. 251-252. Distribution patterns (only localities with known geographical co-ordinates). 251. *Ceratitis fasciventris*. 252. *C. rosa.*

majority of species: midtibia flattened, dorsally and ventrally feathered over, or almost over, the entire length; partly darkened with weak silvery shine in patches.

The newly described *C. argenteostriata* might also belong to the *anonae* subgroup, as it is similar to *C. rubivora* in aculeus shape, wing pattern and midleg feathering. *Ceratitis fulicoides* and *C. flexuosa* may also belong to the *anonae* group, based on the unspotted postpronotal lobe and scutal pattern. Both species further share a more or less extensive reduction of the apical scutellar spots and the wing bands. However, they differ in other important aspects, such as aculeus shape and male feathering, which makes their inclusion in a separate subgroup uncertain. The newly described *C. flava* seems to belong to the *anonae* group based on leg feathering, but this placement requires additional support. Another newly described species, *C. whitei*, has a very similar pilosity on the foreleg to that of *C. tripteris*, but differs from the latter in other leg feathering and the aculeus shape.

Both *C. copelandi* and *C. tananarivana* have highly modified legs with the foretibia flattened and covered by white setulae, and the midtibia more or less club shaped. *Ceratitis copelandi*, however, has the postpronotal lobe unspotted, while in *C. tananarivana* it is spotted albeit weakly. They seem to be closely related to each other, but their position among the other groups and subgroups remains to be settled.

The position of *C. melanopus*, also belonging to the *anonae* group, is unclear, and this species is currently not placed in any of the subgroups.

As indicated above, the females of some species of the *anonae* subgroup are very difficult to differentiate. Some unique characters of the aculeus shape enable us to recognize some related species, such as *C. obtusicuspis* and *C. stipula*. However, *C. anonae*, *C. fasciventris* and *C. rosa* especially are difficult to separate from each other. Our study of long series of aculeus shapes of these species did not result in any clear cut differences that can unambiguously be used to differentiate them. However, a number of other characters that individually show a limited degree of variation might be useful if considered collectively and should enable a fair degree of acuracy in determination. The main characters concerned are:

– Pilosity on forefemur posteriorly: the small setulae between the posterior row of stouter setulae and the ventral setae can be either pale or dark. This character can be extended to the general pilosity of the femora (in particular on the midfemur anteriorly).
– Coloration of the anepisternum: the ventral part of the anepisternum is usually darker than the dorsal part, and the extent of darkening (ventral margin, 0.33, or half) varies.
– Pilosity of the anepisternum: the pilosity is usually pale. Some species have darker setulae along some of the margins.
– Basal spots on scutellum: these can be well defined and developed, or largely absent.
– Abdominal tergite 3: this tergite has a black band along the posterior part. The width of the band can vary, as well as other properties (well defined, or patchy and gradually merging into yellow anterior part).

Below the combinations of the above characters are given for *C. anonae*, *C. fasciventris* and *C. rosa*, as well as for other related species which might be confused with these three.

C. acicularis: ventral 0.25 of anepisternum darker brown, at most in posteroventral corner with few darker setulae; scutellum without basal spots, femora sometimes yellow or orange; forefemur with dark setulae basally between ventral setae and posterior row of setulae; midfemur anterobasally with dark pilosity, ventrally with longer dark setae, abdominal tergite 3

with distinct brown band; oviscape as long as, or longer than, preabdomen.

C. anonae: ventral half of anepisternum darker brown, on ventral part with few darker setulae; scutellum usually without basal spots, femora sometimes darkened (variable); forefemur with dark setulae basally between ventral setae and posterior row of setulae; midfemur anterobasally with dispersed dark pilosity, ventrally with longer dark setae, abdominal tergite 3 with distinct brown band; oviscape shorter than preabdomen.

C. barbata: ventral 0.25 of anepisternum yellowish brown, pilosity pale, at most few dark setulae along ventral margin posteriorly; scutellum without basal spots; femora darkened; forefemur with dark setulae basally between ventral setae and posterior row of setulae; midfemur anterobasally with short, dark setulae, ventrally with longer dark setulae; abdominal tergite 3 with distinct brown transverse band along posterior half; oviscape as long as or longer than preabdomen.

C. colae: ventral half of anepisternum darker brownish black, on ventral part with dark setulae extending dorsally almost to anepisternal seta; scutellum without basal spots; femora slightly darkened; forefemur with dark setulae basally between ventral setae and posterior row of setulae; midfemur anterobasally with dispersed dark pilosity, ventrally with longer dark setae, abdominal tergite 3 with distinct brown band; oviscape about as long as preabdomen.

C. fasciventris: ventral half of anepisternum darker yellow or brown, pilosity entirely pale; scutellum usually without basal spots (variable); femora yellowish, forefemur with pale setulae basally between ventral setae and posterior row of setulae; midfemur anterobasally with dispersed pale pilosity; ventrally with longer pale setae; abdominal tergite 3 with distinct brown band; oviscape shorter than preabdomen.

C. morstatti: ventral 0.33 of anepisternum darker yellowish brown, on ventral part with dark setulae along ventral margin; scutellum without basal spots; femora dark yellow; forefemur with dark setulae basally between ventral setae and posterior row of setae; midfemur anterobasally with dark pilosity, ventrally with longer dark setae, abdominal tergite 3 with very distinct small brown band; oviscape about as long as preabdomen.

C. obtusicuspis: ventral 0.25 of anepisternum darker yellow, pilosity entirely pale (rarely few dark setulae along ventral margin); scutellum without basal spots; femora only slightly darker yellow; forefemur with dark setulae basally between ventral setae and posterior row of setulae; midfemur anterobasally with dispersed dark pilosity, ventrally with longer dark setae, abdominal tergite 3 with patchy brown band; oviscape shorter than preabdomen.

C. paracolae: ventral 0.25-0.33 of anepisternum darker brown, medioventrally with few darker setulae; scutellum without basal spots; femora yellow or orange; forefemur with dark setulae basally between ventral setae and posterior row of setulae; midfemur anterobasally with dark pilosity, ventrally with longer dark setae, abdominal tergite 3 with distinct brown band; oviscape shorter than preabdomen.

C. rosa: ventral half of anepisternum darker yellowish brown colored, pilosity entirely pale; scutellum usually with basal spots; femora yellowish; forefemur with pale setulae basally between ventral setae and posterior row of setulae; midfemur anterobasally with dispersed pale pilosity; ventrally with longer pale setae; abdominal tergite 3 with patchy brown markings; oviscape shorter than preabdomen.

C. rubivora: ventral half of anepisternum darker yellowish orange to brown, pilosity usually completely pale (rarely few dark setulae); scutellum usually with ill defined basal spots, sometimes well developed; femora often darkened (variable); forefemur with pale setulae basally between ventral setae and posterior row of setulae, towards distal end black, occasionally entirely black; midfemur ventrobasally with dark or pale pilosity, ventrally with longer dark or pale setae, abdominal tergite 3 with patchy brown band; oviscape shorter than preabdomen.

C. stipula: ventral 0.25-0.33 of anepisternum darker yellowish brown, pilosity entirely pale; scutellum without basal spot although sometimes darker posterior to prescutellar spots; femora darkened; forefemur with dark setulae basally between ventral setae and posterior row of setulae; midfemur anterobasally with short, dark setulae, ventrally with longer dark setulae; abdominal tergite 3 largely brown (patchily or distinctly) especially at lateral margins; oviscape shorter than preabdomen.

It is advised that female identification, especially of the *anonae* group, should be done in combination with male material, taking into account the geographical origin of the species since they often show only a partial spatial overlap. However, caution should be taken that *Pterandrus* species sometimes co-occur at certain sites and even feed on the same host plants. This is clearly illustrated in series from reared material, as in the case of *C. stipula* and related species (cf. under the former) which were reared from *Myrianthus arboreus* in three different countries in various combinations of two to three different species. Similarly, in Wendo Genet (Ethiopia) *C. gravinotata, C. nigricornis* and *C. podocarpi* co-occurred, infesting the same *Podocarpus* species and even the same individual tree, and in Kenya *C. copelandi* was found together with *C. anonae* and *C. fasciventris* infesting *Synsepalum brevipes.* More in-depth studies are needed to understand the host selection and inter-specific competition among these closely related species.

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